Using immersive virtual reality to help patients with persecutory delusions successfully re-engage with social situations.

J**ohn Grace QC PhD Scholarship 2017:** Department of Psychiatry, University of Oxford, Warneford Hospital, Oxford.

Supervisor: Professor Daniel Freeman

Summary:

Paranoia is when an individual incorrectly thinks that others are out to harm them. Many people have a few paranoid thoughts, a few have many. The severest form is persecutory delusions, when the belief in the thoughts is very strong and distressing. Severe paranoia leads to individuals finding it very difficult to be around other people and therefore withdrawing from social contact. The purpose of the DPhil is to identify the best psychological techniques to help people go back into social situations. Experimental studies will test the effectiveness of five techniques (enhancing self-confidence; developing a compassionate approach to the self; using positive imagery; switching attentional focus away from threat; dropping the use of countermeasures that maintain threat beliefs) for individuals with paranoid thoughts when they go into identical social situations presented using the latest virtual reality technology. The most effective technique will then be tested in patients with persecutory delusions in the context of schizophrenia. This methodological approach will enable recommendations to be given to patients about how to reengage with social situations.

Research Student: Poppy Brown

Poppy completed her undergraduate degree in Psychology and Philosophy at Corpus Christi College, Oxford. She is committed to conducting research into mental health. She published a policy paper on student mental health on behalf of the Higher Education Policy Institute in September 2016 and her final year research project investigated self-criticism in Social Anxiety Disorder. She enjoys volunteering for a number of charities including Oxfordshire Mind and Schools Plus.

Start Date: September 2017

Scientific Goal:

The scientific goal is to identify the most helpful psychological strategies for patients with persecutory delusions to be less paranoid and more meaningfully engaged in everyday social situations.

Progress Report Year 4, 2021

My thesis aims to show that taking a more targeted approach in the early stages of treatment development is important for improving outcomes for patients with psychosis, in particular those experiencing paranoia. In my first two years I systematically assessed the current extent of causal evidence concerning the occurrence of paranoia, and conducted a series of novel experimental studies that aimed to reduce paranoia, via therapeutic techniques targeting a certain aspect of negative cognition. In my latter two years I explored to what extent inter-personal experiences may contribute to the development of negative cognition and thus paranoia, and then qualitatively explored the potential of using virtual reality technology to increase the provision of evidence based psychological therapy on inpatient psychiatric wards. I am pleased to report that in July I handed in my thesis and have my Viva examination scheduled for the end of September. I will then take up my place as a trainee Clinical Psychologist at the Oxford Institute of Clinical Psychology Training.

I had planned to spend much of the last year running the qualitative study on inpatient wards, where I would visit five mental health trusts across the UK to run focus groups with patients and staff. However, for a full 14 months I was unable to visit any wards. I therefore spent time working in a number of other areas.

Firstly, I was fortunate to go on secondment to the civil service, working in the Mental Health Policy Team of the Department of Health and Social Care. This was a fantastic opportunity to contribute to a range of projects, including a cross-governmental response to the mental health needs of the population during the pandemic, the provision of mental health crisis care during the pandemic, and drafting guidance for statutory changes to the Mental Health Act. I wrote a number of evidence notes for the Secretary of State for Health, Matt Hancock, and worked as the private secretary for the Minister of State for Patient Safety, Suicide Prevention, and Mental health, Nadine Dorries. I also led our team's engagement with stakeholders, using this opportunity in particular to try and increase our engagement with experts by experience in mental health.

Secondly, I ran a qualitative project that explored concerns and mistrust regarding the COVID-19 vaccines. More specifically, I explored individuals' concerns about the speed of vaccine development and identified what would increase participants' confidence in the vaccines. This formed part of a programme of work conducted by my team to explore and understand vaccine hesitancy, given the significant current public health implications.

Over the summer I am looking forward to attending the League of European Research Universities (LERU) Doctoral Summer School, to which I was fortunate to be awarded a place. This year's theme focusses on the role of the 'Expert' in science and policy, which I hope will complement the knowledge and experience I gained while working in the Department of Health.

Progress Report Year 3, 2020

Psychosis is characterised by a collection of different experiences, most commonly including paranoia (unfounded ideas that other people intend you harm) and hallucinations (sensory experiences in the absence of the relevant external stimulus). My research aims to help develop greater precision in our understanding of the causes of, and treatments for, paranoia.

In my first two years I conducted a systematic review of the literature and several experimental studies. The first experimental study tested an intervention to increase self-compassion in 100 individuals from the general population with elevated levels of paranoia, and a second tested an intervention to increase compassion for others. Both studies randomised participants to a guided compassionate imagery exercise, or a neutral control imagery exercise. Individuals practised their imagery in immersive virtual reality (VR) social situations, and their level of mistrust towards the VR avatars was assessed. Analysis of the results showed that both interventions significantly increased compassion (for the self and others in each study respectively), and significantly reduced paranoia. The findings suggest that these interventions warrant testing in patients suffering from more severe levels of paranoia. A third experimental study tested an intervention to increase feelings of power through manipulation of body posture. This study found that manipulating body posture had only very small effects on increasing feelings of power, and no subsequent effect on reducing paranoia, suggesting this intervention is not a valuable one to pursue.

Since then, I have run some analysis assessing the relationship between certain parenting behaviours and paranoia. To do so I used network analysis, a technique which I learnt through attending a course in Amsterdam last year with the generous support of MHRUK. My analysis found strong connections between parenting behaviours (such as over-control and abuse), paranoia, and cognitive affective variables (such as anxiety and low self-esteem). Many of these relationships had not previously been assessed, so this work represents an important step towards delineating the association between certain environmental variables and paranoia.

I have also recently begun recruitment for a qualitative study that aims to assess the barriers and facilitators to having virtual reality cognitive therapy on psychiatric wards. The

gameChange trial, led by my Supervisor Daniel Freeman, is currently testing the effects of VR therapy on over 400 individuals being seen in NHS out-patient services for psychosis. However, we know little about whether such a therapy could also be used on inpatient wards. I am therefore visiting five NHS mental health trusts across the UK to conduct focus groups with NHS staff and patients on wards. In the focus groups I demonstrate the VR therapy and then get feedback from staff and patients as to whether they think the therapy would be helpful and feasible to have on the wards. The results will enable us to know far more about whether, and how, VR therapy could be used within psychiatric hospitals.

MHRUK also kindly supported me to attend the annual symposium of the Association for Behavioural and Cognitive Therapies (ABCT), which took place in Atlanta in November. I presented my work on compassion interventions to reduce paranoia, and was fortunate enough to receive the ABCT Student Travel Award for my abstract.

Progress Report Year 2, 2019

Psychosis is characterised by a collection of different experiences, most commonly including paranoia (unfounded ideas that other people intend you harm) and hallucinations (sensory experiences in the absence of the relevant external stimulus). Treatments for psychosis are limited both in efficacy and accessibility. My research aims to help solve this problem by combining a three pronged approach.

Firstly, my focus is specifically on the individual experience of paranoia rather than 'psychosis' as a whole, as this enables a far richer understanding of the experience itself. Secondly, I am conducting several intervention studies that allow for causal conclusions to be drawn about the factors that cause and maintain paranoia, rather than using study designs that yield only correlational data. Finally, I am using virtual reality (VR) technology, as this allows me to expose individuals experiencing paranoia to social situations in a controlled setting where they can practice techniques to overcome their fears.

In my first year I conducted a systematic review of the literature and tested an intervention to increase self-compassion in 100 individuals from the general population with elevated levels of paranoia. Since then I have now tested another intervention, this time to increase compassion for other people, on another 100 individuals with elevated paranoia. Both studies randomised participants to a guided compassionate imagery exercise, or a neutral control imagery exercise. Individuals then further practised their imagery in virtual reality situations, and I assessed their level of mistrust towards the VR avatars. Analysis of the results showed that both interventions significantly increased compassion (for the self and others in each study respectively), and significantly reduced paranoia. The findings suggest that these interventions warrant testing in patients suffering from more severe levels of paranoia. I am now close to finishing recruitment for a third study that aims to reduce paranoia via increasing feelings of power. To increase feelings of power I am using a

manipulation of body posture, commonly known as 'power posing'. While many of the reported effects of power posing are controversial, it has repeatedly been shown that power posing increases feelings of how powerful one feels. Therefore I am testing whether increasing such feelings has any effect on paranoia, again using immersive VR environments.

I am also in the process of setting up a large scale qualitative study that aims to assess the barriers and facilitators to having Virtual Reality cognitive therapy on psychiatric wards. The gameChange trial led by my Supervisor Daniel Freeman is currently testing the effects of VR therapy on over 400 individuals being seen in NHS out-patient services for psychosis. However, we know little about whether such a therapy could also be used on inpatient wards. I will therefore be visiting five sites across the UK to conduct focus groups with NHS staff and patients on wards. I will demonstrate the VR therapy and then get feedback from staff and patients as to whether they think the therapy would be helpful and feasible to have on the wards. The results will enable us to know far more about whether, and how, VR therapy could be used within psychiatric hospitals.

I have also been fortunate this year to attend a statistics course focusing on network analysis. This course is helping me to analyse cross-sectional data I have collected that measures a number of variables such as compassion, paranoia, anxiety, depression, self-esteem and parental behaviours. In November I will also be speaking about my work as part of a symposium at the Association for Behavioural and Cognitive Therapies conference in Atlanta.

Progress Report Year 1, 2018

Psychosis is characterised by a collection of different experiences, most commonly including paranoia (unfounded ideas that other people intend you harm) and hallucinations (sensory experiences in the absence of the relevant external stimulus). Treatments for psychosis are limited both in efficacy and accessibility. My research aims to help solve this problem by combining a three pronged approach.

Firstly, my focus is specifically on the individual experience of paranoia rather than 'psychosis' as a whole, as this enables a far richer understanding of the experience itself. Secondly, I am predominantly conducting manipulation studies that allow for causal conclusions to be drawn about the factors that cause and maintain paranoia, rather than using study designs that yield only correlational data. Finally, I am using virtual reality (VR) technology, as this allows me to expose individuals experiencing paranoia to social situations in a controlled setting where they can practice techniques to overcome their fears.

My research began by conducting a systematic review of the literature in order to identify all studies that used some sort of manipulation of a psychological mechanism and

measured the effect of this manipulation on the experience of delusions or hallucinations. It is this type of study that allows causal, rather than correlational, inferences to be made. I found only 41 such studies, predominantly looking at mechanisms such as self-confidence, attention biases, sleep, worry, and negative affect. An area that seemed to have not have received much attention was compassion.

Feeling that the self is vulnerable and holding core beliefs that other people are inherently hostile and dangerous are two things that are thought to lie at the heart of paranoia. It seems feasible that increasing compassion for the self would help to reduce feelings of vulnerability, and increasing compassion felt towards other people would help increase the flexibility of core beliefs concerning other people as hostile and threatening, thus reducing paranoia. These two hypothesis are what my first two studies aim to test.

I have just completed testing on 100 individuals from the general population reporting paranoid thoughts who were randomised to complete guided imagery that either aimed to increase self-compassion or that was entirely neutral in affect. The self-compassion imagery task involved creating a 'compassionate coach', an ideal image unique to each individual that embodies all the components of compassion and confidence and who can provide support in difficult situations. Individuals then practised using their compassionate coach in virtual reality situations, and we assessed their level of mistrust towards the VR avatars. Analysis on the results is currently underway.

A second study will use a similar design but instead use elements of Loving Kindness Mediation in order to foster compassion felt for other people, rather than the self. The imagery exercise will likewise be practised in VR social situations and be compared to a neutral imagery condition, in order to measure the effect of the intervention on paranoia.

In the future I will conduct another study using a third different kind of psychological intervention and measure its effect on levels of paranoia experienced in VR. I will then also conduct a clinical trial on whichever VR intervention is found to be most successful in order to see the whether it is similarly effective on the clinical population experiencing more severe paranoia.

Meanwhile I am collecting cross-sectional data from the general population that will enable analysis of the associations between the experience of paranoia, compassion for the self, compassion for others, and feelings of vulnerability and safety. Alongside this I am doing some analysis on a large existing dataset on whether certain aspects of parenting e.g. levels of care protectiveness are associated with paranoia. Both feelings of vulnerability and beliefs about the world as hostile may stem from certain aspects of parenting but this, to our knowledge, has not previously been looked into.