1. Pathways to psychosis: examining whether potentially modifiable cognitive processes mediate the effect of childhood trauma on psychosis

**Supervisors:** Stan Zammit, Professor of Psychiatric Epidemiology, School of Social & Community Medicine, University of Bristol; Dr Jon Heron, Senior Research Fellow in Statistics, School of Social & Community Medicine, University of Bristol; Dr Christoph Teufel, Lecturer in Cognitive Neuroscience, School of Psychology, Cardiff University

**Background**

Psychotic disorders such as schizophrenia are serious illnesses that have a substantial impact on individuals, their families, and the population. Whilst the incidence of such disorders is too low to study in longitudinal/cohort designs, psychotic experiences (e.g. hearing voices) that exist on a continuum with clinical disorders, occur much more frequently within the population and can be used to study the effects of childhood/adolescent exposures on psychosis.¹

Traumatic stress and victimization are more common in people with schizophrenia/psychotic experiences than in the general population. However, few studies have had longitudinal data to study long-term effects of trauma, whether critical periods of risk exist, or examine mechanisms by which such adversity leads to psychosis.²

Whilst the theory of dysregulated dopamine activity remains the most empirically supported aetiological model for psychosis, recent formulations of this theory emphasise the important impact of trauma on this pathway to psychosis.³ Traumatic stress leads to mesocorticolimbic dopamine hyperactivity and behavioural sensitisation in animal models, supporting a conceptual model whereby trauma impacts upon biological processes underlying schizophrenia.

It is not clear however how this dysregulation results in hallucinations or delusional beliefs. Theories developed within the field of cognitive neuroscience go some way towards answering this, particularly in relation to deficits in source-monitoring, reasoning biases, and errors in predictive processing.⁴ A particularly promising avenue of cutting-edge research in this area is the use of computational models to precisely characterise cognitive profiles and provide the basis for sophisticated neurocognitive phenotyping. Identifying such cognitive mechanisms is of great clinical importance as they are potentially modifiable and could be the focus for preventive interventions for psychosis.

**Aims**

This project cuts across the complementary disciplines of epidemiology, statistics, and cognitive neuroscience. The overall aim of the project is to understand the relationship between childhood traumatic experiences and adult psychotic outcomes, and to identify modifiable cognitive processes that might mediate this relationship and explain how biological/psychological effects of trauma lead to people hearing voices or developing paranoid beliefs.

**Methods**

This project will utilise a wealth of data from approximately 5,000 individuals within the Avon Longitudinal Study of Parents and Children (ALSPAC) birth cohort; one of few studies worldwide with appropriate data to examine this research question. The doctoral student will learn about epidemiological and statistical approaches applicable to longitudinal data analysis, including
multivariate regression, structural equation modelling, mediation analysis, multiple imputation, and computational modelling of cognitive data.

The PhD student will be supported by a strong team of post-docs with expertise in complex statistical modelling and causal analysis methods (headed by Jon Heron), and will be part of the Psychosis Research Group and the Psychiatric Epidemiology Group within the Centre for Academic Mental Health, both of which meet monthly to discuss methodological issues and analytical problems.

Keywords: Psychosis; traumatic stress; epidemiology; cognitive neuroscience; statistical modelling

References


2. Depressive symptoms and poor wellbeing among school teachers: identifying risk factors, and exploring the association with student mental health and self-harm behaviour

Supervisors: Judi Kidger, Becky Mars, David Gunnell. Collaborator: Rhiannon Evans, Cardiff University

Background
Secondary school teachers are at elevated risk of psychological distress and poor wellbeing [1]. A recent survey of 555 teachers in the Bristol area found 19.4% had evidence of moderate to severe depression (a score of 10 or more on the 9-item Patient Health Questionnaire) and a mean wellbeing score on the Warwick Edinburgh Wellbeing Scale (WEMWBS) of 47.2 (SD 8.8) [2]; approximately four points lower than that of the general working population [3]. Such problems may lead to long term mental disorder, as well as sickness absence, presenteeism and early exit from the profession [4]. This has implications not only for teachers’ own health, but for the quality of staff-student relationships and for student health. Teachers with poor mental health have been reported to find it difficult to manage classes effectively, and to develop supportive relationships with students [5]. Difficult teacher-student relationships in secondary school predict psychiatric disorder and exclusion from school three years later [6]. Young people in the UK have amongst the worst wellbeing in Europe [7] with almost 10% having a clinically diagnosed mental health condition [8], and as many as 18% of 16-17 year olds engaging in self-harm behaviour [9]. Teachers have more contact with students regarding mental health issues than any other professional, and supportive relationships with teachers have been associated with lower depression and self-harm in the teenage years [10, 11]. However, teachers themselves report that experiences of stress and distress render them less capable of providing students with the support they need [12]. Few previous studies have examined risk factors for poor teacher mental health, particularly in the context of ever-increasing performance management, and changes to the governance of schools in England and Wales. There is also a lack of evidence regarding the association between teacher and student mental health, and the school contextual factors that are likely to have an impact on both. With regard to self-harm and suicidal behaviour in particular, many teachers express concern about such behaviours. However, no study has examined the impact of encountering and supporting students who self-harm on teacher wellbeing and emotional health, or the response of schools more widely in terms of support provided to staff and students in the event of serious self-harm. This PhD will be nested within a £1.3 million NIHR funded cluster randomised controlled trial (RCT) ‘the WISE study’ – a collaboration between the Universities of Bristol and Cardiff evaluating an intervention aiming to improve the mental health support and training available to secondary school teachers. The PhD will make use of data collected as part of the WISE study, and generate new data, incorporating quantitative and qualitative methodologies to address the gaps in the knowledge base identified above.

Aims
The candidate will have access to data from 25 secondary schools, and approximately 1250 teachers and 3750 students, to answer the following questions:
1. What school processes, policies and features are risk and protective factors for poor teacher wellbeing and depressive symptoms?
2. Is there an association between teacher and student mental health? What are the potential explanations for this, taking contextual factors into account?
3. What is the impact of student self-harm or suicidal behaviour on teacher wellbeing and depressive symptoms, and how do schools respond to such behaviours?

Methods
1. Qualitative analysis of data collected from WISE study schools as part of an audit regarding mental health relevant policies and activities, and development of a variable list for use in the analyses below

2. Multilevel multiple regression analyses of factors associated with teacher wellbeing and depressive symptoms (measured via self-report questionnaires), focusing on i) variables identified in point 1 ii) school-level features e.g. size, SES catchment, Ofsted rating and Academy status

3. Multilevel multiple regression analyses of the association between teacher wellbeing and depressive symptoms and i) student wellbeing and mental health difficulties (measured via self-report questionnaires), and ii) student self-harm / suicidal behaviour (as reported by teachers). Examination of potential explanatory factors of any association, focusing on i) quality of teacher – student relationships ii) school context variables

4. Qualitative case studies of schools within the WISE sample found to have high rates of student self-harm and/or suicide attempts, to examine the impact of such behaviours on teachers’ emotional health, and the response of schools to such behaviours in terms of support offered to staff and students, changes to policies etc.

**Key words:** mental health, self-harm, secondary school teachers, adolescence, school context, mixed methods

**References**


3. The impact of maternal mental-health on learning infant preferences: Computational model-based analysis of maternal responses

Supervisors: Dr. Rebecca Pearson, Dr. Casmir Ludwig (Experimental Psychology); Dr. Paul Moran
Collaborators: Dr. Kate Button, Bath University & Improve Perinatal Mental Health Integration Team

Background
Maternal mental-health disorders are associated with long-term risks to offspring’s health as well as academic achievement. These effects appear to be mediated by difficulties in the interaction between parent and offspring. However, the precise mechanism underpinning these difficulties has not yet been elucidated. Disruption to particular cognitive processes, such as learning and decision-making, in mentally ill mothers may underlie difficulties in parent-child interactions. However, this has not been previously investigated.

Aim
The aim of this PhD is to use computational modelling techniques to understand maternal cognitive disturbances in mentally ill mothers and provide novel intervention targets.

As a first step to exploring dysfunctional decisions, the proposed PhD would explore maternal decisions in a simple computerised learning task. The task involves mothers choosing pictures of toys in order to evoke as many happy baby faces as possible. The task is programmed so that the probability that each picture elicits a happy or sad baby face changes over time, but in a predictable pattern.

Standard analysis of this task, focusing on individual responses (e.g. number of times a mother chooses a particular toy), cannot easily identify which underlying cognitive processes are maladaptive. For example, two mothers may both choose a toy 50% of the time, but one mother may choose that toy for the first 50% of trials and the other chooses the toy intermittently. Therefore, in this project, we will look at the overall pattern of responses and how they interact with each other, looking at the influence of the order of responses and changes to responses over time using a ‘model-based analysis’ of observed decision patterns. Following on from this simple scenario the PhD would aim to apply this models to more complex tasks and real life maternal responses.

The PhD will investigate which of a number of hypothesised representations or ‘models’ best fit the observed patterns in actual responses made by healthy mothers and mothers suffering from mental illness:

1. Adaptive responses to maximise positive outcomes (i.e., happy baby) in a classic win-stay loose-shift approach (mothers make choices based on learnt probabilities and responses correlate well with underlying probabilities)
2. Failure to update (mothers stick with early successful responses and do not shift based on new feedback)
3. Catastrophic response to negative feedback (negative feedback [crying baby] will be over weighted in decisions and mothers will abandon adaptive decisions at first sign of a sad baby rather than waiting to see if the change in baby preference is found over a number of trials).
4. Impulsive decisions (mother shift between responses without incorporating feedback, in other words the responses show little relationship with the baby feedback or underlying probabilities)
We hypothesise that different models will best fit data from the task in mothers with and without different aspects of psychopathology. For example, we hypothesis that while healthy mothers will show the adaptive learning styles, based on literature of hypersensitivity the negative feedback in anxiety, anxious mothers will show a catastrophic pattern and, based on literature of faulty decisions making in personality dysfunction, mothers with personality disorders will show the inflexible pattern or the impulsive pattern.

Methods
The proposed PhD would consist of the following stages:

(i) Final refinement of the maternal learning task, adapting existing paradigms developed by the research team and development of a learning task with baby and non-baby stimuli to understand the specificity of the decision making to the maternal context.

(ii) Data collection using the computerised tasks in samples of healthy and mentally ill mothers. Power calculations will be based on initial pilot work of variations in response patterns.

(iii) Development and implementation of models described above and fitting the data from the tasks to estimate parameters of learning and decision-making processes that best account for the data.

(iv) Development of a real-world mother-child interaction situation to which the hypothesised decision making models described above may be applied. For example, real life choice of toys in a video-taped mother-child interaction.

(v) Consideration of application to interventions through public engagement focus groups.

More detailed understanding of the underlying mechanisms involved in producing maladaptive parental decisions will open up novel intervention targets for different populations of mothers experienced different mental health problems. Different intervention strategies may be called for if problems are associated with different aspects of dysfunctional decision making.

Keywords: Maternal Mental health; Learning; Computational modelling; Psychology

References
Daw et al 2006, Cortical substrates for exploratory decisions in humans Nature 441, 876-879
4. Through babies’ eyes: Observed mother, father and infant interactions at home using wearable technology and adaptation to therapeutic interventions.

**Supervisors:** Dr Rebecca Pearson and Dr. Iryna Culpin

**Collaborators:** Marc Bornstein NICHD, Prof Alan Stein Oxford

**Background**

There is substantial evidence from animal and human studies that parent-infant interactions, and the quality of the early life environment, are associated with long-term child outcomes, including mental and physical health and academic achievement. However, what specific aspects of parental behaviour are important or how to change them through interventions is less clear. Research into the causes and consequences of variations in parenting is important for determining how family interactions might be modified to improve long-term health and wellbeing in children. However, a central issue is that ecologically valid measurement of parental behaviour is difficult. The current gold standard is to observe behaviour in a play setting either at home or in a research or clinical setting, however, this is generally recorded by one or more cameras operated by a third party (i.e., a researcher). Mothers may respond differently to the presence of a researcher, thus, these snap shots of behaviour are likely to be biased.

**Aim 1**

The aim of this PhD is to utilise advancements in technology to develop novel methods for collecting and coding parental behaviour on a larger scale and in a more ecologically valid way using wearable technology. Specifically, using cameras worn on headbands [first-person cameras (1st PCs)] to record first-person points of view of the mother, father and infant simultaneously, leaving the families alone with the 1st PCs for a number of days to record interactions and naturally occurring parenting behaviour at home.

This will advance our understanding of parenting behaviours. This is important because although parenting emerges as a key risk factor for a number of adverse child outcomes, there is strong evidence to suggest that it is modifiable by interventions (Bakermans-Kranenburg et al., 2003). For example, therapeutic interventions known as ‘video-feedback’ have previously been shown to be effective in improving mother-infant interactions in a range of populations, including adolescent mothers, mothers with schizophrenia, and mothers with poor attachment styles (Bakermans-Kranenburg, van et al. 2003) and improving early father-infant interactions (Lawrence et al., 2013). This therapeutic approach consists of video feedback intervention sessions in which parents are recorded interacting with their infants in a naturalistic free-play session. These recordings are then discussed with a mental health professional, and mothers are encouraged to observe their own sensitive and insensitive behaviours, thereby improving their observational skills and empathy. Any sensitive behaviours displayed by the mother are supported and are used as examples to contrast with instances in which insensitive behaviours are displayed. This means that each mother acts as her own model. A key focus of video feedback is ‘mind-mindedness’, which refers to the mother’s ability to see the world from her baby’s view point and thus respond to the baby’s emotional needs.

1st PCs would be particularly useful in facilitating mind-mindedness as the infant’s actual viewpoint is captured during mother-infant interactions, enabling mother’s better understanding of their infant’s world and their infant’s perceptions of that world. In addition, the majority of early parenting interventions have exclusively focused on intervening with mothers and infants, with relatively little regard to the role of fathers. This approach, however, is against an increasing body of evidence emphasising the unique importance of fathers’ engagement in their children’s socioemotional and behavioural development (Cummings et al., 2005, Tamis-LeMonda et al., 2004). Aim 1 in this project...
will provide unique insights into specific aspects of father-infant interactions that may be different from mother-infant interactions.

**Aim 2:**
The second aim of this PhD project is to apply 1st PC video feedback approach to potential therapeutic applications by allowing mothers and fathers to see the world from their infant’s viewpoint and each other’s.

**Method**

**Aim 1:** This project will involve in-depth analysis of observed video data from naturalistic recordings of parent-infant interactions using wearable technology which records mother, father and infant data from ‘head cams’ in Children of the Children of the 90s (CoCos90). Families of 6 month old infants will be given the cameras and asked to wear them during routine activities such as meal times and bedtimes. The videos are then returned and footage analysed. This PhD project will build on existing observational coding methods to represent interactive parenting behaviours and identification of precursors of parent-child conflictual interactions utilising specifically designed observer software.

**Aim 2:** The project will also involve adaption of the 1st PC recording method in therapeutic ‘video feedback’ interventions for conflictual family interactions through facilitating mothers’ and fathers’ ability to see their interactions through their babies and each other’s. The Student will be involved in working with local patient and public involvement groups in the context of parental mental health difficulties and universal services such as children centres. This will involve a series of focus groups and qualitative interviews to assess views of wearing the headcams for these purposes. There will be 2 main objectives: to understand the acceptability of using 1st PC cameras and feasibility of this approach within a family context.

**Keywords:** Parenting, technology, developmental psychology, mental health, epidemiology

**References**


5: Understanding the role of dysfunctional personality traits in mothers, fathers and offspring in relation to mental health, relationships and employment.

Supervisors: Dr. Rebecca Pearson Dr. Paul Moran and Dr.Hannah Jones

Background
Parents have a substantial influence on the development of their children. Variations in parental (especially maternal) mental health and behaviour have consistently been shown to predict a broad range of child outcomes including mental and physical health as well as academic achievement and success (Stein et al 2014). However, to date, some key parental characteristics remain relatively overlooked. One prominent candidate is parental personality. The American Psychological Association defines personality as ‘individual differences in characteristic patterns of thinking, feeling and behaving’. Personality determines behaviours towards others, and so aspects of parental personality that are less functional in the role of parenthood likely exert negative influences on the development of children. However the relationship between maternal and paternal and offspring personality especially dysfunctional aspects of personality, have not be explored, but could play an important role in the health and development of children. Differential aspects of parental personality and the combinations between maternal and paternal personality are also likely to be associated with different domains of offspring development and this can inform more targeted interventions. During the PhD a number of hypotheses can be explored.

Aim
The PhD will explore intergenerational associations between personality, and the relationship between maternal and paternal personality traits (and their combination), and offspring, personality, mental health risk and functional outcomes such as employment, educational achievement and intimate relationships. The mechanisms to explain any associations will also be explored looking at parenting and genetic pathways:

Method
The PhD will utilise longitudinal data from approximately 15,000 families in ALSPAC and will include analysis of measures of personality traits in mothers, fathers and offspring as well as follow up data on offspring mental health, relationships and achievement up to early adulthood. The student will utilise a number of statistical and epidemiological techniques which the student will learn through training courses in the School and through supervision.

Parenting Pathways: The PhD will explore the association between maternal and paternal personality traits and different aspects of parental behaviour (i.e., conflict, stimulation or warmth) by using detailed measures of self-reported parenting in ALSPAC. In a second step the mediating role of different aspects of parental behaviour will be tested using mediation using path models and causal mediation techniques. Genetic Pathways: We will also explore the role of genetic pathways utilising molecular genetic data in both mothers and children in ALSPAC. The student will use data from published Genome Wide Association Studies reporting genetic correlates of personality traits such as neuroticism (Smith et al 2016) and dysfunctional traits related to borderline personality disorders (Lubke et al 2014) to generate polygenic risk scores (aggregate scores of thousands of risk alleles which previous studies find correlate with the phenotype in question) in ALSPAC in both mothers and children. The student will separate out genetic risk into that which is and is not transmitted from mother to child, deriving polygenic risk scores for transmitted and non-transmitted risk. These scores will then be used to test the role of genetic and environmental pathways in the associations between maternal and child personality and mental health and functional outcomes.

References


Lubke, C Laurin, N Amin, JJ Hottenga, G Willemsen, G van Grootheest, A Abdellaoui, LC Karssen, BA Oostra, CM van Duijn, BWJH Penninx, and DI Boomsm: Genome-wide analyses of borderline personality features Molecular Psychiatry (2014) 19, 923–929


**Supervisors** Dr. Rebecca Pearson and Dr Deborah Caldwell
Key internal collaborators: Dr Nicky Welton, Reader in Statistical and Economic Modelling, University of Bristol
Key external collaborators: Professor Rachel Churchill, Co-ordinating Editor of Cochrane Common Mental disorders group, University of York, Professor Alan Stein, Child and Adolescent Psychiatry Oxford and Dr. Marc Bornstein NICHD, US

**Background**
Mental health problems are the leading cause of disability worldwide. While pharmacological treatments can be effective, psychological interventions are often preferred for the primary and secondary prevention of mental health problems for young children, during pregnancy or after birth, or across different cultural settings. Family-based, parenting support and early childhood interventions are designed to mitigate the factors that place children at risk of poor mental health outcomes. Such interventions are, by definition, complex as well as intensive for both therapist and service user. Inevitably this means they can be time consuming and expensive. Identifying which components of the interventions are most effective for prevention and treatment of mental health problems could enable more focused interventions to reach a larger number of those at risk. They may also be more acceptable to service users if they are less time consuming. This is particularly important in contexts where resources are scarce.

The evidence base for parenting programmes is mixed; findings from meta-analyses which pool the results of several studies to form a single effect estimate are consistent with both an improvement and no improvement in overall mental health and wellbeing outcomes. However, standard meta-analyses group interventions together as the same “treatment” and make a lumped comparison, for example, “all parenting programmes” vs. control. This only answers the question “Are parenting programmes in general effective?” and may mask important differences between parenting programmes (heterogeneity). Parenting interventions are multi-level, with several components which can be examined using meta-regression, although there are often too few studies to apply this technique in standard meta-analysis.

A network meta-analysis [2] avoids the need to make ‘lumped’ comparisons, and can compare multiple interventions simultaneously in a single analysis. As such, meta-regression is more feasible and can be used to investigate which components of parenting programmes are the ‘active ingredients’ driving effectiveness for mental health outcomes [2]. However, this relatively novel components approach has rarely been applied.

**Aim**
The PhD will aim to apply a components based network meta-analysis approach to important questions for prevention of mental health, where there are growing numbers of complex interventions trials.

Question: Which components of early parenting interventions are effective in reducing later mental health risk in:
   a) All children?
   b) Specifically in refugee or migrant populations? Given the context and cultural dependent nature of parenting it is important to look at this growing group of families separately.
Method
This mixed method PhD will develop skills in both quantitative and qualitative analysis. Building on existing systematic reviews, it will involve updating systematic literature reviews of randomised controlled trials to address the above questions. The identification of intervention components will use the Constant Comparative method, an inductive and iterative qualitative analytical technique. Component level-network meta-analyses will then be conducted on eligible studies. These analyses have previously been implemented in psychiatry and psychotherapy [3] and have highlighted the importance and feasibility of NMA for policy and practice recommendations, and how it can be useful to explore and minimise heterogeneity in evidence syntheses. A component-based NMA is ideally suited to synthesising mental health interventions since we can incorporate the complexity of interventions whilst providing a coherent and quantitative assessment of effectiveness necessary for future economic evaluations of early parenting interventions. The PhD will consist of the following stages:

1. Update existing systematic reviews of early intervention and parenting interventions, identifying intervention components.
2. Develop a taxonomy of intervention components used for each question.
3. Establish which interventions with a particular component or combination of components are effective?
4. Qualitative assessment of the acceptability of the component interventions, using focus groups and/or in-depth interviews with key stakeholders and target groups through the Perinatal Mental Health

Keywords: Evidence synthesis; mental health, early parenting; prevention

References
7. Epidemiology and management of anxiety disorders in primary care

Supervisors: Nicola Wiles, David Kessler, Katrina Turner

Background
Anxiety is a common and important problem in primary care. Studies from the USA and Europe show that anxiety disorders are prevalent and disabling (1-6). However, to date, the focus of UK research has been on depression; there has been little work undertaken in UK primary care into anxiety disorders. Two studies have estimated the prevalence of anxiety disorders in UK primary care (7, 8) but neither distinguished between the various sub-types of anxiety. Such data are need to inform the planning and provision of NHS services.

As well as understanding, how prevalent anxiety is, it is also important to understand the impact of anxiety disorders on people’s lives. Anxiety may be under-diagnosed and under-treated in primary care, and we need to know more about the reasons for this from the point of view of both sufferers and health care professionals. Two previous studies have examined detection of common mental disorders (CMDs) in the UK (9, 10) but neither distinguished between detection rates for anxiety and depression. Moreover, both recruited from a single GP practice making it difficult to generalise the findings. Accurate estimates of the rate of GP detection of anxiety disorder in primary care attenders would, together with information on the barriers and facilitators to the identification of such disorders, provide a robust evidence base for promoting greater awareness of anxiety disorders. This is in line with calls from Anxiety UK, a service user-led organisation (11).

Aims
1. To estimate the prevalence of anxiety disorders (& subtypes) in primary care attenders
2. To estimate the sensitivity, specificity and predictive values of general practitioner (GP) diagnoses of anxiety disorders
3. To identify barriers and facilitators to the identification of anxiety disorders in primary care
4. To describe outcomes for patients whose anxiety disorder is not identified by their GP
5. To describe the clinical management of those with anxiety disorders

Methods
This project will address these issues using a mixed methods approach including epidemiological surveys and qualitative interviews.

A cross-sectional survey of primary care attenders will be used to estimate the prevalence of anxiety disorder (& sub-types), and provide data on the sensitivity, specificity and predictive values of GP diagnoses. A longitudinal phase will address the question of detection of anxiety disorders by GPs over time and will gather data on treatment and outcome.

As part of a mixed methods approach there will be a qualitative study focussing on the barriers and facilitators to the identification of anxiety, the management of anxiety disorders in primary care and the impact anxiety has on individual’s lives. It will involve semi-structured interviews with service users, primary health care practitioners and third sector personnel including IAPT practitioners. Interviews will focus on attitudes towards and knowledge about anxiety disorders, their detection and management, the importance of sub-types and distinguishing between anxiety and depression.

We will support the student in developing collaborations with service user led groups such as Anxiety UK to ensure our work is responsive to the needs of those with anxiety disorders.
Keywords: anxiety, primary care, epidemiology, quantitative methods, qualitative methods

References