THE UNIVERSITY
of EDINBURGH

The Relationship between Developmental Factors and Daily Stressors in the Context of Psychotic Experiences: An Experience Sampling Study

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PhD in Clinical Psychology

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2023

Acknowledgements

I am hugely grateful to all of the participants who were involved in this project. I hope that my work does justice to the generosity with which they gave their time.

I would like to thank my supervisors Matthias Schwannauer and Helen Griffiths for the support and guidance over the many years spent working on this PhD. Thank you also to fellow researchers Alice, Liesbeth and Sarah who I have shared this PhD adventure with.

Finally, this thesis would not have been possible without the support of my family and friends especially Scott, who has kept me going throughout this journey, and a big thank you to Iona, for keeping me smiling!

Dedication

Dedicated to Finlay Maclean

Lay Summary

This thesis explores the way in which young people with varying experiences of psychosis respond to daily stressors, and whether this is related to young peoples' ability to manage their own emotions (emotion regulation); their ability to understand the motivations and thoughts of others (mentalization); and their predisposed approach to interpersonal relationships (attachment style). While there are theoretical arguments for the relationship between attachment and both emotion regulation and mentalization, there is a lack of empirical research exploring these concepts, which this thesis aims to address. By exploring these relationships it is expected this will contribute to understanding the development of psychotic experiences.

A key aspect of the methodology used in the current study is the experience sampling method (ESM) which allows for real-time data to be collected while participants are in everyday environments. ESM is used to measure how young people respond to daily hassles or stressors. Experience sampling data will be compared with data collected through self-report questionnaires to examine whether there are differences in these approaches.

This thesis will examine 5 different objectives; i) the relationship between attachment, emotion regulation and mentalization; ii) whether attachment and psychotic experiences influence the way young people respond to everyday stressors; iii) whether attachment or mentalization impact on a young persons appraisal of their environment; iv) whether psychotic experiences are associated with the use of distraction, rumination and suppression to manage emotions in daily life and v) to compare data collected through ESM with self-report data to examine whether there are differences between these methods.

In the current study, 55 young people between 16-35 years consented to take part and were recruited in the community and in clinical services across Lothian. Participants completed questionnaires and interviews about their mental health. They also completed 6 days of ESM which asked questions about young peoples' feelings, current environment and how they manage their emotions in daily life.

Results demonstrated that mentalization was associated with attachment security and emotion regulation. Attachment security and psychotic experiences were related to the way young people responded to social stress in daily life. Attachment security and mentalization were not associated with how young people appraised their environment and results suggest a more complex relationship. Young people with experiences of psychosis reported using rumination and suppression in daily life.

Finally, it was demonstrated that data collected from ESM was associated with one subscale (out of 8) from self-report measures of emotion regulation.

Results of the current study therefore suggest secure attachment is a protective factor in mental health wellbeing as attachment security was associated with greater positive emotion and reducing the impact of social stress in daily life. Findings also suggest emotion regulation and mentalization could be targets for intervention to reduce sensitivity to stress for young people with experiences of psychosis. It has also been demonstrated that ESM taps into a different aspect of a young persons' subjective experience and therefore contributes to a more specific understanding of individual mental health which has implications for developing more personalised interventions.

Abstract

Background
This thesis examines whether developmental factors influence the way young people respond to daily stressors in the context of psychotic experiences. Although there is a clear theoretical argument for attachment to be related to mentalization and emotion regulation, empirical research is lacking that examines links between these concepts. It is therefore unclear if attachment styles and mentalization impact on how young people manage their emotions in daily life.

Experience sampling methodology (ESM) is used to study psychological constructs in daily life where the flow of emotions and experiences is reported in context and in real-time. ESM is often employed through digital technology and can bring potential opportunities to both research and clinical practice by contributing to a greater understanding of individual mental health and lead to innovations in psychological interventions.

Objectives
This thesis will examine several key objectives; 1) whether attachment, mentalization and emotion regulation are related, and if mentalization mediates the relationship between attachment and emotion regulation, 2) whether attachment security and psychotic experiences influence stress sensitivity, 3) whether attachment security and mentalizing ability relate to aspects of an individuals' social context, 4) whether first episode psychosis (FEP) participants report using maladaptive emotion regulation strategies in daily life. Given the prominence of ESM throughout this thesis, a further objective will be 5) to examine whether emotion regulation data collected through self-report and ESM are significantly related, to establish whether ESM taps into a different aspect of subjective experience when compared to self-report.

Methodology
55 young people aged between 16-35 years consented to take part in the current study and were recruited in the community and through clinical services across Lothian. Participants completed several measures; the Adult Attachment Interview (AAI), the Comprehensive Assessment of At-Risk Mental States (CAARMS); the Difficulties in Emotion Regulation Scale (DERS) and the Adolescent Coping Scale (ACS). Participants also completed 6 days of experience sampling with questions regarding emotions, daily stressors and emotion regulation strategies.

Results
Results demonstrated associations between attachment, emotion regulation and mentalization with mentalization mediating the relationship between attachment security and greater difficulties managing emotions and reduced problem focused coping. Attachment security was associated with positive emotion and reducing social stress sensitivity in this group of young people. Additionally, psychotic experiences were associated with increasing social stress sensitivity. Attachment

security and mentalizing ability did not influence appraisals of social context directly, however there were interaction effects of mentalization. Mentalization buffered the negative relationship between reported enjoyment when alone and psychotic experiences, as well as buffering the positive relationship between psychotic experiences and preference to be alone. FEP participants reported using maladaptive emotion regulation strategies in daily life. Emotion regulation strategies measured through self-report and ESM were related through one self-report subscale only suggesting ESM measures a different aspect of subjective experience.

Discussion

This thesis supports attachment theory as a theory of resilience as attachment security buffered the effect of social stress on emotion in daily life. Results also highlight the relationship between social stress sensitivity and psychotic experiences supporting an affective pathway to psychosis. Promoting adaptive emotion regulation strategies and mentalizing ability to target outcomes such as stress sensitivity in young people should be considered in clinical practice. ESM can provide vast opportunities for clinical services, especially as this thesis demonstrated experience sampling measures a different aspect of subjective experience compared to self-report. Through increased use of ESM, clinicians and researchers can obtain a greater understanding of individual mental health which can produce more individualised interventions.

CONTENTS

Chapter 3: The Validity of the Experience Sampling Method and its use in Mental Health Research and Clinical Services

Chapter 4: The Relationship between Attachment, Emotion Regulation and Mentalization

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Chapter 6: The Impact of Attachment Styles, Mentalization and Psychotic Experiences on Social Context

Chapter 1 - Introduction to adolescence, unusual experiences and developmental factors

1.1 Introduction to Chapter

There are a number of different pathways and mechanisms involved in the development of psychosis. Research has highlighted the significance of previous trauma (Gibson et al., 2016), childhood abuse (Bonoldi et al., 2013), insecure attachment styles (Harder, 2014), being a member of a minority group, using cannabis or growing up in an urban area (Van Os et al., 2009). It has also been demonstrated that people with experiences of psychosis are more likely to have an increased sensitivity to stress (Collip et al., 2013; Myin-Germeys & van Os, 2007; Myin-Germeys et al., 2009). This thesis aims to look specifically at stress sensitivity, an increase in negative affect and decrease in positive affect in relation to everyday stressors, as a risk factor for psychotic experiences. To understand further the relationship between stress sensitivity and experiences of psychosis, this thesis aims to explore the potential influence of attachment security on stress sensitivity. Insecure attachment has been associated with psychosis however the mechanisms through which attachment style can influence psychosis are less clear. Further research is required to understand more about the potential mechanisms and relationships of attachment security and psychotic experiences. In addition the attachment security, this thesis will also examine mentalization and emotion regulation, concepts that are argued to be closely related to attachment.

This manuscript will be divided into five main analysis chapters which will explore different aspects of the literature examining the potential links between the concepts of attachment style (as well as the related terms of emotion regulation and mentalization), stress sensitivity and psychotic experiences. Within this manuscript the experience sampling methodology (ESM) is prominent in many of the chapters as this the methodology used to measure stress sensitivity. The first analysis chapter will explore how psychological constructs are measured by comparing data collected through ESM, a more dynamic measurement, with data collected through self-report,

a more static measurement. It will be argued that ESM is tapping into a different aspect of subjective experience which accounts for individual context. The second analysis chapter in this thesis will examine attachment in relation to both emotion regulation and mentalization. There is a theoretical argument that attachment is related to mentalization and emotion regulation however empirical evidence is limited. It will therefore be examined whether mentalization mediates the relationship between attachment and emotion regulation. The potential relationship between attachment styles and stress sensitivity in addition to the association between stress sensitivity and experiences of psychosis will form the basis of a further chapter in this manuscript. Given the importance of social interactions and environments in attachment theory and psychosis the impact of social context will be examined in a further chapter. It will be examined whether attachment and mentalization influence appraisals of social context in daily life. The remaining analysis chapter will look specifically at a case series of first episode psychosis participants and examine their use of emotion regulation strategies reported via ESM.

To set the following introduction in context, firstly the concept of psychosis will be examined through a discussion of the importance of adolescence in addition to the continuum of experiences that encompass psychosis. Secondly, this introduction will examine current literature on the causes of psychosis and two main theoretical stances before exploring the key developmental concepts of attachment, emotion regulation and mentalization.

1.2 Adolescence and Unusual Experiences

Adolescence is a time of transition as young people develop their independence from their family and focus on building relationships within their peer groups. This can be a challenging period as this is a time of significant brain development as well as changing hormones and changing social environments (Blakemore, 2019). The adolescent brain develops in a number of ways including changes in cognitive functioning, reasoning, control of emotions and appraisals of risk (Giedd et al., 2008) making it an important developmental stage for young people. However, for a subset it also marks the beginning of difficulties with their mental health as the onset of most

mental health problems occurs at this developmental stage (Blakemore, 2019). During adolescence experiences of psychosis are reasonably common, in a general population study the median prevalence of psychotic symptoms in young people aged 13-18 years old was 7.5% (Kelleher et al., 2012). In a further community study, 13.7% of adolescents aged 12-19 years old reported experiencing auditory hallucinations, while 10.4% reported visual hallucinations and 13.1% reported experiencing paranoia (Dolphin et al., 2015). Despite these relatively high prevalence rates not all of these young people will seek help for these experiences and for some these will be transient experiences that resolve before adulthood (e.g. Poulton et al., 2000).

It has been suggested that psychosis is a disorder of adolescent development and is on a continuum with normal adolescent development during the transition to adulthood (Harrop & Trower, 2003). In particular, two possible pathways have been suggested as routes to developing psychosis in adolescence; a difficulty obtaining autonomy from family or through a difficulty developing peer relationships (Harrop & Trower, 2001). Also important during adolescence is the development of mentalizing skills to help young people understand that others have different thoughts, motives and feelings from them. Without developing these skills, the young person will remain ‘egocentric’ where they are more focused on their own views and motives (Harrop and Trower, 2001). Parallels have been drawn between normal adolescent development and young people experiencing psychosis as it is emphasized that some of the symptoms of psychosis are similar to behaviour demonstrated by adolescents without psychosis such as feelings of being indestructible or ideas of reference. This leads to the question of how to distinguish between young people who experience more difficulties with their mental health and experience symptoms of psychosis from experiences that are part of a trajectory of adolescent development. To help answer this, it is necessary to discuss the continuum of psychosis and define further what constitutes these types of experiences.

General Population Studies

At the less severe end of the continuum, psychotic like experiences, or experiences of psychosis that are not usually associated with distress are often reported in general population studies. It has been shown that 8% of the general population report psychotic-like experiences but only 4% of this population report psychotic experiences which are associated with distress and help-seeking (Van Os et al., 2009). Researchers have attempted to understand what leads to help seeking and increased distress with evidence pointing to a person's appraisal of their experiences as one key factor. This has been demonstrated with auditory verbal hallucinations (Baumeister et al., 2017) as well as experiences of paranoia (Peters et al., 2017). In the Peters et al (2017) study a clinical group were more likely to interpret their experiences as being due to other people, usually involving malevolent intent, and were less likely to normalise their experiences or view them as being related to supernatural events, suggesting a threat based appraisal of experiences is important. This is in line with the cognitive model of psychosis, which will be referred to later in this chapter, but briefly the cognitive model suggests that psychosis results from emotional and cognitive changes in response to stress and can be influenced by subjective appraisals of experiences. Additionally, it has been demonstrated that maladaptive coping is also important in differentiating individuals who seek support for experiences of psychosis. Ward et al (2020) explored coping strategies in three groups of participants; a group of patients with a psychosis diagnosis, a group of people with psychotic experiences without any need for care and a final group of control participants without any psychotic experiences. The clinical group reported significantly more maladaptive coping compared to the other two groups. This study also reported that there were no differences in adaptive coping strategies between any of the groups. These results are in line with previous findings where it is argued that maladaptive strategies are more strongly related to psychopathology than adaptive strategies (e.g. Aldao et al., 2010; Aldao & Nolen-Hoeksema, 2012).

At-Risk Mental States

Moving on from psychotic like experiences in the general population, the next aspect of the continuum of experiences is covered by the term at-risk mental state. Many

people who are diagnosed or are in touch with services for psychotic experiences typically report a period of time before they seek help where they notice changes in their mental health. The symptoms they report are often general changes so they may have problems with their sleep or mood, and they also report subthreshold (or subclinical) psychotic experiences. This period has been described as the prodrome of psychosis. Although this phase has been important in understanding there is a pathway to psychosis in terms of symptoms the prodrome of psychosis can only be identified retrospectively, once individuals have progressed to develop psychosis. Therefore, to allow for focusing on preventing of transition to a first episode of psychosis (FEP), criteria have been developed which aim to detect this stage and have been referred to by a range of different terms including at-risk mental state (ARMS); clinical high risk (CHR) or ultra high risk (UHR). ARMS, CHR and UHR are often used in reference to the transition to a first episode of psychosis (Kwapil & Barrantes-Vidal, 2015) and ARMS has been defined as a state that 'confers high, but not inevitable risk of development of psychotic disorder in the near future' (Yung et al, 2005, p.965). At-risk mental states therefore refer to experiences of psychosis that are at a reduced intensity or frequency to that reported in a first episode of psychosis (FEP). For example, a young person with ARMS may report hallucinations of mumbling voices but cannot decipher any words whereas in a first episode of psychosis a young person may report hallucinations of a voice commenting on their behaviour involving clear words and sentences. These experiences can be associated with different levels of distress and vary in their frequency. In distinguishing ARMS from experiences reported in general population studies, ARMS are generally associated with some level of distress.

Although examination of at-risk mental states has led to further exploration of the development of psychosis, it has also been noted that this phase or process is not linear and in fact in recent years the number of young people transitioning to experience a first episode of psychosis is reducing (Fusar-Poli et al., 2012). For example, a recent meta-analysis reported that meeting criteria for ARMS was associated with a 16.4% risk of developing psychosis in the next 2 years in contrast to the previously reported 29.1% transition rate (Oliver et al., 2018). This reduction in transition rates is likely due to increased awareness of early intervention services

and improved awareness of the at-risk mental state. In addition to this increased awareness there has also been a shift in how psychosis is viewed and a greater understanding of the experiences and symptoms, especially their more dynamic and transient nature which also makes it more difficult to define ARMS and FEP. As research develops to show that psychotic experiences are more fluid it is argued it will be increasingly difficult to measure these experiences and categorise them into distinct groups.

Psychosis

Psychosis has been defined as 'when people lose some contact with reality. This might involve seeing or hearing things that other people cannot see or hear (hallucinations) and believing things that are not actually true (delusions)' (NHS, 2019). This definition reflects a broad range of experiences by emphasizing a loss of contact with reality while maintaining a focus on hallucinations and delusions. This definition does not include reference to the role of emotion in psychosis, something that is highlighted in a further definition from Johannessen and Joa (2021) where they provide the following definition, 'psychosis essentially signifies a serious mental breakdown' and state that psychosis is 'a state of confusion, where mental and emotional chaos has arisen, and where the most important characteristic is a reduced ability or inability to distinguish between oneself and the reality around oneself' (p.291). This second definition therefore emphasizes the core component of psychosis where there is a change in a person's ability to understand the world around them, however it also makes reference to changing emotions. It will be argued in this thesis that changing emotions and difficulties regulation emotions is part of psychosis and is particularly evident in the early stages.

It should be noted that psychosis and the related concept of schizophrenia are often used in the literature to refer to similar experiences. The history of schizophrenia however refers to a categorical disorder which is often viewed as genetically inherited (Read, 2019). This is contrast to the more fluid definitions of psychosis described above. Psychotic experiences are associated with a number of environmental factors and exist across a continuum from low intensity and low

frequency to more enduring and frequent experiences therefore disputing the term schizophrenia as a categorical disorder (Guloksuz & van Os, 2018). By viewing these experiences dimensionally, it is argued to be more representative of the variety and differing intensity of psychotic experiences individuals may report (David & Ajnakina, 2016) as well as accounting for findings that psychotic experiences are often transient in nature (Guloksuz & van Os, 2018). Where choice is available in discussing the literature, psychosis will be the term referred to in this thesis as this aligns more closely with the stance taken by the author where psychotic experiences are viewed as diverse, existing along a continuum of intensity and frequency.

In returning to the earlier discussion of adolescent development and how to distinguish adolescents who may need support for their experiences of psychosis it has been demonstrated that there are varying degrees of psychotic experiences which can be measured along a pathway from experiences in the general population which are not associated with any help-seeking and distress, to more severe symptoms and possible help-seeking in at-risk mental states, and finally to more intense experiences and increasing levels of distress in a first episode of psychosis. Research across this range of experiences is advancing to help piece together the pathways and mechanisms involved in the development of psychosis, often with the collective aim to understand these processes further to reduce individual distress and improve functioning and quality of life.

The Aetiology of Psychosis

Research into the causes of psychosis have demonstrated the significance of environmental factors which are also relevant in subclinical or at-risk mental states. Van Os et al (2009) demonstrated that similar demographic profiles are evident in both individuals with psychosis and those with ARMS, for example, male sex, being a migrant, being unemployed or unmarried. This meta-analysis also demonstrated that substance use, traumatic or stressful experiences were associated with a higher incidence of psychotic experiences, in addition to social cognition in particular mentalizing ability which is also impacted across the continuum of psychotic experiences. A further meta-analysis has also demonstrated the importance of

childhood trauma, childhood emotional abuse, childhood physical neglect, high perceived stress, low functioning, social deficits, affective comorbidities, male gender, single status, unemployment and low educational status, obstetric complications, tobacco use, less use of alcohol (compared to controls), physical inactivity all being associated with ARMS (Fusar-Poli et al., 2017). In both of these meta-analyses it is evident that there are several factors associated with experiences of psychosis, reflecting the different pathways to the development of psychosis. As one example, accumulating research suggests that there is a pathway to psychosis from childhood trauma, however it is likely that there are a several mediators and moderators of this relationship as psychosis typically develops a number of years after traumatic experiences (Beards & Fisher, 2014). It has also been demonstrated that environmental factors can be additive, with individuals who report experiencing a range of environmental factors also reporting that psychotic experiences last longer over time (Cougnard et al., 2007). The range of experiences and complexity of the pathways to psychosis makes understanding the causes of psychosis particularly challenging. This has led many researchers to focus on specific pathways and in some cases particular symptoms of psychosis.

By exploring symptoms and linking factors to symptoms rather than broader states like ARMS or FEP, research has started to highlight more specific pathways to psychosis. Bentall et al (2014) demonstrated that hallucinations are associated with a history of childhood sexual abuse while thought disorder has been associated with parental communication deviance. Additionally, this article also reported early attachment relationships have been implicated in experiencing paranoia. It can therefore be argued that by examining specific symptoms of psychosis it may be possible to uncover particular risk factors which are more relevant to individual symptoms. By focusing on specific symptoms this would also impact on how treatments for psychosis are approached with it being suggested that individual mediators of psychotic symptoms should be the target of psychological interventions (Garety & Freeman, 2013). For example, targeting worry (an experience significantly related to persecutory delusions) has been demonstrated to result reducing distress associated with delusions (Foster et al., 2010). This approach has led to the development of a manualised treatment for paranoia including modules on mediators

such as worry, sleep or self-confidence. In a recent randomized controlled trial this treatment approach has resulted in improvements in paranoia (Freeman et al., 2021) demonstrating the potential for this approach which could be adapted for other psychotic symptoms.

Research has also advocated the role of stress in psychosis, one early theory has gained significant support in the literature known as the stress-vulnerability model. This model suggests that individuals have their own level of vulnerability in response to stressors and once this level of vulnerability is reached a psychotic episode can result (Zubin & Spring, 1977). Initial research into the stress-vulnerability model centred on life events as the stressors, however this area of research encountered limitations given the reliance on retrospective reporting, difficulties defining life events and lack of consideration of mediating factors (Philips et al., 2007). Additionally, it was emphasized that in studying life events, an individual's subjective appraisal of those experiences was not examined leading other authors to advocate for the study of appraisals of stress as well as lower level stress such as everyday stressors (e.g. Norman & Malla, 1993).

1.3 Stress Sensitivity

One model of psychosis that allows for individual appraisals to be explored and studies everyday hassles is that of the stress sensitivity model. Stress sensitivity can be operationalized as a subjective report of reduced positive emotion and increased negative emotion in response to everyday hassles and stressors (Reininghaus et al., 2016). It is typically measured using the experience sampling method and has been reported across the continuum of psychotic experiences, in ARMS participants (Reininghaus et al., 2016; Van der Steen et al., 2017) participants with psychosis (Myin-Germeys et al., 2003) as well as participants with psychosis in remission (Myin-Germeys et al., 2005). Additionally, individuals with persistent subclinical experiences of psychosis have been shown to report greater sensitivity to stress than those with less persistent experiences (Collip et al., 2013), emphasizing the importance of stress sensitivity in young with at-risk mental states.

In addition to being a risk factor, stress sensitivity is also a mechanism through which other risk factors such as childhood trauma can influence psychotic experiences through a process of sensitization. Sensitization is defined as when 'the response to an environmental risk factor increases in intensity with repeated exposure to this risk factor' (Collip et al., 2013, p.1). It is argued that this process occurs before the development of psychotic experiences and through sensitization individuals become more responsive to stress over time. Therefore, in a vulnerable individual following an initial stressor (e.g. childhood neglect) their sensitivity to stress increases and as a result less stress is required in future for the individual to report further symptoms or report a more severe presentation of symptoms (Mayo et al., 2017).

Stress sensitivity is a key component in this thesis, both as a risk factor and also as a mechanism by which other factors impact psychotic experiences. It will be explored whether attachment styles relate to stress sensitivity. To the author's knowledge there is very little research into a possible link between attachment styles and stress sensitivity which is surprising given the clear crossover between these concepts as they both explore social contexts and emotional experiences. One available study that has explored attachment styles and stress sensitivity was conducted in a student population and demonstrated that anxious attachment styles were associated with higher negative emotion and lower positive emotion in response to daily hassles when compared to secure attachment styles. Additionally, avoidant attachment styles were associated with less positive emotion in comparison to secure attachment styles (Sheinbaum et al., 2015). This study therefore suggests that attachment styles can influence affective states in daily life, however it is not clear yet whether these findings will be replicated in further studies. Furthermore, it is not known whether attachment styles and stress sensitivity will be related in a population of young people with varying experiences of psychosis.

1.4 Experience Sampling Methodology

Experience sampling methodology (ESM) is the technique used in this thesis to measure stress sensitivity. ESM is a structured diary reporting technique where individuals are asked to report in the moment on a wide range of psychological experiences such as emotions and cognitions in daily life (Hektner et al., 2007). To do this, individuals are asked to complete a set of questions at several different timepoints over a number of days, weeks or months. The methodology is centred in Ecological Psychology meaning that behaviour can only be understood in the context in which is arises. ESM is focused on everyday life and explores how people's thoughts, feelings and emotions develop and relate to contextual factors (Myin-Germeys & Kuppens, 2021). Therefore, ESM allows for the collection of contextual information such as where someone is or who they are with which can be combined with information of affective states or symptoms and can contribute to understanding the temporal order of events. This temporal order is important as it may provide insight on the pathways to psychosis (and other mental health conditions).

Not only can ESM allow researchers to gather more information about individual experience, ESM provides valuable insight in real-time as individuals are in their everyday environments. As participants are asked to report on their current mental states this reduces the possibility of recall bias. ESM also allows for the subjective experience of an individual to be explored, contrasting with observation approaches exploring someone else's behaviour, ESM instead allows the individual to be the expert of their own mental health experiences (Myin-Germeys & Kuppens, 2021). Additionally, experience sampling examines both within-person (how an individual's response can differ depending on the context they are in) and between-person differences (how individuals are different from one another; Myin-Germeys & Kuppen, 2021). Being able to distinguish between within-person and between-person effects as well as explore an individual's appraisal of their context is crucial for understanding the causes of psychosis.

ESM has become an invaluable research tool allowing access to experiences as they happen in real-time, however it can also contribute to revolutionising the way in

which mental health problems are diagnosed and treated bringing clear utility to the field of Clinical Psychology. Firstly, in diagnosing and understanding psychosis (as well as other mental health conditions) experience sampling allows for more individualised assessment and monitoring. In relation to psychosis, this this can contribute to better awareness of the transition to a first episode of psychosis. Through using ESM, information can be gathered about individual trajectories and allow for individuals (as well as clinicians) to understand the process of change or possible improvements and declines in mental health. It is argued that the information rich data collected via ESM can contribute to the creation of more reflective treatments to support individuals through a greater understanding of these mechanisms of change (Myin-Germeys et al., 2018). Additionally, ESM can also lead individuals to become more aware of their own experiences, such as triggering events or warning signs, leading to a greater understanding for the individual in terms of their own mental health potentially leading to greater feelings of empowerment (Myin-Germeys et al., 2018).

Secondly, ESM can contribute to revolutionising Clinical Psychology by changing how treatments for mental health are delivered. Ecological momentary interventions (EMI) have been designed to provide individualised interventions in real-time through electronic devices (Teixeira, 2021). Currently there are a variety of interventions using ESM varying from providing personalised feedback (e.g. Kramer et al., 2014) to providing therapy interventions (e.g. Moitra et al., 2020). These interventions can be stand-alone or blended care interventions as an additional tool in the delivery of face-to-face interventions. Although relatively early in development, research has shown that experience sampling interventions are acceptable (Naslund et al., 2015). In a series of systematic reviews, EMI has been shown to have positive effects on depression (Firth et al., 2017; Versluis et al., 2016); perceived stress (Versluis et al., 2016) and generalized anxiety (Gee et al., 2016). Variations in the quality of studies have been reported however (Gee et al., 216; Versluis et al., 2016) therefore emphasizing the need for further research into the effectiveness of EMI's.

Discussion around ESM also leads to questions on how constructs are measured in Clinical Psychology. Self-report and interview measurements are widespread in psychology research and practice. They are often relatively quick and easy to use, however these traditional approaches tend to focus on static timepoints and ask people to summarise their experiences, symptoms or affective states. Although this approach has been successful in contributing to knowledge and is routine in clinical practice, it is argued that the richness of this data can be significantly improved by taking into consideration the context in which symptoms and affective states arise. This thesis will argue that much more can be understood by examining mental health in context and in real-time using dynamic measurements such as ESM. It is only through realising that symptoms, experiences and emotions are impacting on each other often in short time frames can interventions be targeted in such a way to support individuals when they are most vulnerable or in most need.

1.5 Cognitive Models of Psychosis

The vast number and interplay of factors that are involved in the development of psychosis contributes to difficulties in producing an inclusive framework or theory for the development of psychotic experiences. This thesis will primarily focus on the impact of attachment theory in psychosis, however there are parallels between attachment theory and cognitive theory which are important to highlight. Cognitive theory suggests that in individuals with an underlying vulnerability, emotional and cognitive changes can result in a stress response which in turn causes unusual experiences such as hallucinations or delusions (Garety et al., 2007). Several factors are argued to be involved in maintaining psychotic interpretations such as reasoning biases, an externalizing attributional style and poor social understanding or mentalizing ability (Garety et al., 2001). Given the variety of symptoms and the prevailing consensus that psychosis is not a categorical disorder, cognitive models have developed in relation to specific symptoms of psychosis, for example focusing on delusions (Gartey & Freeman, 2013; Turkington et al., 2011) or on hallucinations (Morrison & Renton, 2001). Cognitive models suggest that the experience in and of itself is not enough to reach the threshold of psychosis, instead the interpretation and appraisal of the experience is also important. As mentioned previously in this thesis,

studies have shown that people with psychosis can appraise situations differently, for example, individuals with psychosis have reporting interpretating their experiences as due to the malevolent intent of others while those without psychosis may normalise these experiences or suggest supernatural explanations (Peters et al., 2017).

Cognitive models also emphasize the significance of social context as well as how an individual views themselves and others. Based on early relationships people develop schemas, or beliefs about the world, themselves and others and cognitive models advocate that these schemas help an individual to make sense of their experiences (Mander & Kingdon, 2015). In the case of negative schema for example, these are associated with emotional distress which are likely to influence beliefs that develop in relation to understanding experiences. The cognitive model therefore touches on a number of elements discussed in this thesis with several parallels with attachment theory.

1.6 Attachment Theory

Attachment theory involves similar concepts to those in cognitive models including schemas, appraisals, and emotion in the development of mental health difficulties. Attachment can be defined as ‘a type of affectional bond, which an individual forms with a specific person, who is approached in times of distress’ (Berry et al, 2007, p459). The concept of attachment originates in the work of Bowlby (1969/1982; 1973; 1980) who emphasized the role of the primary caregiver and the attachment bond between parent and child. The theory rests on the idea that the child uses the caregiver as a secure base in which to explore the world but can also return to in periods of stress. Bowlby argued that this relationship between child and caregiver impacts on how an individual perceives’ themself and also allows them to build ideas about how others will behave in social relationships thus emphasizing the importance of attachment throughout the lifecycle.

It is through these interactions with caregivers that children develop internal working models, or expectations, beliefs and appraisals of relationships (Levy et al., 2011). Internal working models can therefore be seen as a child's expectation of their caregiver's responsiveness or availability (Kobak et al., 2006). Attachment theory is heavily influenced by emotions which has been emphasized in much of Bowlby's work and the cornerstone of the theory emphasizes that a child's attachment experience influences the way they regulate emotion (Cassidy, 1994). If a child has a secure attachment relationship with their caregiver they are aware through experience that the parent will respond to their emotional signals, whereas insecure infants understand that their emotional signals will only be responded to selectively. This impacts on how the child subsequently regulates emotion as secure infants believe that their caregiver will respond to them and support them especially with emotions that cause distress. Insecure infants however, learn that their caregiver will only be available selectively and they must therefore develop other ways of regulating emotion.

Initial experimental support for Bowlby's theory originated in the work of Mary Ainsworth who conducted several experiments called the 'Strange Situation', involving two planned departures and reunions of the caregiver in a laboratory room. Children presented a number of behaviours when their caregiver returned to the room allowing them to be classified into one of three organised attachment styles; secure, ambivalent or anxious. Secure children would welcome their caregiver back following a separation and then continue to play with the toys in the room, reflecting the child's confidence in the availability of the caregiver. In comparison, some infants displayed angry behaviour when reunited with their caregiver while a final group of infants appeared to ignore their caregiver when they returned to the room (Bretherton, 1992). Both of these groups (ambivalent and avoidant, respectively) are suggested to demonstrate insecure attachment styles and this behaviour results as they have experienced inconsistency in the availability of their caregiver. A fourth category was also added allowing for classification into a disorganised or disorientated category. These infants would often show frightened or unusual behaviour and it is argued that infants displaying this behaviour do not have an

organised strategy for coping with the stress of being separated from their caregiver (Lyons-Ruth & Jacobvitiz, 2008).

The importance of attachment theory in mental health can be demonstrated by exploring the prevalence of attachment styles in clinical populations. For example, it has been shown that dismissive attachment styles are over-represented in psychosis groups (Gumley et al., 2014; Harder, 2014; Korver-Nieberg et al., 2015). A similar pattern is also reported when examining clinical groups more broadly. For example, in a meta-analysis study 37% of a clinical sample were classified as dismissing, 27% as secure and 27% as preoccupied (Bakermans-Kranenburg & van Ijzendoorn, 2009). For comparison, this meta-analysis study also provided attachment style prevalence rates for nonclinical groups where in a female only sample 23% were classified as dismissing, 58% as secure and 19% as preoccupied. Similar figures were reported in a male sample with 28% classified as dismissing, 58% as secure and 15% as preoccupied. Results therefore emphasize that there are differences in the prevalence of attachment styles across levels of psychopathology with higher rates of insecure attachment styles in clinical groups. It is therefore suggested that a dismissive attachment style is associated with mental health difficulties and psychotic experiences specifically. Dismissive attachment styles often reflect a distancing from social interactions and a valuing of independence. It should be noted that although dismissive attachment styles are more common in people experiencing psychosis (and other mental health conditions) it is not the case that dismissing attachment style causes psychosis but rather a dismissing attachment style in combination with other factors are likely to interact in the development of psychosis.

Attachment through the Lifecycle

One of the premises of attachment theory is that attachment relationships are important throughout the lifecycle. For example, Hazan and Shaver (1987) explored romantic relationships to examine the influence of attachment styles in adulthood, and studies with the Strange Situation Procedure emphasize the role of attachment in childhood. Although attachment is argued to be relevant throughout the lifecycle,

the nature of this relationship will change, with a move away from focusing on proximity to the caregiver in early years to a more internalised role in adult years where individuals develop the ability to self-regulate their emotions.

This change to a more internalised role in adulthood is made possible through internal working models (IWMs). Internal working models are representations based on experiences with caregivers that allow the infant to form expectations about others and themselves (Sherman et al., 2015). These models develop during an infant's first year and are built on previous interactions between the child and their caregivers. A number of factors are likely to impact on how infants experience interactions with their caregivers such as their contextual environment, their own temperament as well as their caregivers temperament (Sherman et al., 2015). While the infant is developing an understanding about others they are also building up an understanding of themselves. A positive view of self is developed through experiences with responsive caregivers and therefore children believe they are loveable or worthy while through interactions with caregivers who are less responsive or unreliable a negative view of self may develop.

It has been argued that during adolescence, rather than developing specific expectations of individual caregivers, adolescents start to develop expectations of relationships more generally and this has been termed states of mind with regards to attachment (Dykas & Cassidy, 2007). Research is beginning to explore whether these states of mind help the individual to process social information in the same way during adolescence as they would during childhood. Adolescence is a particularly important developmental stage as young people go through changes in their social environment and associated fluctuations in emotions as they learn to navigate their changing relationships with family and peers in addition to the significant brain development that occurs during this phase (Blakemore, 2019). Given that there are significant changes during this stage it is possible that this influences how people interpret social information. Research has demonstrated that attachment styles remain relatively stable during this period (Ammaniti et al., 2000). However, when exploring internal working models within the field of social

neuroscience it has been demonstrated that internal working models may change over time (Long et al., 2020). Although exploring attachment in social neuroscience is a relatively recent area of study particularly in exploring adolescence, this points towards a growing focus on internal working models and how these may influence how young people process social information. It is likely that research from more longitudinally designed studies is required to examine whether there is a change in how social information is processed during adolescence and into adulthood.

Measuring Attachment

In the psychological literature both developmental and social psychology have highlighted the importance of attachment theory and have taken different approaches to the measurement of attachment. The social psychology literature developed out of the study of romantic relationships with Hazan and Shaver (1987) highlighting three types of attachment style - avoidant, secure and anxious-resistant. Bartholomew and Horowitz (1991) challenged this three category model and suggested that a dimensional model was more appropriate. This dimensional model is based on two models - a model of the self and a model of others. Both models can be split into two categories; positive and negative. Positive models of self represent a view of self as autonomous and content while negative models represent a view of self that lacks confidence and experiences self doubt. Positive views of others means that attachment figures will be viewed as trustworthy and reliable, negative views of others refers to attachment figures that are unreliable and less dependable. These four viewpoints can be placed on two dimensions leading to four attachment patterns; secure, preoccupied, dismissing and fearful. This approach led to a number of self-report measures for attachment that focus on adult romantic relationships (Shaver et al., 2000).

In contrast, developmental psychology has also examined attachment relationships but measurement has typically involved the Adult Attachment Interview (AAI) or the Strange Situation Procedure (SSP). Both of these measures use a categorical approach to attachment as discussed above in relation to the SSP. The AAI is often

viewed as the gold standard measure of attachment styles but involves considerable resource to complete. The interview often takes an hour to conduct and involves twenty questions regarding experiences of growing up such as relationships with caregivers, memories of separation, loss and threatening or abusive behaviour from caregivers. The interview is transcribed verbatim and coded following the coding system developed by Mary Main and colleagues (George et al., 1996). In contrast to self-report measures the AAI assesses 'states of mind' in relation to attachment and was primarily designed to establish a child's attachment style to their parent based on the parents state of mind in relation to attachment (Shaver et al., 2000). Given the differences in the focus of these measures (adult romantic relationships vs. states of mind in child/adult relationships) it is understandable that these measures cannot be used interchangeably however associations between self-reports and the AAI have been demonstrated (e.g. Shaver et al., 2000).

1.7 Emotion Regulation and Coping

Attachment theory emphasizes a considerable role for emotions and how individuals learn to manage their emotions. One of the earliest studies into attachment styles and emotion regulation was conducted by Kobak and Sceery (1988) where it was shown that emotion regulation differed between attachment styles with both insecure groups being less ego resilient than the secure group. This finding suggests that insecure attachment is associated with difficulties dealing constructively with negative emotion. Further differences were highlighted between the two insecure groups with dismissing attachment style being associated with more hostility and preoccupied styles more anxious when compared to the other two styles (secure and preoccupied; secure and dismissive). This is reflected more recently with Mikulincer and Shaver (2016) highlighting that dismissive attachment styles are associated with distancing strategies such as diverting attention and disengagement while preoccupied attachment styles are associated with focusing on distress through strategies such as self-blame or rumination. It is therefore advocated that attachment styles lead to individual differences in how individuals regulate their emotions.

Within the literature, two related concepts of emotion regulation and coping have been referred to in the regulation of emotion. Emotion regulation has been defined as 'the extrinsic and intrinsic processes responsible for monitoring, evaluating and modifying emotion reactions, especially their intensive and temporal features, to accomplish one's goals' (Thompson, 1994 pp. 27-28). This concept is often used interchangeably with affect regulation leading Gross and Thompson (2007) to emphasize that affect regulation is a higher order function which includes emotion regulation in addition to several other processes including coping, mood regulation and psychological defences. Emotion regulation is an important component of the majority of mental health conditions and there are numerous strategies an individual can use to manage both negative and positive emotions. Many of these strategies have been divided into adaptive and maladaptive strategies, reflecting differences in outcome with maladaptive strategies more often associated with mental health difficulties (Aldao & Nolen-Hoeksema, 2012).

The study of emotion regulation in psychosis has shown that in general individuals with psychosis report using more maladaptive regulation strategies to manage their emotions (Ludwig et al., 2019; O'Driscoll et al., 2014). Although many studies are based on comparing control participants to participants with psychosis, further work has also examined specific regulation strategies across the spectrum of psychotic experiences. For example, Chapman et al (2020) have shown that individuals report using less reappraisal as they experience a greater intensity of psychotic experiences. The study of specific emotion regulation strategies for psychosis is however likely to be particularly difficult given the dynamic nature of symptoms and emotions changing over time. A further option for studying emotion regulation in psychosis is to explore emotion regulation in context, through methods such as ESM.

Coping has been defined as the 'conscious and volitional efforts to regulate emotion, cognition, behaviour, physiology and the environment in response to stressful events or circumstances' (p.89, Compas et al., 2001). Coping strategies are often interchangeable with emotion regulation strategies but have been divided into

avoidance and approach focused strategies in reference to whether an individual engages or distances themselves from the stressful experience (Marroquin et al., 2017). In parallel to the emotion regulation literature, avoidance strategies are generally associated with negative outcomes while approach strategies are often associated with the promotion of wellbeing (Marroquin et al., 2017). Coping is often referred to as being something individuals do during periods of stress which contrasts with the broader contexts in which an individual would use emotion regulation. Both emotion regulation and coping refer to changing or adapting emotions in some way but coping includes both emotional and non emotional goals while emotion regulation is focused on emotions only. Generally, emotion regulation involves managing both positive and negative emotion and emotions out with stressful experiences with coping more generally associated with negative experiences (Marroquin et al., 2017). However, it will be argued in this thesis that stress is a subjective experience and differentiating contexts that are stressful will be challenging as this is likely to vary from person to person.

When looking specifically at experiences of psychosis, in an ARMS sample it has been demonstrated tension-reduction strategies (an emotion-focused strategy) are more common and problem-focused coping is used less often in comparison to healthy controls (Lee et al., 2011). In this study similar maladaptive strategies were reported by participants in the ARMS group and a recent onset psychosis group leading the authors to conclude that a maladaptive pattern of coping may emerge before the onset of overt psychotic symptoms therefore emphasizing a potential risk factor for developing psychosis. Given the significant cross over between the concepts of emotion regulation and coping, and the overarching focus in this thesis on whether an individual manages their emotions by altering or changing their emotional response, both emotion regulation and coping will be explored as key concepts in this thesis.

1.8 Mentalization

A further construct which is crucial in attachment theory literature is mentalization. Mentalization can be defined as the 'process by which we realise that having a mind mediates our experience of the world' (Fonagy et al, 2004, p3), and involves the ability to understand that one's own behaviour and that of others is the result of beliefs, thoughts and feelings. Fonagy and Target (1997) have operationalized mentalization for use in research as 'reflective function' (RF) and have developed a rating scale which allows individuals to be assigned a score of reflective function through analysing therapeutic transcripts. They argue that reflective function is a mediator between attachment and emotion regulation and therefore is key to the application of attachment theory.

Mentalizing ability is thought to develop in attachment relationships as through the process of returning to the caregiver during times of distress and using them to help cope with distressing situations, a child learns to reflect on their own emotions and behaviours as well as others through interactions with their caregiver. Higher reflective function scores have been shown to be associated with secure attachment (e.g. MacBeth et al, 2011) therefore emphasizing that secure attachment allows for a child to learn and develop mentalizing ability. It has been highlighted however that mentalizing ability can be improved through therapy (e.g. Fischer-Kern et al., 2015; Levy et al., 2006) therefore demonstrating that this ability can be developed out with the original caregiving relationship.

There are a number of similar concepts to mentalization which it is necessary to define. Two of the main concepts are theory of mind and metacognition. Theory of mind has been defined as 'understanding that our own and other's behaviour is determined by thoughts, beliefs and intentions' (Corcoran & Frith, 2005, p.2). In contrast, metacognition has been defined as 'one's ability to think about thinking' (Davis et al., 2020). Often researchers have used these terms interchangeably and different research groups have used these terms to mean different cognitive processes at different times. It will be argued in this thesis that mentalization refers

to a more complex process than metacognition as it includes more than just cognitions (Karlsson & Kemott, 2006) and is similar to theory of mind, however the key difference is that mentalization is learned through attachment relationships. For clarity mentalization will be the term referred to in this thesis.

Greater mentalizing ability is argued to be associated with more successful emotion regulation, given that individuals are able to reflect on their thoughts and feelings and how this subsequently impacts on behaviour. Fonagy et al (2004) suggest that there are two levels of affect regulation, the first largely out with consciousness and without any element of reflection, while the second level involves controlling emotions in addition to communicating them. It is argued that the highest form of affect regulation is that of 'mentalized affectivity' where 'one is conscious of one's affects, while remaining within the affective state' (Fonagy et al, 2004, p.96). These authors suggest that this can encourage positive affect but also helps individuals to cope with negative affect. It is therefore suggested that mentalized affectivity represents affect regulation that has been transformed by the process of mentalization (Solbakken et al, 2011). It is advocated that not only does mentalization impact on emotion regulation but that emotion regulation also impacts on mentalization. Greater mentalizing ability will allow individuals to regulate emotions more successfully and reduce negative emotion. If emotion regulation strategies do not reduce negative emotion successfully this will impact on an individual's ability to mentalize, as increasing amounts of negative emotion will make it more challenging to mentalize.

Initial research into mentalization in clinical populations has centred on the study of Borderline Personality Disorder (BPD) which is associated with reduced mentalizing capacity (e.g. Fonagy & Bateman, 2007). It is also highlighted that a number of individuals with BPD have difficulty regulating emotions successfully and are more likely to have insecure attachment patterns (Fonagy et al., 2011). Mentalization based therapy (MBT) has been developed to improve the outcomes of those with BPD. In the first RCT of this therapy significant results were found for both symptom and clinical measures. Reductions in self-harming and suicidal behaviour were

reported in the treatment group in comparison to the control group as well as reductions in state and trait anxiety and depression scores (Bateman & Fonagy, 1999). Similar results were also reported in an 18 month follow-up of this RCT with more self-harming acts reported in the control group in comparison to the treatment group (Bateman & Fonagy, 2001). Additionally, state and trait anxiety scores and depression scores were substantially lower in the treatment group.

From these initial trials mentalization-based therapy has been developed as a manualised treatment for BPD. The therapy has subsequently been adapted for other adolescent samples, for example Rossouw and Fonagy (2012) explored MBT as a treatment for self-harm. In this instance, greater improvements in self-harming behaviour and depression in the MBT group was reported compared to a treatment as usual group. In a further pilot study, self-harming behaviour was also reduced in a group of adolescents attending CAMHS services (Griffiths et al., 2019). Additionally, a recent systematic review has also highlighted that MBT is an effective treatment for reducing distress in families and children (Simonsen et al., 2020). Collectively these studies suggest that by focusing on mentalizing ability there can be a reduction in mental health symptoms. These results are promising and are required to be examined in further larger RCTs, of which there are currently several in progress (e.g. Beck et al., 2016; Robinson et al., 2014; Weijers et al., 2016).

This thesis aims to explore aspects of attachment theory in several empirical chapters. Attachment styles will be explored in addition to emotion regulation strategies and mentalization given that these concepts overlap. It is advocated that emotion regulation strategies develop through attachment relationships while mentalization develops through secure attachment relationships. Mentalization contributes to emotion regulation as individuals develop an understanding of their own and others mental states. As attachment styles, emotion regulation and mentalization have not often been explored together despite the theoretical argument that these concepts are related, one chapter in this thesis will explore the links between all three concepts while the remaining analysis chapters will explore whether attachment styles influence the way young people respond to their

environment and daily stressors. All analysis chapters in this thesis will report data collected from experience sampling methodology. This methodology was used in the current study for two core reasons. Firstly, ESM allows for exploring whether attachment styles influence the way young people respond in daily life to their environment therefore examining whether an intrinsic characteristic of the self (attachment style) influences how a person responds in day-to-day life. Secondly, a core component of this thesis is emotion regulation which is difficult to measure given that people often do this instinctively, experience sampling methodology allows for people to report about their emotions in the moment and in real-time, therefore providing a more reflective understanding of how young people manage their emotions in daily life. The role of attachment theory in everyday life will be explored in the context of psychotic experiences. The sample of the current study is made up of young people some with experiences of psychosis and some without. Despite accumulating evidence for attachment styles to be associated with psychosis, research in this area is not conclusive and therefore this thesis aims to contribute to this field further by understanding links between attachment, psychotic experiences and emotional responses to stress in everyday life.

Chapter 2 - Methodology

2.1 Study Design

This study employed a longitudinal design using the experience sampling method (ESM). ESM is a structured diary technique that requires participants answer a set of questions at a number of semi random time points over a specific time period, allowing the researcher to gather repeated measures data of individual experience in daily life. In the current study, ESM was employed for 6 days for each participant and was completed either through a mobile phone app or through paper and pen notebooks. In addition, participants were also asked to complete one semi-structured interview and one self-report questionnaire prior to completing the ESM and a further interview and self-report questionnaire after the ESM.

2.2 Setting

Recruitment for the study started in March 2016 and ended in September 2019. Participants were recruited through three main approaches;

1. In response to flyers and posters advertised at the University of Edinburgh
2. Potential participants taking part in another ethically approved research study
3. Young people in touch with NHS mental health services in Lothian

A sample size of approximately 90 participants with a range of experiences of psychosis was set, however following challenges with recruitment the sample size in the final analysis was reduced to 55 participants (see section 2.3 for further details of participants).

2.3 Inclusion and Exclusion Criteria

Inclusion criteria for the study were; aged between 16-35 years old and ability to provide written consent. For participants recruited through clinical services, they also had to be in touch with an NHS service for experiences of psychosis. Exclusion criteria were a lack of English language ability to complete study tasks and

measures; acquired head injury; or a diagnosis of a learning disability that would prevent ability to complete study measures.

2.4 Participants

55 young people (43 female and 12 male) consented to take part in the study and were recruited from university students and from clinical services across Lothian. The age range of the sample was 17 – 34 years (mean = 21.98, SD = 4.18), and 61.8% of the sample were single. In the whole sample just over half reported having sought treatment for their mental health either currently (25.5%) or in the past (29.1%). The majority of the sample were students (81.8%), while a small number worked full-time (7.3%), part-time (3.7%), in voluntary work (1.8%) or were unemployed (3.6%).

2.5 Ethical Approval and Safeguarding

Ethical approval was obtained from the School of Health in Social Sciences Ethics Committee. The researcher is a member of the PVG Disclosure Scheme, and both of their supervisors hold clinical roles within the NHS. If the researcher was concerned for the safety of any of the participants this was discussed with the researcher's supervisors. All participants were required to provide details of their GP (and clinical team if appropriate) to allow the researcher to contact a professional involved in the participants care if required. The researcher also provided signposting for participants if this was deemed appropriate following discussion in supervision.

For participants recruited from NHS services, ethical approval was obtained from the South East Research Ethics Committee (REC reference: 16/SS/0049) and management approval was received from NHS Lothian Research and Development (R&D number: 2016/0187). Clinical teams from Child and Adolescent Mental Health Services and Adult Mental Health Services across Lothian were informed about the project. For participants recruited through this route, the first contact regarding the study was made by a member of the young person's care team. Following consent

from the participant to take part, data collection was then completed by the researcher or in collaboration with another research student (AT) also completing research within clinical services across Lothian.

2.6 Procedure

The study was advertised using promotional flyers, posters and email adverts to students at the University of Edinburgh. These adverts included a contact email address allowing interested young people to contact the researcher. Additionally, potential participants taking part in a similar research project were also approached to see if they would like to take part. Briefly, this study explored risk and resilience factors for psychosis and participants between the ages of 16 – 35 years old were recruited from the general population through an online screening tool. The reader is referred to the original publication of this study for further details (Uhlhaas et al., 2017). An information sheet was provided to potential participants and any questions young people had regarding the project were answered. If the young person was interested in taking part, they were invited to meet with the researcher at the University of Edinburgh. For participants recruited from NHS services initial contact was from a member of the young person's care team. If they consented to finding out more about the project, the main researcher or AT arranged to meet with the participant at their local service. All participants were given a minimum of 24 hours to consider whether they would like to take part in the study.

The researcher arranged two meetings with each participant. In the first session, the researcher discussed the study information sheet and answered any questions. If the participant was happy to take part, they completed a consent form, a contact form and a short demographics interview. Following this, participants completed the Comprehensive Assessment of At-Risk Mental States (CAARMS) and the Adolescent Coping Scale (ACS). The appointment ended with an ESM training session, explaining the format of the questions and demonstrating how to use the equipment.

Participants then completed 6 days of experience sampling, answering questions about their current emotions, emotion regulation strategies, and daily stress. On day two of the experience sampling, the researcher contacted the participant to make sure there were no problems with the equipment and to confirm the task was not causing any distress. The researcher arranged to meet with the participant at a second appointment following the ESM to complete the Adult Attachment Interview (AAI) and the Difficulties in Emotion Regulation Scale (DERS).

Participant Pathway and Attrition

The flow of participants through the study is reported in figure 1. One participant dropped out following consent and did not complete the self-report measures or experience sampling. Three participants completed a pilot version of the ESM, this version included questions in a different format to the current ESM version so these datasets could not be compared in the final analysis. A further six participants did not complete enough experience sampling timepoints for the analysis (33% of timepoints in keeping with previous ESM studies) and therefore data from these participants were also excluded from any analysis involving experience sampling data.

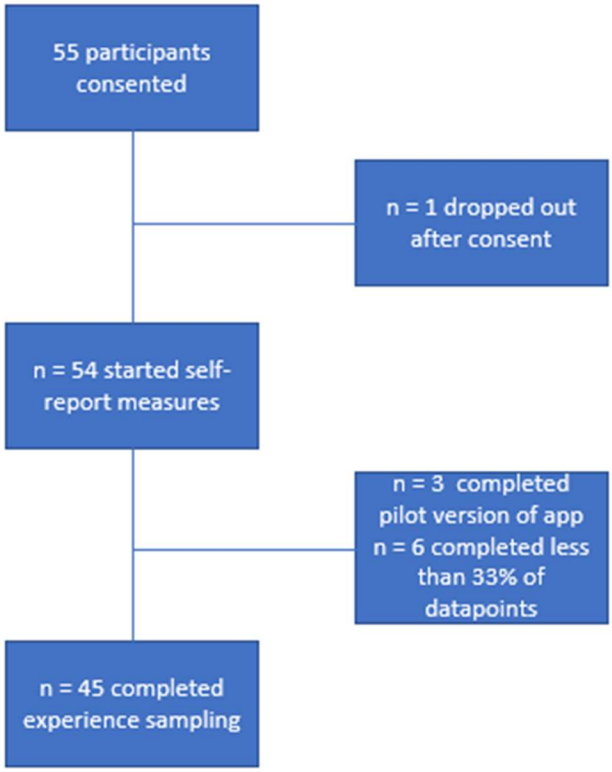

Figure 1: Participant flow in the study

In addition to the flow of participants in the study, table 1 also demonstrates the number of participants who completed each of the measurements in this study.

Table 1: Number of participants who completed each of the study measures

Measure	Number
CAARMS	52
ACS	54
DERS	53
AAI	52

2.7 Measures

At-Risk Mental State/Severity of Experiences of Psychosis

The Comprehensive Assessment of At-Risk Mental States (CAARMS; Yung et al., 2005) is a semi-structured interview which explores experiences of psychosis. The full assessment involves 7 scales explores psychopathology and is generally used for research purposes. There is also an abbreviated version of the CAARMS which is routinely used to establish whether a young person meets criteria for an at-risk mental state and examines 4 different positive symptoms of psychosis. The abbreviated version was used in the current study. The main researcher was trained by qualified Clinical Psychologists in the administration and scoring of the CAARMS. During study recruitment, the main researcher also took part in regular inter-rater reliability for the CAARMS supervised by Clinical Psychologists at the University of Edinburgh and University of Glasgow. All members of the research team working clinically (supervisors and AT) routinely used the CAARMS in clinical settings. If any uncertainty arose regarding scoring of the CAARMS this was discussed in supervision to reach a consensus decision.

The positive symptoms of the CAARMS consists of unusual thought content, bizarre ideas, perceptual abnormalities and disorganised speech. The CAARMS rates participant's experiences on a global score of severity of experience from 0 - 6, as well as a frequency score from 0 - 6. Participants are also asked to rate a distress score between 0 - 100 reflecting how distressing the young person finds the reported experience. Completion of these scales allows participants to be classified into one of four at-risk mental state groups:

Group 1: Vulnerability group - the young person has a first degree relative with a diagnosis of psychosis or has a history of Schizotypal Personality Disorder.

Group 2: Attenuated psychotic-like symptoms - the young person reports experiences of psychosis that are at a reduced frequency or intensity to those that would be reported in a first episode of psychosis.

Group 3: Brief Limited Intermittent Psychotic Symptoms (BLIPS) - the young person reports experiences of psychosis but these experiences remit within one week.

Group 4: Psychosis threshold - the young person reports experiences that are more intense and frequent and meet criteria for a first episode of psychosis (with symptoms present for longer than a week).

As can be seen from table 2 below, in this study the majority of the participants who met at-risk mental state criteria did so based on group 2, the attenuated psychotic-like symptoms group.

Table 2: Participant groupings based on CAARMS scorings

CAARMS criteria	Percentage of sample (%)
Below criteria on the CAARMS	45.5
Vulnerability	0
Attenuated psychotic-like symptoms	36.4
Brief limited intermittent psychotic symptoms	0
Vulnerability & attenuated psychotic-like symptoms	1.8
Psychosis threshold	10.9
Missing	5.5

The CAARMS can also be used to measure severity of psychotic experiences. This is achieved by multiplying the global rating scores and the frequency score for each of the subscales and combining these to reach an overall severity score with a total possible score of 144 (Morrison et al., 2012). This allows for more detailed exploration of the potential change in experiences of psychosis in addition to group membership of the at-risk mental state or psychosis threshold. In this study, the CAARMS severity score of the whole group varied considerably (M = 19.02, SD = 21.67) with a range from 0 – 92.

The reliability of the CAARMS has been reported as good to excellent (Yung et al., 2005). The concurrent validity of the CAARMS has also been reported as good, with 91.8% of participants in one study meeting both ARMS criteria on the CAARMS and the Brief Psychiatric Rating Scale and Comprehensive Assessment of Symptoms and History (Yung et al., 2005). The predictive validity of the CAARMS, and in particular the positive scale has however been questioned in the literature, with Yung et al (2005) reporting that as the overall score of positive symptoms increases the risk of onset of developing psychosis also increases but not significantly (hazard ratio = 1.28, p = 0.42). Further examination of the predictive validity has explored the transition to psychosis rates of the CAARMS, a relative risk has been reported of 12.44 (95% CI = 1.5-103.41, p = 0.0025; Yung et al., 2005). This was further explored in a meta-analysis by Oliver et al (2018) where it was highlighted that the CAARMS has a low specificity but adequate sensitivity, and is therefore able to identify individuals with symptoms, but less so individuals without symptoms. Despite these limitations, the CAARMS is currently one of the gold standard measures for examining at-risk mental states and early experiences of psychosis and is often used in clinical settings within the NHS (National Institute for Health and Care Excellence, 2013).

Functioning

The Global Assessment of Functioning (GAF) is an observer completed measure of participants functioning or overall wellbeing. This scale explores how well a person manages to complete everyday tasks such as attending university, college or work, or keeping in contact with family and friends. It also takes into consideration any mental health symptoms a person may be experiencing. The GAF is scored between 0 - 100, with higher scores reflecting greater functioning and overall wellbeing. In this study the GAF score ranged from 41 - 80 with a mean score of 64.71 (SD = 12.76). The mean score is therefore in the ‘some persistent mild symptoms’ bracket, while a score of 41 is in the ‘some serious symptoms or impairment in functioning’ bracket, and a score of 80 refers to ‘absent or minimal symptoms’.

The validity of the GAF has been examined through comparisons with other similar measures with people with mental health problems. These measures include the Functional Assessment Rating Scale (Schwartz, 2007), the Scale for the Assessment of Positive Symptoms (SAPS), the Scale for the Assessment of Negative Symptoms (SANS) and the Social Behaviour Schedule (Startup et al., 2002). Additionally, the GAF has also been compared with measures of support need and antipsychotic medication (Jones et al., 1995). In all cases the GAF has varied in the expected direction in relation to these measures.

Coping

The Adolescent Coping Scale (ACS; Frydenberg & Lewis, 1993) is a self-report measure looking at how individuals cope in stressful situations. There are two versions; a long-form and a short-form, the latter was used in this study. The short form assesses 18 coping strategies, divided into 3 categories; problem focused, reference to others, and non productive coping. Participants are required to rate answers on a 5 point Likert scale reporting how often they use each of the coping strategies ranging from 1 – 'doesn't apply/don't do it' to 5 'used a great deal'. There are general and specific versions of the questionnaire, both of which were used in this project. The general version asks the young person to report in general how often they would use each of the strategies, while the specific version asks the participant to note a particular concern or worry and rate the coping strategies in relation to that concern. The descriptive statistics for both versions of the ACS used in this study are reported below.

Table 3: Descriptive statistics for subscales of the ACS

ACS subscale	Mean (SD)
General version	
Problem focused coping	19.92 (4.27)
Reference to others	10.28 (2.20)
Nonproductive coping	25.28 (5.79)
Specific version	
Problem focused coping	19.63 (5.22)
Reference to others	10.17 (2.95)
Nonproductive coping	25.19 (6.46)

This measure reports good validity, the scale authors explored the correlations between individual items in the short form with the original long form of the questionnaire and the majority of the correlations were above 0.7 (Frydenberg & Lewis, 1993). When exploring the factor structure of the ACS three categories were reported in both the long and short form and moderate reliability was reported in both the general and specific forms respectively (problem focused: α= 0.61, α = 0.66; reference to others, α = 0.50, α = .66; non-productive coping, α = 0.66, α = 0.69), demonstrating evidence for these 3 scales within the measure (Frydenberg & Lewis, 1993).

In testing the reliability of the ACS in the current study, mixed results are reported. The reference to others subscale has low reliability, particularly in the general version of the questionnaire with cronbach's α = -0.07. The problem focused coping subscale demonstrated acceptable reliability in the general version (α = 0.76) and in the specific version (α = 0.80) of the questionnaire. On examination of the individual questions, the removal of any of the items did not improve the reliability of this subscale in both versions and therefore the original structure was retained. The nonproductive coping subscale initially produced an α = 0.70 in both versions of the

questionnaire which is acceptable, however on examining each of the individual items, two of these reported higher alpha values if they were removed from the subscale (question 5 and question 6) so these items were removed in both the general version and specific version to improve the consistency of the subscale. Results are displayed in table 4.

For subsequent analysis in this thesis, the reference to others subscale will not be used due to the low reliability score, while the problem focused coping and nonproductive coping subscales will be retained. Problem focused coping will reflect the original structure suggested by Frydenberg and Lewis (1993) with 6 items (questions 2, 17, 18, 6, 3 and 15). Nonproductive coping will consist of a 7 item subscale instead of the original 9 item scale (questions 4, 7, 8, 9, 11, 12, 13). The updated Cronbach's α are reported in table 4.

Table 4: Cronbach's α scores for subscales of the ACS

ACS subscale	Cronbach's Alpha
General version	
Problem focused coping	0.76
Reference to others	-0.07
Nonproductive coping	0.83
Specific version	
Problem focused coping	0.80
Reference to others	0.29
Nonproductive coping	0.81

Emotion Regulation

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a self-report questionnaire of emotion dysregulation compromising of 41 items split into

6 subscales. These 6 subscales are; nonacceptance (responding negatively to current distress); difficulties with goal-directed behaviour (difficulty completing tasks while experiencing negative emotions); impulse control difficulties (difficulties controlling behaviour while experiencing negative emotions); lack of emotional awareness (lack of awareness and ability to acknowledge emotions); limited access to emotion regulation strategies (belief that there is nothing that can be done to regulate emotions effectively once distressed) and lack of emotional clarity (lack of understanding of current emotions). The descriptive statistics for the DERS in this study are shown in table 5 below.

Table 5: Descriptive statistics for subscales and total score of the DERS

DERS subscale	Mean (SD)
Nonacceptance	17.46 (5.58)
Difficulties with goal-directed behaviour	17.19 (4.19)
Impulse control difficulties	13.37 (5.24)
Lack of emotional awareness	15.48 (4.62)
Limited access to emotion regulation strategies	20.69 (7.23)
Lack of emotional clarity	12.65 (3.70)
Total DERS score	97.73 (21.81)

The total score of the DERS has been associated with emotion regulation difficulties across a number of different mental health problems such as obsessive compulsive disorder (Yap et al., 2018); social anxiety (Helbig-Lang et al., 2015) and bipolar disorder (Van Rheenen et al., 2014). The authors of this measure report excellent internal consistency with α = 0.93, and the individual subscales were also reported as good to excellent; nonacceptance α = 0.85, goals α = 0.89, impulse α = 0.86, awareness α = 0.80, strategies α = 0.88 and clarity α = 0.84 (Gratz & Roemer, 2004). More recently however, the reliability of the DERS has been questioned with

some researchers examining the overall factor structure (Benfer et al., 2019) and in particular discrepancies have been reported with the awareness subscale of the DERS (Bardeen et al., 2016; Hallion et al., 2018). In the current study, the DERS reported good to excellent consistency with Cronbach's alpha scores ranging from 0.81 - 0.90 for the questionnaire subscales, these results are reported in table 6.

Table 6: Cronbach's α scores for the subscales of the DERS

DERS subscale	Cronbach's Alpha
Nonacceptance	0.87
Difficulties with goal-directed behaviour	0.88
Impulse control difficulties	0.90
Lack of emotional awareness	0.81
Limited access to emotion regulation strategies	0.90
Lack of emotional clarity	0.86

Attachment

The Adult Attachment Interview (AAI; George et al., 1996) is a semi-structured interview of 20 questions exploring participants' experiences of growing up. The interview follows a set protocol and asks individuals about their relationship with their caregivers and asks them to recall specific memories from childhood, including experiences of separation, rejection, abuse and threatening behaviour. It allows states of mind with regards to attachment to be assigned. Interviews were recorded on an encrypted Dictaphone and then transcribed verbatim and coded by the author. The author completed a 2 week training course in coding the AAI, and following this successfully completed 18 months reliability training with the AAI institute (see Appendix 14). Following coding, transcripts were assigned to one of three organised categories; secure-autonomous, insecure-dismissing and insecure-preoccupied. A fourth category was also assigned for transcripts that are unresolved with regards to

trauma or loss. The AAI has been found to be reliable, with researchers reporting 78% of participants classified in the same main category when interviewed two months apart (Bakermans-Kranenburg & van Ijzendoorn, 1993). Additionally, the predictive validity has been reported as acceptable for 3-way and 4-way classifications (Ijzendoorn, 1995). In the current study, the split of the attachment categories for both 3-way and 4-way coding can be seen in table 7 below.

Table 7: Number of participants meeting AAI classifications (percentage in brackets)

Classification	3-way	4-way
Secure (F)	38 (73)	36 (69)
Dismissing (Ds)	11 (21)	11 (21)
Preoccupied (E)	3 (6)	1 (2)
Unresolved (4-way)	-	4 (8)

In this thesis, scores from the AAI will be used to provide three variables of attachment for the analyses in the following chapters. The first will be a categorical variable where participants will be grouped into either secure or insecure categories. The second will use the coherence of mind scores to provide a dimensional measurement, in this case higher scores will reflect greater attachment security. Both of these methods of using scores from the AAI have been used robustly in previous literature. The final variable of attachment is more exploratory and is based on the subcategories assigned to AAI transcripts. When coding the AAI, transcripts are assigned to categories for secure, preoccupied and dismissing attachment styles, and they are also subcategorised into twelve more specific classifications based on these groupings. For secure attachment styles one of five subcategories can be scored (F1 - F5), for dismissing attachment styles there are four subcategories (Ds1 - Ds4) and for preoccupied attachment styles there are three (E1 - E3). These ratings were organised into a dimension from secure to insecure by the author, following discussion with their supervisors. Although this method has not

previously been reported in current literature, it is based on the original categories of the AAI and as such is not a new way of coding the AAI but builds on the available coding structure currently published by Main and colleagues. Despite this, it should be noted that there is no current published validity of using this scale and therefore this will be a more exploratory element to measuring attachment styles in this thesis. This dimensional scale produces a 6 point Likert scale where again higher scores represent greater attachment security. This attachment variable will be referred to in this thesis as attachment dimension. The scale is summarised in the table below;

Table 8: Overview of scoring attachment based on subcategories of the AAI

AAI subcategory	Assigned score	Adult states of mind
F3	6	Prototypically secure
F2 & F4	5	F2 - some detachment F4 - slightly preoccupied
F1 & F5	4	F1 - some 'setting aside' F5 - somewhat resentful/conflicted
Ds3 & E1	3	Ds3 - restricted in feelings E1 - passive
Ds1, Ds2, & E2	2	D1 - dismissing D2 - devaluing E2 - angry
Ds4 & E3	1	Ds4 - cut off from source of fear regarding possible loss E3 - overwhelmed/fearfully preoccupied

Table 8 shows the AAI subcategories on the left, these are the subcategories assigned by the coder following training at the AAI institute. The middle column shows the assigned score, this score was allocated by the researcher based on the level of attachment security in line with the notes in the final column of the table under adult states of mind. To put the subcategories onto a dimensional scale the researcher used the adult states of mind to apply the level of attachment security. For example, a transcript that is placed into the F3 subcategory is prototypically secure according to the scoring from training at the AAI institute. In this case, an F3 transcript was assigned a score of 6 on the dimension variable in this thesis.

Continuing through the subcategories, a transcript that is assigned an F2 or F4 category is a secure rating however the transcript will demonstrate some aspects of an insecure attachment style, the F2 rating is similar to a F3 rating but there will be some indices of detachment in the transcript, for example there may be low level idealization of parents. An F4 rating is also a secure rating but the transcript demonstrates aspects of preoccupation at low levels. Both an F2 and F4 rating are assigned a score of 5. A transcript assigned an F1 rating also demonstrates some elements of dismissing attachment at low levels (some lack of attention to attachment relationships). A transcript rated as F5 will show elements of a preoccupied attachment style with elements of mild preoccupation with attachment relationships. Both of the F1 and F5 ratings were assigned a score of 4 for the dimensional scale.

The remaining subcategories all refer to insecure attachment styles and were assigned scores between 3 – 1. The Ds3 subcategory is assigned when the transcript demonstrates a dismissive attachment style that is restricted in feelings or downplays negative experiences. The E1 subcategory is assigned when the transcript demonstrates a passive or vagueness in discussion of childhood experiences. Both of the Ds3 and E1 ratings were assigned a score of 3. Two further dismissing subcategories, Ds1 and Ds2 reflect transcripts that demonstrate a dismissive stance to attachment or a devaluing of attachment relationships respectively. Both of these subcategories were assigned a score of 2 for the attachment dimension variable. In addition, the E2 subcategory, a transcript that demonstrates an angry stance to attachment relationships is also assigned a score of 2.

The final two subcategories, Ds4 and E3 have been assigned a score of 1 on the dimensional scale. A rating of Ds4 reflects a transcript that demonstrates an insecure attachment style based on a fear of loss of a child which is not connected to a specific source and suggests an avoidant attachment style. The E3 rating is assigned to transcripts that demonstrate a current fearful preoccupation from traumatic experiences.

Analyses in this thesis will use all three variables of attachment to explore the relationships with stress sensitivity, psychotic experiences, mentalization and emotion regulation. Descriptive statistics of these three variables are displayed in table 9 and 10 below.

Table 9: Summary statistics of attachment categories from the AAI

Category	Number of participants	Percentage of sample
Secure	38	73
Insecure	14	27

Table 10: Summary statistics of coherence of mind scores and attachment subcategories from AAI

	Mean	SD
Coherence of mind	5.32	1.41
Attachment dimension	4.19	1.03

Mentalizing

The AAI was also coded to establish an individuals' ability to mentalize, using the Reflective Function Scale developed by Fonagy and colleagues (Fonagy et al., 1998). By coding the AAI narrative, a score of reflective function (RF) is reported on an 11 point scale from -1 (negative RF) to 9 (exceptional RF). Extensive work on the psychometric properties of the scale has yet to be completed, but the initial validation of the scale demonstrated that RF scores are related to the coherence factor on the

AAI (which is the most widely used subscale on the AAI to differentiate secure and insecure transcripts) as well as the strange situation behaviour of children (Fonagy et al., 1998). Further validation studies have shown that the RF scale is unaffected by age or gender, and lower scores are reported in people with mental health conditions (Taubner, Hörz et al., 2013) as well as people with aggressive behaviour and psychopathic personality traits (Taubner, White et al., 2013).

The author coded the transcripts for RF following successful completion of reliability training at the Anna Freud Centre (see Appendix 15). In the current study, mentalization scores ranged from 1 – 7 and the mean score was 2.73 (SD = 1.65). The mean score is therefore lower than a score of 5 which has been reported previously for general population adult samples (Fonagy et al., 1996), and a score of 3.99 in a sample of adolescents (Taubner et al., 2013).

To demonstrate the associations between the measurements of attachment and mentalization in the current study, table 11 shows the correlations between these concepts which are all above .3. There is a large association between the coherence of mind score and the subcategory dimension score on the AAI. A smaller association is reported between the RF score and both attachment scores (CoM and dimension).

Table 11: Correlation matrix of attachment and RF scores

	CoM Score	Subcategory dimension score	RF score
CoM score	-		
Subcategory dimension score	.73	-	
RF score	.46	.36	-

The Experience Sampling Method (ESM)

Participants completed 6 days of experience sampling and were alerted via a tone signal occurring at quasi-random points 8 times per day between the hours of 7.30am-10.30pm. Participants were asked to complete the experience sampling questions within 15 minutes of the notification. Participants were able to complete the ESM through a mobile phone app or by using paper booklets, the majority of participants used the mobile phone app with only 2 participants using the paper booklets. When using the mobile phone app, the questions become inactive after 15 minutes and the opportunity to report at that time point was lost. Previous ESM studies have reported that questions answered after 15 minutes are less reliable and therefore this is usual practice for ESM studies (Delespaul, 1995). Each participant was required to complete a minimum of 33% of the ESM questionnaires to be included in the analysis which is also in line with other experience sampling studies (e.g. Bak et al., 2012; Kimhy et al., 2012; Palmier-Claus et al., 2011). A number of questions were asked which on average took less than two minutes for participants to complete and were based on previous ESM studies (Myin-Germeys et al., 2002; Myin-Germeys et al., 2003):

A) Current emotions: participants reported whether they were currently experiencing a range of emotions from: irritated, enthusiastic, lonely, anxious, sad, guilty, happy, relaxed and satisfied. They reported these on a 7-point scale from ‘not at all’ to ‘very much’.

B) Activity stress: report of current activity and rating on: whether they like this activity; how much effort it requires; whether they feel they have the ability to do the activity; and whether they would prefer to be doing something else. Answers were reported on a 7-point Likert scale from ‘not at all’ to ‘very much’.

C) Social Stress: participants responded whether they were alone or with others, and whether they currently like being alone/with others. When reporting that they are with others, participants are asked to report who they are with (from partner; family; friend; classmate; colleague; stranger and other).

D) Event stress: report of the most important event that has happened since participant’s last completed ESM, and rating of how pleasant this event was on a 7-point Likert scale from ‘very unpleasant’ to ‘very pleasant’.

E) Emotion regulation strategies: six questions were asked regarding emotion regulation strategies, participants were required to rate how often they had used each of these strategies since their last report. Three questions explored adaptive strategies; trying to keep calm by taking deep breaths or relaxing muscles (calming); talking about your feelings and reactions with others (social sharing) and changing the way you think about the situation you are in (reappraisal). A further three questions explored maladaptive strategies; thinking about your feelings over and over (rumination); turning your attention away from what is making you feel emotional (distraction) and trying not to show your emotions on the outside (suppression). Participants reported on a 7-point scale from 'not at all' to 'very much'.

Mobile Phone App Development

At the time of designing this PhD there was no available mobile technology that could be used to collect the required experience sampling data. Therefore, the author worked in collaboration with a MSc student from the Informatics department at the University of Edinburgh to develop a mobile phone app. The mobile phone app named TRACK was developed for the Android platform and was available on Googleplay to download on to mobile phones. The process of designing the app involved a number of features that were imperative to the current study. Not only did the app need to meet the requirements to complete the experience sampling questions such as providing participants will set questions over several timepoints throughout a 6 day period, the app also needed to provide notifications to the participant to inform them when the questions were available to complete. The app was required to support a range of questions, including Likert scales and free text options. The data from the app was also required to be sent to the University of Edinburgh server for later download and analysis by the author. The mobile phone app went through several iterations to include these necessary features and to reach the final version used in the current study.

2.8 Statistical Analysis

Data cleaning and preparation was conducted in IBM SPSS statistics version 25. Study demographics and analysis in chapter 2 and 3 were also completed in IBM SPSS. When using ESM, the data has a hierarchical structure as ratings in daily life (level 1 data) are nested within participants (level 2 data). This structure means that traditional regression analyses would not be suitable as they require observations to be independent. Multilevel models are typically used in the analysis of ESM data as these types of models can take into consideration the structure of the data as well as difficulties arising in ESM studies such as missing timepoints or unequal spacing between time points (Viechtbauer, 2021). In the models in the following chapters, outcome variables are focused on daily emotions, daily emotion regulation strategies or aspects of social context. Predictors are attachment variables, stressors, and psychotic experiences. Predictor variables will be grand mean centred where the overall mean score of the variable across the sample is subtracted from each individual value. The intercept will then be the value of the outcome variable when the predictor variable is at its mean (Finch et al., 2019). Centring in MLMs is common as it reduces collinearity from including interactions in models as well as from correlated random intercepts and slopes (Finch et al., 2019). All multilevel modelling in chapters 4, 5, 6 and 7 will be completed using the R statistical package.

In this thesis, the traditional significance cut off points will be used in the results sections, referring to probabilities of less than 0.05 or less than 0.01. Given that the sample size is modest, trend level results (between 0.05 – 0.10) will be also be signposted within the results, these results will be highlighted to the reader as to differentiate these from significant findings.

Missing Data

In this study there are two areas of missing data; individual scores on the self-report questionnaires and data from experience sampling timepoints. For individual scores, data were checked to confirm missing data did not constitute more than 10%. It has been argued that datasets with less than 10% missing are unlikely to bias the statistical

analysis (Bennett, 2001). All of the self-report questionnaires in this study reported less than 10% of missingness, with the ACS reporting less than 5% of individual items missing and the DERS less than 10%.

For experience sampling data, participants were unable to skip questions in completing their reports on the mobile phone app to help reduce the incidence of missing values at each timepoint. Despite this, missing data is routine in experience sampling studies as many participants will miss notifications to complete timepoints. Following previous experience sampling research, if a participant completed less the 33% of the notifications (16 timepoints) in the current study their data was not used in the analysis. Six participants completed less than 33% of the ESM timepoints and were therefore excluded from the analysis. When all the experience sampling items are missing at an individual time point this is often taken as Missing At Random (MAR) despite there being no appropriate method to confirm this in experience sampling studies (McLean et al., 2017). All multilevel models will use restricted maximum likelihood estimation which has been noted as appropriate for multilevel models (Finch et al., 2019).

2.9 Study Aims and Hypotheses

Each of the analysis chapters (chapters 3 - 7) will cover several hypotheses centring around the developmental factors of attachment, mentalization and emotion regulation and how they influence responses to daily hassles. The aims and hypotheses in each chapter are noted below.

Given the prominence of ESM in this thesis, chapter 3 will provide a critical overview of the wider context in which ESM sits in relation to the use of digital technology in clinical psychology. The opportunities and barriers within this field will be discussed before one specific area surrounding the validity of ESM data will be explored further. Chapter 3 will examine data collected through self-report and data collected through experience sampling to establish the validity of the experience sampling method. This chapter aims to establish whether emotion regulation data collected

through self-report and data collected through experience sampling with be correlated and related in regression analyses.

Chapter 3 therefore hypothesizes that problem focused coping (ACS) will be positively correlated with adaptive regulation strategies (ESM). Nonproductive coping (ACS) and subscales of the DERS (non-acceptance of emotional responses; difficulties engaging in goal-directed behaviour; impulse control difficulties; lack of emotional awareness; limited access to emotion regulation strategies; lack of emotional clarity) will be positively correlated with maladaptive regulation strategies (ESM). The same relationships between variables are hypothesized for the regression analyses however it is expected that in both cases the self report variables will not account for a large proportion of the variance in ESM variables.

Chapter 4 aims to explore the relationship between attachment, emotion regulation and mentalization. Firstly, it will examine the relationship between these concepts and then mediation analyses will explore whether mentalization mediates the relationship between attachment and emotion regulation. A final set of analyses in this chapter will use multilevel models to explore the relationship between attachment style and emotion regulation strategies measured in daily life.

It is hypothesized in chapter 4 that secure attachment will have a positive relationship with problem focused coping and a negative relationship with non productive coping. Secure attachment is also hypothesized to have a negative relationship with difficulties with emotion regulation (total score on the DERS). It is further hypothesized that mentalization will mediate the relationship between attachment and problem focused coping, nonproductive coping and difficulties in emotion regulation. Analyses with multilevel models will examine the hypothesis that secure attachment will be positively associated with adaptive emotion regulation strategies namely calming, social sharing and reappraisal to regulate momentary levels of negative emotion. A further hypothesis is that there will be a negative association between secure attachment and maladaptive regulation strategies

namely rumination, distraction and suppression to regulation momentary levels of negative emotion.

Chapter 5 will explore the concepts of attachment, psychotic experiences and stress sensitivity. Stress sensitivity refers to the impact of daily hassles or stressors on an individual's affective states. This chapter will examine whether attachment styles impact on how young people respond to daily hassles and stressors and it was also look at the association between psychotic experiences and stress sensitivity.

It is hypothesized in chapter 5 that insecure attachment will be associated with increased stress sensitivity, i.e. increasing negative affect and decreasing positive affect in response to daily hassles (activity, event and social stress). It is further hypothesized that psychotic experiences will be associated with increased stress sensitivity, therefore as psychotic experiences increase participants will report increasing negative affect and decreasing positive affect in response to daily hassles.

Chapter 6 will examine the impact of attachment, mentalization and psychotic experiences on young people's appraisal of their social context. Two aspects of context will be explored; enjoyment being alone or with others and preference to be alone or with others. To examine whether these appraisals persist over time, an exploratory time series analysis will explore whether reported enjoyment and social preference linger from one timepoint to the next.

Chapter 6 hypothesizes that enjoyment when alone or with others will not be related to attachment style or mentalization score. It is hypothesized that secure attachment will however be associated with preference to be with others when alone. Greater mentalization score will also be associated with preference to be with others when alone. This chapter further hypothesizes that psychotic experiences will be associated with decreasing enjoyment (whether alone or with others) and a greater

preference for company when alone. It is also expected that attachment security and greater mentalization will buffer the negative relationship of psychotic experiences on enjoyment and social preference. Although the time series analysis is exploratory it is suggested both reported enjoyment and preference to be with others or alone will persist over time.

The final analysis chapter (chapter 7) explores emotion regulation strategies in daily life by looking in greater detail at a case series of FEP participants. In this chapter, a case series group of FEP participants will be compared with participants in the current study who did not report any experiences of psychosis. Emotion regulation strategies used in daily life will be compared across these two groups.

Chapter 7 will specifically explore social stress and it is hypothesized that FEP participants will report using more maladaptive emotion regulation strategies namely rumination, distraction and suppression than the comparison group in response to social stress. It is also hypothesized that FEP participants will use more maladaptive strategies over time.

Chapter 3 - The Validity of the Experience Sampling Method and its use in Mental Health Research and Clinical Services

3.1 Research objectives

This chapter has two main aims; firstly, to provide a critical overview of the growth of digital technology in mental health research and practice including how this technology, with a specific focus on the experience sampling method (ESM), has been utilised as a tool in mental health research and can be integrated into mental health services. The use of digital technology has quickly evolved in mental health research and the speed of this progression has created questions around the reliability, validity and effectiveness of this technology. This chapter will explore one of these areas in greater detail by examining the validity of ESM data and comparing this to data collected by self-report. This chapter therefore secondly aims to examine emotion regulation data collected via ESM with self-report data collected from validated questionnaires to explore whether ESM data is conceptually different from data collected from more traditional measurement methods.

3.2 Introduction

mHealth and the Growth of Mental Health Apps

Access to the internet has grown in the last 20 years with just 9% of UK households having access in 1998 compared to 90% in 2018 (Office for National Statistics, 2018). Related to the growth in internet usage is also a change in the way people now access information and content online. Recent figures show 95% of young people aged 16-24 years access the internet away from home or work, and the majority (92%) access via a mobile phone or smartphone (Office for National Statistics, 2018). This has contributed to vast developments in mobile technology which allow people to complete a wide range of tasks from communicating through social media to monitoring activity data such as step counts or sleep patterns. Many of these functions are completed through mobile phone applications (apps), software or computer programmes that are specifically designed for a mobile device.

In addition to these more general functions, mobile phone apps have also been designed specifically in relation to mental health for example to provide short-term therapy, assisting individuals to monitor their symptoms and overall mental health as well as educational tools providing information on mental health conditions. Recent estimates suggest there are 10,000 mental health apps currently available to download (Torous & Roberts, 2017) and it is reported that mental health apps are now being developed with a focus on more advanced features and further integration of data (Bucci et al., 2019). By further developing apps and adding more features it becomes more difficult to pinpoint which aspects of mobile apps may be behind changes in participants' mental health. This is particularly challenging for replicating and producing reliable evidence on the effectiveness of mental health apps. To further compound these difficulties the speed of progression and existential growth in this field has also been challenging for researchers, clinicians and the general public to keep up with.

The use of mobile technology has particularly expanded in mental health research to explore new approaches to understanding mental health challenges both in their aetiology and phenomenology. In fact, it has been argued that mobile technology may be of particular relevance to the development of psychosis in young people as it can be used to assist in understanding the nuances of early psychosis (Torous et al., 2019). Psychotic experiences are often integrated with other mental health experiences and can be challenging to differentiate in the early stages. Using technology to report on micro level changes in mental states may help to further identify the development of psychosis as more subtle changes in emotional experience can be reported through approaches like experience sampling. To date, ESM has allowed for a greater understanding of individual experiences, as well as treatment effects and biological mechanisms in psychosis (Myin-Germeys et al., 2009). Experience sampling studies have emphasized the dynamic nature of symptoms waxing and waning, for example Myin-Germeys et al (2001) reported that on average participants with Schizophrenia reported delusions around 32% of the time. Additionally, ESM studies have shown that participants with Schizophrenia reported more intense and variable emotional experiences in daily life, a point that may be more difficult to establish through behavioural observations of participants

interactions (Myin-Germeys et al., 2000). By focusing on the more dynamic nature of symptoms, early experiences of psychosis can be greater understood and researchers and clinicians can explore the factors that influence these changes in symptoms to develop more relevant and personalised treatments.

In addition to exploring the nuances of early psychosis, it is argued that the use of technology can be particularly appealing to many young people with mental health problems. As mentioned previously, young people are generally accepting of the use of technology with research showing that 67% of young people with psychosis reported they were comfortable or very comfortable in online settings (Lal et al., 2015). Additionally in a recent systematic review exploring interest in mHealth interventions, 60% of people with psychosis reported an interest in tracking or monitoring their mental health (Firth et al., 2016) reinforcing the potential for advancing mobile technology in this area for young people with psychosis.

Digital Technology in Clinical Services

Although mobile technology has provided opportunities within mental health research, applying these advances to clinical services is more difficult and has been fraught with a number of significant challenges. Currently the NHS recommend 15 mental health apps for use (NHS, 2021) despite the extensive number that are available online. Often apps that are advertised directly to the public are unchecked for reliability, validity and efficacy and there are significant risks around privacy and confidentiality of data, with many apps lacking sufficient privacy policies (Torous & Roberts, 2017). There are also concerns around the IT skills of users and staff to be able to keep up with developments in app interventions as well as around services being able to work in conjunction with mobile technology (Aref-Adib et al., 2018). People report having reservations using technology as it can feel impersonal without face-to-face interaction (Aref-Adib et al., 2018). Given these limitations, some researchers have advocated for mobile apps to be used as a subsidiary until further evidence of their efficacy and validity can be achieved (Hsin et al., 2016). However, more recent research has now started to explore efficacy with two systematic reviews reporting that mobile technology can moderately improve medication and

appointment adherence (D'Arcey et al., 2020; Gire et al., 2017). There is therefore initial evidence for the merits of using mobile technology although significantly more research is required to advance into areas of symptoms, experiences and treatment effects.

Despite these challenges, mobile technology can provide opportunities to create better services designed around individuals. For example, mobile technology can be used to provide clinicians with more relevant information about patient's symptoms allowing clinicians to tailor treatment plans to individual needs. This is particularly relevant to the experience sampling method where people can monitor their mental health symptoms which can lead to people gaining ownership over their mental health wellbeing (Myin-Germeys et al., 2018) while additionally providing clinicians with more individualised information regarding their patients' context and the wider influences on their mental health. It has also been suggested that digital technology can provide a degree of anonymity which may be beneficial to some people who choose to be more open about their mental health through technology. For example, Torous et al (2015) found that participants reported suicidal ideation more often through an app than through a traditional self-report questionnaire. Additionally, mobile technology gives the opportunity to engage people over a wide geographical area, which for people in remote communities may be the only realistic option to allow routine access to mental health services. Another avenue for technology use in mental health services is by providing interventions, either as stand-alone treatments or adjunct to therapy. Although very much in its infancy early research has demonstrated that such approaches are generally feasible and acceptable to participants (Camacho et al., 2019; Gire et al., 2017). The next step will be to establish whether these interventions are effective in improving mental health for participants where currently results are less clear. For example, in relation to psychosis symptoms, a recent meta-analysis suggested computer-assisted cognitive remediation had no impact on symptoms while web-based cognitive behavioural therapy for psychosis (CBTp) and therapies using avatars had potential to improve symptoms however results are based on a small number of studies (Clarke et al., 2019). A further review of the literature demonstrated that on the limited number of RCTs of digital interventions in early psychosis participants reported they were

willing to try such interventions with some evidence for improvements in social functioning (Rus-Calafell et al., 2020) but again studies of RCTs and systematic reviews are only starting to be published in this area so further work is required to reach more concrete conclusions.

Despite a number of challenges in incorporating mobile technology into clinical services there is ever increasing pressure within services as many people are waiting to access treatment while services are required to become more cost efficient and to find new ways of providing services (Hollis et al., 2015). Recent figures in Scotland show young people are waiting longer to start treatment, as average wait times increased from 7 weeks in 2013/2014 to 11 weeks in 2017/2018, additionally there are variations across NHS boards with young people in NHS Grampian waiting 21 weeks on average for their first appointment and those in NHS Islands (including NHS Orkney, NHS Western Isles and NHS Shetland) waiting 5 weeks in 2017/2018 (Audit Scotland, 2018). Demand for CAMHS services across Scotland was shown to be increasing with referrals up by 22% between 2013/2014 and 2017/2018 (Audit Scotland, 2018).

The Impact of the COVID-19 Pandemic

More recently the COVID-19 pandemic has also greatly impacted mental health services in Scotland with CAMHS referrals reducing at the start of the pandemic but increasing following the end of lockdown with the highest number of referrals reported at the last publication of figures in June 2021 (Public Health Scotland, 2021). Services have been required to adapt to moving online during lockdown periods and then returning to more face-to-face sessions in later stages of the pandemic. Recent waiting list figures are comparable to previous years with half of all young people starting treatment within 7 week and continued variations across boards with shorter wait times in NHS Islands and NHS Greater Glasgow and Clyde (3 weeks) and longer wait times in NHS Dumfries and Galloway (21 weeks; Public Health Scotland, 2021). Despite these comparable figures, the number of young people starting treatment is still below the Scottish Government target of 90% of

young people being seen within 18 weeks of a referral, for the period April-June 2021 72.6% of young people were seen within this timeframe.

Although the impacts of lockdown are to be fully examined early research has shown that mental health problems in young people have been exacerbated by continued periods of isolation from social groups and time away from school, clubs and social interactions with their wider family. This is exemplified in a recent report from January/February 2021 stating that 67% of young people felt that the pandemic will have a long-term negative impact on their mental health (Young Minds, 2021). Additionally, participants reported that loneliness/isolation and worries about school, college or university work were their main concerns during this time. Therefore, the mental health implications of the pandemic are likely to continue to be felt for some time, and this could also continue to put pressure on mental health services.

A further consequence of the pandemic is that many people have interacted with technology in ways never required before, both for individuals themselves but also for organisations such as the NHS. Again, research is only starting to be published in this area but so far it has been suggested that the pandemic has changed the way we interact with technology with both positive and negative implications. One recent survey examining the impact of increasing technology in patients of NHS services and NHS staff noted that the majority of individuals reported positive experiences using technology in the early stages of the pandemic (Horton et al., 2021). This report did however find an effect of age where participants over 55 years were more likely to report negative experiences and younger people more likely to report positive experiences in the use of technology in NHS services. Although there are still significant challenges to overcome, the pandemic has demonstrated that the NHS can adapt to using technology in delivering services across the UK and this has the potential to transform services (Hutchings, 2020). This should be viewed with the backdrop that technology will not be a suitable solution for everyone as demonstrated by the differing experiences of using technology for different age groups however, if mobile technology can become one option available to people that are happy to use it this could help to provide people with a more personalised

approach to their mental health while secondarily transforming the way NHS services are delivered.

The Experience Sampling Method

The experience sampling method (ESM; Hektner et al., 2007) or ecological momentary assessment (EMA; Shiffman et al., 2008) is a structured diary technique which allows for the repeated collection of data over periods of time, usually days or weeks. ESM is related to ecological psychology which emphasizes that behaviour can only be understood in the context in which it originates (Myin Germeys et al., 2018). This methodology is often used to examine momentary changes in affect, subjective experience, and people's thoughts and feelings. These psychological constructs are integral across different mental health diagnoses, contributing to the appeal of using experience sampling to understand the development and experience of many mental health challenges such as depression (Hartmann et al., 2015); psychosis (Lataster et al., 2013); social anxiety (Blalock et al., 2016); bulimia nervosa (Goldschmidt et al., 2014); anorexia nervosa (Vansteelandt et al., 2013) and attention deficit hyperactivity disorder (Knouse et al., 2008).

Experience sampling has a number of benefits; firstly as participants are required to report in the moment while in everyday contexts, recall bias is reduced and ecological validity is high. Secondly, experience sampling methodology allows for a deeper understanding of an individual's context which more traditional methods are unable to access and allows for exploration of the influence of context on mental health. Related to this, ESM also enables the study of dynamic processes, for example emotion and mood changes throughout the day and how this flow impacts on behaviour and the way we interact with others. Understanding these links between context, experiences and mental wellbeing is vital for developing effective treatments and interventions (Ebner-Priemer & Trull, 2009; Myin-Germeys et al., 2009). Treatments and interventions can therefore be designed around dynamic processes allowing for a more personalised approach where a particular combination of experiences, feelings and thoughts can be established as an early warning sign

for an individual and relevant therapy techniques can subsequently be designed around these warning signs to prevent relapse (Marzano et al., 2015).

Although originating as a research methodology, ESM has been advocated as a tool for use in mental health services. It is argued that in combination with face-to-face appointments, ESM provides the opportunity for people to self-monitor their mental health and develop a more individualised approach to mental health care (van Os et al., 2017). Evidence suggests that data collected from ESM is regarded by patients as more personal or neutral which could provide a strong basis to make decisions collaboratively regarding care and treatment (Bos et al., 2019). It has also been argued that ESM can be utilised in clinical services as a routine outcome measure (Verhagen et al., 2017). This would allow for a more reflective and nuanced understanding of an individual's distress and mental wellbeing. Current outcome measures often involve validated questionnaires or clinical assessments, which do not allow for a more detailed exploration of change such as a worsening of symptoms over time. ESM data in comparison is in the context of the individuals daily life and therefore allows for changes to be better understood, as ESM taps into microlevel changes in mental state. This is particularly relevant to mental health as for the majority of mental health problems fluctuations in emotions are key features (Myin-Germeys et al., 2018). The benefit of this is not only can wellbeing be examined in everyday contexts and is therefore more reflective, but also when changes in mental states occur these are highlighted quicker with ESM. When changes are known quickly, treatment decisions can be made earlier to continue or to change a particular intervention.

Validity of the Experience Sampling Method

The experience sampling method is known to produce data with high ecological validity, and as a result is often used in comparison studies to explore the validity of more traditional approaches such as self-report questionnaires or clinical interviews. It has been argued that ESM produces data that is related to self-report or interview data but that there will be differences between these methodologies as they measure different aspects of subjective experience. ESM typically explores in the moment

feelings, while self-report and interview measures focus on more longer term affective states (Myin-Germeys et al., 2009; So et al., 2013).

Initial studies exploring the validity of ESM with traditional measurements suggested similarities between the two methodologies. In one such study comparing ESM data with depression and anxiety scores on the Beck Depression Inventory (BDI) and the Beck Anxiety Inventory (BAI) in people with psychosis, scores on the BDI and the BAI significantly predicted depressed and anxious mood severity on the ESM. Several questions were also asked regarding experiences of psychosis, and the positive subscale of the Positive and Negative Syndrome Scale (PANSS) predicted matched symptoms on the ESM (Granholm et al., 2008), indicating evidence for the concurrent validity of experience sampling. Kimhy et al (2009) also explored subjective levels of stress on ESM with arousal levels measured through electroencephalogram (ECG) in people experiencing psychosis and confirmed an association between levels of stress across both measures.

A number of studies exploring the validity of ESM have used correlational analyses emphasizing important findings which provide a basis for more intensive statistical analyses. When comparing symptoms of psychosis reported through an app with symptoms measured on the PANSS, some experiences (hopelessness, delusions, anxiety, hallucinations, and suspiciousness) strongly correlated (rho > .60), while some moderately correlated (grandiosity, depression, guilt and somatic concern; rho > .35) and on others no correlation was reported (passive and apathetic social withdrawal, hostility, excitement and cognitive disorganisation; Palmier-Claus et al., 2012). The authors argue the symptoms which showed no correlation are usually scored through observation on the PANSS making direct comparison between these scores more difficult. It is also of note that in this study participants were asked to report the presence of symptoms since the last report they completed therefore giving participants the opportunity to reflect on their symptoms, this is slightly different from typical ESM studies as they often ask people to report in the moment, however comparison here is still useful.

Similar results have also been reported in a study of negative mood (on ESM) correlating with measures of depression (correlation range: .39 -.71) and anxiety (correlation range: .54 - .69; Tsanas et al., 2016), as well as quality of life explored through ESM and self-report in people with psychosis and controls, where a positive correlation was also reported (.52 for patients and .44 for the control group; Leendertse et al., 2018). Although these studies report similarities between constructs measured via ESM and self-report or interview data the majority of the reported correlations are not large suggesting that these constructs are not fully related. These types of relationships could be further explored with more stringent statistical analyses exemplified by So and colleagues (2013) who used multilevel modelling and reported associations between suspiciousness, visual hallucinations but not auditory hallucinations. Additionally, Peters et al (2012) used multilevel modelling and reported associations between aspects of hallucinations and delusions measured through clinical ratings and ESM. These authors conclude that ESM data is more sensitive in comparison to clinical measurements adding to the discrepancies when trying to compare these measures. It is evident that more studies are required using multilevel modelling to examine these discrepancies further and establish how these methodologies are related.

It is likely that traditional methods are tapping into more longer term feelings contributing to differences in results from ESM variables which are argued to be more momentary feelings. In an effort to explore the possible role of memory impacting on self-report measures, two important studies have supported the viewpoint that ESM and self-report measures may be tapping into different facets of the same constructs. When comparing ESM measured depression and retrospectively reported depression in a group of people with psychosis, Blum et al (2015) reported a significant correlation ($r = .61$, $p<0.001$) between the two measures, however when long-term memory was controlled for this correlation reduced to trend level ($r = .31$, $p=0.09$), highlighting the impact of retrospective reporting of mood. These results should be interpreted with caution as the sample size in this study was moderate ($n = 51$). The authors suggest that ESM measured depression may be tapping into a different aspect of depression, with ESM exploring in the moment feelings of low mood and the retrospective measure relying on past

memories of depressed mood which are susceptible to memory biases (Blum et al., 2015). Ben-Zeev et al (2012) also reported that retrospective ratings of emotions were an overestimate in participants with Schizophrenia and in a control group, however this overestimate was within the overall range of participants' reported experiences of emotions and therefore the authors conclude these ratings were not grossly exaggerated. In this latter study, participants were asked to retrospectively report their emotions for the past week in which they completed ESM so it is possible the ESM task primed participants to be more aware of their mood reducing the opportunity for any memory bias. It is suggested to allow for a clearer comparison between ESM and the retrospective measure of depression it would have been beneficial to compare these methodologies on different weeks or time periods to prevent any priming effects.

The fact that this field is in its infancy and the evolving landscape of mobile technology in mental health research makes reaching clear conclusions particularly challenging. Broadly, it appears that constructs measured via ESM and through self-report or clinical data are related, however the majority of this work involves correlational data with a handful of studies using more advanced statistical measurements. Researchers have emphasized that in the moment measures and retrospective measures of cross-sectional data are not completely comparable and therefore a linear relationship would not be expected (Myin-Germeys et al., 2009; So et al., 2013). Therefore, the hypothesis that ESM and self-report measures are tapping into the same constructs but different facets of these constructs is explored in the current study.

Conceptual Overview of Emotion Regulation and Coping

Before moving on to the analysis in this chapter, it is necessary to provide a conceptual overview of the constructs of coping and emotion regulation. These concepts have often been used interchangeably in the literature, however some areas of divergence have been highlighted which can be exemplified in the commonly referenced definitions. Coping is the 'conscious and volitional efforts to regulate emotion, cognition, behaviour, physiology and the environment in response

to stressful events or circumstances' (Compas et al., 2001, p.89). In comparison, emotion regulation has been defined as 'the processes by which individuals influence which emotions they have, when they have them, and how they experience and express emotions' (Gross, 1998, p275). Emotion regulation therefore tends to focus more specifically on emotions and changing the experience of that emotion, whether positive or negative, and is less focused on times of stress. In the literature, emotion regulation strategies have often been split into maladaptive (such as suppression, rumination or avoidance) and adaptive (such as reappraisal, acceptance or problem solving) with maladaptive strategies more strongly related to problems with mental health (Aldao et al., 2010; Aldao & Nolen-Hoeksema, 2012). When comparing these definitions, coping initially appears to be a wider concept as it involves regulation of more than emotions, however it is also narrower in that this regulation is specified to times of stress. Research into emotion regulation and coping is still developing to date and it is argued that continued work exploring each concept would help to further expand divergences and similarities (Compas et al., 2014).

The difficulty in differentiating these concepts can be exemplified when examining the theoretical background of emotion regulation which is at the core of attachment theory. Attachment theory provides a framework for how people manage their emotions under stress, and the attachment system is activated in times of stress. For the purposes of the following analysis, emotion regulation and coping will be thought of as related terms that provide an understanding of how an individual manages their emotions in every day and stressful environments. It is argued that differentiating these concepts is challenging without looking at the wider context and individual differences, for example what may be an everyday stressor to one person may be more challenging to another.

The aim of the following analyses is to explore the possible associations between emotion regulation as measured by the experience sampling method, with self-reported measurements of coping and emotion regulation. It is expected correlations will demonstrate a positive association between problem focused coping (ACS) and

adaptive emotion regulation strategies (ESM), while negative relationships between nonproductive coping (ACS) and subscales of the DERS (non-acceptance of emotional response; difficulties engaging in goal-directed behaviour; impulse control difficulties; lack of emotion awareness; limited access to emotion regulation strategies; lack of emotion clarity) are hypothesized to be associated with maladaptive regulation strategies (ESM). Regression analyses are expected to demonstrate the same relationships between these variables (self-report vs. ESM) but self-report variables will not account for a large proportion of the variance in ESM variables. It is expected by using regression analyses to examine the strength of the relationships between self-report and ESM variables this will provide more nuanced information about these relationships rather than exploring correlations only.

3.3 Data Analysis

Overview

Initial associations between the ESM data and self-report questionnaires were explored through correlations. Regressions and multilevel modelling were employed to model the relationships between the variables. Using an online calculator, sample size calculations for regression demonstrated that with a power level of 0.8, 5 predictor variables and a probability level of 0.05, the sample size required was 91 to detect a medium effect size and 43 to detect a large effect size (Soper, 2022).

The experience sampling data was split into two variables exploring adaptive and maladaptive emotion regulation strategies. These variables were compared with two self-report questionnaires; the Adolescent Coping Scale (ACS) and the Difficulties in Emotion Regulation Scale (DERS) using the structure referred to in chapter 2 with the problem focused coping subscale following the original structure suggested by Frydenberg and Lewis (1993) and the nonproductive coping subscale consisting of 7 items instead of the original 9 items. The original structure of the DERS suggested by Gratz and Roemer (2004) was used in this analysis.

Variables in the Analysis

Variable	Measurement
ESM adaptive regulation strategies	The combined means of the regulation strategies social sharing, reappraisal and calming.
ESM maladaptive regulation strategies	The combined means of distraction, rumination and suppression strategies.
ACS problem focused coping	Attempting to solve the problem whilst remaining physically fit and socially connected.
ACS non-productive coping	Avoidance strategies generally associated with an inability to cope.
DERS non-acceptance of emotional responses	Items reflect a tendency to experience further negative response in relation to negative emotion, for example feeling angry or embarrassed in response to feeling upset.
DERS difficulties engaging in goal-directed behaviour	Items reflect difficulty concentrating and completing tasks when experiencing negative emotion.
DERS impulse control difficulties	Items reflect difficulty staying in control of behaviour when experiencing negative emotion.
DERS lack of emotional awareness	Items reflect lack of awareness of emotional responses.
DERS limited access to emotion regulation strategies	Items reflect belief that there is little someone can do to regulate emotions once they become distressed.
DERS lack of emotional clarity	Items reflect lack of knowledge and clarity regarding emotions that are experienced.

3.4 Results

Demographics

55 young people consented to take part in the current study and were recruited in the community and through clinical services. Participants completed the Adolescent Coping Scale, the Difficulties in Emotion Regulation questionnaire and the ESM. Summary demographics and summary statistics are displayed in table 12 and table 13 below.

Table 12: Summary of participant demographics

	Count
Gender - M/F	12/43
Mean age (SD)	21.98 (4.18)
Employment status:	
Student	45
Full time employment	4
Part time employment	2
Voluntary work	1
Unemployed	2
Missing	1

Table 13: Summary statistics for the ACS and the DERS

	Mean	SD
ACS problem focused coping	19.92	4.27
ACS non-productive coping	20.06	5.72
DERS nonacceptance of emotional response	17.46	5.58
DERS difficulties engaging in goal directed behaviour	17.19	4.19
DERS impulse control difficulties	13.37	5.24
DERS lack of emotional awareness	15.48	4.62
DERS limited access to emotion regulation strategies	20.69	7.23
DERS lack of emotional clarity	12.65	3.70
DERS total score	97.73	21.81

Correlations

Both variables from the ESM were not normally distributed so Spearman's correlations were examined to explore the association between the ESM data and self-report questionnaire data. The table below summarises these correlations:

Table 14: Correlations of the ESM emotion regulation scales with the subscales of the ACS and the DERS

	Adaptive emotion regulation strategies (ESM)		**Maladaptive emotion regulation strategies (ESM)**	
	Correlation	**95% Confidence Interval**	**Correlation**	**95% Confidence Interval**
Maladaptive emotion regulation (ESM)	.50**	0.22, 0.70	-	-
Problem focused coping (ACS)	.25	-0.05, 0.52	-.14	-0.42, 0.17
Nonproductive coping (ACS)	.05	-0.24, 0.34	.65**	0.41, 0.80
Nonacceptance of emotional response (DERS)	.04	-0.26, 0.33	.29	-0.01, 0.55
Difficulties engaging in goal directed behaviour (DERS)	.04	-0.26, 0.33	.36*	0.06, 0.59
Impulse control difficulties (DERS)	.13	-0.18, 0.41	.41**	0.12, 0.63
Lack of emotional awareness (DERS)	-.04	-0.34, 0.27	.34*	0.03, 0.59
Limited access to emotion regulation strategies (DERS)	.11	-0.19, 0.39	.57**	0.32, 0.75
Lack of emotional clarity (DERS)	-.16	-0.44, 0.14	.26	-0.04, 0.52

* p<0.05; **p<0.01

From table 14, maladaptive emotion regulation strategies measured through ESM significantly correlated with several subscales from the self-report measures. Positive correlations were reported on the nonproductive coping subscale of the ACS while difficulties engaging in goal directed behaviour, impulse control difficulties, lack of emotional awareness, and limited access to emotion regulation subscales on the DERS were also positively correlated. No significant correlations were reported between the adaptive emotion regulation strategies and the self-report measures however there is a significant positive correlation with maladaptive regulation strategies measured on the ESM. Adaptive emotion regulation strategies will therefore not be explored further in regression analyses given there are no significant results from the correlations.

Regression and multilevel regression

Regression analysis with the maladaptive emotion regulation strategies as the dependent variable were conducted to explore these relationships further. As this variable did not follow a normal distribution, a log 10 transformation of the data was computed which improved the distribution of the scores. Based on the correlations, any variables above .3 was entered into the regression model using the enter method. The adaptive emotion regulation strategies subscale was not controlled for in the analysis as the aim of this chapter was to specifically explore the relationship between the ESM and self-report data. As can be seen in the table below, one variable makes a significant contribution to the model, the nonproductive coping subscale of the ACS. In this model this variable accounts for 40% of the variance in maladaptive regulation strategies on the ESM.

Table 15: Enter regression model with all significant variables from correlation analysis

	B	SE B	β
Constant	.59	.10	
ACS non productive coping	.01	.005	.43*
DERS difficulties engaging goal directed behaviour	-.005	.006	-.13
DERS limited access to ER strategies	.009	.005	.42
DERS impulse control difficulties	-.003	.006	-.10
DERS lack of emotional awareness	.003	.004	.09

R^2 = .47; Adjusted R^2 = .40; * $p<0.05$

Multilevel modelling was also employed to explore these relationships and examine whether taking into consideration the structure of the data would produce different results. The same subscales were entered into the model as predictors (ACS nonproductive coping; DERS goal directed behaviour; DERS impulse control difficulties; DERS lack of emotional awareness and DERS limited access to emotion regulation strategies) and each of these variables was grand mean centred.

Table 16: Multilevel regression of maladaptive emotion regulation strategies

	B	SE	95% confidence interval	p
Intercept	8.89	0.38	8.14; 9.64	<0.001
ACS nonproductive coping	0.24	0.10	0.04; 0.46	0.02
DERS limited access to regulation strategies	0.14	0.10	-0.07; 0.36	0.17
DERS lack of awareness	0.05	0.10	-0.14; 0.24	0.60
DERS impulse control difficulties	-0.03	0.13	-0.30; 0.23	0.79
DERS lack of goal directed behaviour	-0.03	0.13	-0.30; 0.24	0.81

From the results in table 16, the nonproductive coping scale of the ACS again significantly predicted ESM maladaptive strategies reflecting the outcome of the earlier regression analysis.

3.5 Discussion

In relation to the study hypotheses, there was no evidence that problem focused coping (ACS) was associated with adaptive emotion regulation strategies (ESM), and adaptive emotion regulation strategies were dropped from any further analyses. Maladaptive strategies (ESM) however were associated with nonproductive coping (ACS) and four out of the six subscales of the DERS therefore partially supporting the hypotheses. When the significant variables from the correlations were entered into regression analyses results suggested maladaptive emotion regulation strategies measured through experience sampling are comparable with one subscale, the non productive coping scale of the ACS, from the two self-report questionnaires. Non productive coping reflects avoidance strategies and includes items such as ignoring the problem or blaming yourself, and the subscale is associated with an inability to cope (Frydenberg & Lewis, 1993). It is argued that this

is aligned with maladaptive strategies which in the long-term may not be effective at reducing distress and are associated with mental health problems (Aldao & Nolen-Hoeksema, 2012). It was also reported in the current study that the variance in maladaptive emotion regulation strategies accounted for by nonproductive coping was 40% suggesting that the majority of the variance is unexplained in this analysis. This finding supports previous literature which emphasizes data collected through ESM and self-report are tapping into different aspects of subjective experience.

In the correlational analyses five subscales from self-report measures were associated with the maladaptive strategies measured through ESM. The size and variety of these correlations are in line with other work in this area such as Palmier-Claus et al (2012) and Leendertse et al (2018). However, when entered into further statistical analysis only one subscale was significantly related to maladaptive emotion regulation strategies. This finding suggests future work that examines the relationships between self-report and ESM measurements should examine potential relationships rather than exploring associations through correlations. It is suggested that the reliance on correlation data to date may not be producing results that are fully reflective when more intensive statistical procedures are used.

In addition, the correlational analysis in the current study showed that maladaptive and adaptive strategies measured on the ESM positively correlated, which could reflect the theory that people use a wide variety of strategies including both adaptive and maladaptive ones (e.g. Bonanno & Burton, 2013; Lennarz et al., 2019). Although initially strategies are segregated into those that are inherently maladaptive and those that are adaptive, it is unlikely that individuals use one set over another. In fact, recent evidence suggests that the context is particularly important when deciding whether a strategy is adaptive or maladaptive and people may use maladaptive strategies to reduce distress in the moment, and therefore in the short-term these strategies are useful but in the long-term they have a negative impact on mental health (Moritz et al., 2016). This point will be returned to in future analysis chapters in this thesis as emotion regulation strategies used in daily life are examined further.

It is of note that the adaptive strategies from the ESM were not associated with any of the self-report measures. It can be postulated what may be behind this finding. One suggestion is that identifying what individuals do to manage their emotions positively is more difficult to do and therefore it could be harder to self-report and reflect on positive strategies to be able to report them appropriately. It could also be the case that the positive strategies asked about in the current study particularly in the ESM were not relevant to participants and they use other strategies more routinely to manage their emotions.

In relation to the wider context discussed in the introduction to this chapter, results of the current study provide one example why it is important to examine more closely the validity of digital technology approaches and further understand how these relate to more routinely used methods. The speed of progression of using technology in mental health research especially has advanced quickly and further work is required to fully understand how these methods differ from more traditional approaches. The current study has explored one specific area and has shown that ESM is tapping into a different aspect of subjective experience when compared to questionnaires. As ESM is measured when the participant is in their everyday context and in real-time the opportunities to develop a much greater and detailed understanding of many mental health problems and psychological mechanisms is vast, and this can be bolstered by increasing focus on validity, reliability and greater understanding of mechanisms of change when using this methodology. Research should continue to examine the implications of increasing technology both in research and clinical services.

Limitations

In the current study participants were only asked about a small number of emotion regulation strategies during the experience sampling, namely three adaptive and three maladaptive strategies and it is likely that young people use a range of different strategies some of which were not asked about in the current study. However, it

should be noted that the strategies used in the current study have often been examined in previous literature for their associations with mental health outcomes, particularly in relation to the maladaptive strategies (Ludwig et al., 2019; Moritz et al., 2016; Nittel et al., 2018). A further limitation of the current study is that the sample size is modest and the regression analysis is underpowered. Results should therefore be interpreted with caution as they may not generalize to other samples and therefore replication in further larger samples would be beneficial.

3.6 Conclusion

This chapter has explored one specific aspect of the growth of digital technology in mental health and has demonstrated that data collected through ESM is measuring a specific aspect of subjective experience in the moment and in real-time. ESM sits within a wider field of technology that has been utilised in mental health research and can be integrated within mental health services. Significant challenges to the successful inclusion of digital technology in clinical services remain, specifically around privacy, reliability and validity which need to be further defined and resolved. However, there is also a backdrop of difficulties in effectively delivering clinical services while meeting the level of demand, which has been exacerbated by the COVID-19 pandemic, and it is evident that technology can support and alleviate pressure on services. It has been suggested that one way this could be implemented is through a personalised approach to mental health of which ESM could be one such element. ESM can be used as a tool for gathering reliable outcome data that can lead to more collaborative and effective treatment, as well as a supporting tool to complement face-to-face practice. This chapter has shown that ESM is a valid measure when it comes to exploring emotion regulation strategies, and the results reported here are similar to previous studies exploring other mental states and symptoms (Leendertse et al 2018; Palmier-Claus et al., 2012; Tsanas et al., 2016).

It is clear that mobile technology may not be a solution for everyone, however there is promising initial research with young people that this methodology could be suited to them and can be integrated in their daily lives (Berry et al., 2016; Lal et al., 2015). It has also been demonstrated that experiences of psychosis, particularly early

psychosis can benefit from using mobile technology to understand the development of symptoms. The current study adds to this growing literature. Further research should continue to examine the reliability, validity and effectiveness of digital technology to support the integration of technology in clinical settings and to further our understanding of mental health experiences particularly early psychosis.

Chapter 4 – The Relationship between Attachment, Emotion Regulation and Mentalization

4.1 Research Objectives

This chapter aims to explore the empirical evidence for relationships between attachment, mentalization and emotion regulation, including examining a possible mediating role of mentalization. To do this, attachment scores from the AAI and emotion regulation measured through validated questionnaires will be examined in a series of regression and mediation analyses. Additionally, this chapter will examine the links between attachment styles and six emotion regulation strategies (suppression; rumination; distraction; social sharing; reappraisal and calming) with multilevel modelling to examine the associations between attachment and emotion regulation measured in daily life.

4.2 Introduction

The Relationship between Attachment and Emotion Regulation

Attachment theory centres on the idea that early attachment experiences with caregivers allow children to develop strategies to manage their emotions. Individual differences in attachment styles reflect differences in regulation strategies that are implemented in times of stress. Broadly, these individual differences fall into two categories of secure and insecure attachment. Secure attachment develops through a responsive caregiver who the child can rely on in times of stress to contain emotions, particularly negative ones, while insecure attachment develops in a caring relationship where the caregiver is less responsive or reliable. Although insecure attachment styles are adaptive in childhood as they help deal with stress in the moment these strategies become less adaptive as adult relationships develop and a level of interdependence is required (Mikulincer & Shaver, 2019). Insecure attachment can be further divided into anxious (preoccupied) and avoidant (dismissive) styles which reflect differences in regulating emotions. Anxious attachment is argued to result in hyperactivating strategies such as rumination or focusing on emotional experiences, while avoidant attachment styles lead to

deactivating or distancing strategies through disengagement or suppression of emotions (Mikulincer et al, 2003).

One of the first studies to explore the relationship between attachment and emotion regulation examined the correlates of attachment in a sample of young adults. Evidence of a relationship between secure attachment and ego-resiliency, a pattern of strategies that focus on constructively adapting negative emotions in problem-solving and social contexts was reported (Kobak & Screey, 1988). Tentative conclusions were reached regarding an association between dismissive attachment and hostility as well as between preoccupied attachment and anxiety. This early study set the pathway for viewing secure attachment as a protective factor in development while pointing to a more complex role of insecure attachment.

Following this initial progress literature has continued to explore the associations between attachment styles and emotion regulation demonstrating relationships between these constructs however the majority of this work has been conducted with adult populations. For example, when looking more broadly at a global measure of emotion regulation, Owens et al (2013) reported that attachment avoidance and attachment anxiety were positively correlated with overall emotion regulation difficulties measured on the Difficulties in Emotion Regulation Scale (DERS). The link between attachment and emotion regulation can also be seen when exploring specific types of coping where attachment anxiety has been associated with emotion focused coping and attachment avoidance has been associated with less support seeking from others (Holmberg et al., 2011). Interestingly, this study also noted distancing strategies were associated with attachment anxiety rather than attachment avoidance. The authors question whether for relatively low level stressors individuals with anxious attachment initially distance themselves from the impact of the stressor but eventually become overwhelmed and return to hyperactivating strategies as a possible explanation for these results emphasizing the potential for strategies to change in response to the context in which they are used.

In looking specifically at the role of hyperactivating and deactivating strategies, several studies have highlighted theoretically congruent results with attachment insecurity. Anxious attachment has been shown to be related to emotion-oriented regulation strategies including self-blame, rumination and focusing on negative emotions (Pascuzzo et al., 2013), while avoidant attachment has been associated with suppression (Read et al., 2018; Winterheld, 2016) and using less social support strategies (Pascuzzo et al., 2013). Cognitive reappraisal has been associated with secure attachment (Winterheld, 2016) but negatively associated with both avoidant and anxious attachment (Read et al., 2018). In a longitudinal study, Girme et al (2020) explored infant attachment styles relating to emotion regulation strategies in adulthood. Participants were split into three groups; stable insecure consisting of participants who were coded as insecure at both 12 months and 18 months when completing the Strange Situation Procedure (SSP); stable secure involving participants who were coded as secure at both 12 and 18 months of the SSP and the third group insecure unstable who were coded as insecure at only 12 or 18 months on the SSP. Results showed that stable insecure participants were more likely (than stable secure) to use suppression and disengagement while those participants in the unstable insecure group were more likely to use rumination and exaggeration of emotional expression. These results are particularly important as this was a longitudinally designed study and it demonstrates evidence for attachment styles impacting on emotion regulation strategies in adulthood. Therefore, in looking at research with adult samples collectively, there is evidence to support the theoretical links between attachment and emotion regulation, with associations between secure attachment styles and adaptive emotion regulation strategies and insecure attachment styles relating to more maladaptive strategies.

Despite a number of studies supporting the association between attachment and emotion regulation there are more inconsistencies reported in the literature into avoidant or dismissive attachment styles. Karreman and Vingerhoets (2012) reported that a dismissing attachment style predicted higher wellbeing through higher reappraisal and resilience, which contrasts with expected results. This study reported in line with expectations for preoccupied and secure attachment, with preoccupied attachment predicting lower wellbeing through lower reappraisal and resilience, and

with secure attachment the positive effect on wellbeing was mediated by higher reappraisal and resilience, therefore highlighting a particular difference with dismissive attachment style. In a further study examining pathways between attachment insecurity and lower levels of mood repair and ego-resiliency, rumination and increased negative affect mediated the relationship with anxious attachment, but the pathway from avoidant attachment mediated by suppression and lack of emotional clarity was not significant (Caldwell and Shaver, 2012). Both of these studies suggest dismissive attachment styles are not always associated with distancing emotion regulation strategies. One possible explanation for these outcomes can be attributed to the characteristics of the dismissive attachment style as it is argued that people with dismissive attachment styles may report in a particular way due to the positive image of self that is associated with this attachment style. Bartholomew and Horowitz (1991) have highlighted that both avoidant and secure attachment styles are positively correlated with self-concept. Therefore, as those with dismissive attachment styles have a positive view of themselves, they may not be consciously aware that they are using distancing strategies and instead self-report that the strategies they use are more aligned with secure attachment styles.

Attachment and Emotion Regulation in Adolescence

Although there is increasing literature in adult samples for the relationship between attachment and emotion regulation, this has not been replicated to the same extent in adolescent samples to date. For example, a recent review article of a small number of papers specifically involving adolescent populations concluded that there was some evidence that attachment security was related to more adaptive emotion regulation strategies whilst there was little evidence of an association between attachment insecurity and several measures of emotion regulation (Zimmer-Gembeck et al,2017). It is therefore argued that there remains a gap in the literature to examine the potential link between attachment styles and emotion regulation strategies in adolescence further.

It is also important to note that the developmental stage of adolescence may impact on how individuals choose to regulate their emotions potentially making it more difficult to establish links between attachment styles and emotion regulation in adolescent samples. Given that adolescence is a stage of significant development and change it is suggested that going through this developmental stage is associated with increasing emotions (Cracco et al., 2017) and potential changes in emotion regulation strategies (De France & Hollenstein, 2021). It is therefore possible that the successful implementation of emotion regulation strategies is still developing during adolescence and this may be reflected in the strategies young people report using.

Attachment, Emotion Regulation and Mental Health Outcomes

The attachment literature has also explored the impact of both attachment styles and emotion regulation strategies on mental health outcomes. These associations have been examined with global measures such as the DERS where an indirect effect between both attachment anxiety and attachment avoidance and depression is reported through the limited access to emotion regulation strategies subscale of the DERS. Additionally, a significant indirect effect between attachment avoidance and depression through the lack of emotional awareness subscale of the DERS has also been shown (Owen et al., 2018). When looking further at depression, a recent systematic review concluded that emotion regulation mediates the relationship between attachment and depression and in particular attachment anxiety was associated with emotion focused coping and attachment avoidance was associated with less support seeking from others (Malik et al., 2015). Again, this evidence is derived from a limited number of studies, especially adolescent samples, but the trend is also reported with other mental health conditions such as Borderline Personality Disorder (BPD). Kim et al (2014) reported an association between attachment security and reduced BPD symptoms through positive emotion regulation strategies such as positive reappraisal or acceptance. Negative regulation strategies (e.g. self-blame or rumination) however, were found to be associated with BPD at higher levels and these negative strategies reduced the impact of positive regulation strategies. The authors argue that insecure attachment relationships may reduce the

prospect to learn positive emotion regulation strategies rather than supporting the theory that insecure attachment relationships lead to the increased use of negative emotion regulation strategies.

Studies have also explored the link attachment and emotion regulation play in other mental health outcomes. For example, Wei et al (2005) examined the role of emotion regulation between attachment and negative mood, and interpersonal problems in a group of college students. Examining two strategies, emotional reactivity, a hypersensitivity to the environment and emotional cutoff, a distancing from the environment, it was reported that attachment anxiety and avoidance were associated with negative mood through the strategies of emotional reactivity and emotional cutoff respectively. In the exploration of interpersonal problems, a partial mediation was reported, therefore suggesting that these regulation strategies do not act alone in the development of interpersonal problems.

In exploring the link between attachment and disclosure of distress, Garrison et al (2014) found that attachment avoidance was related to higher suppression, and suppression was linked to a lower tendency of disclosure. Attachment anxiety was associated with higher rumination but this was not related to tendency to disclose distress. The authors explored these relationships further by examining disclosure using the experience sampling method. In this instance, participants reported a stressful event, the associated emotional intensity of the event and whether they avoided or ruminated over the event. Emotional intensity of the event did not interact with avoidance or rumination, and the relationship between attachment avoidance and disclosure was not mediated by emotional avoidance. Additionally, the relationship between attachment anxiety and emotional disclosure was not mediated by rumination. These findings are surprising, with the expected relationship (i.e. attachment avoidance relating to suppression and no disclosure) being reported on self-report measures but not in the experience sampling. Interestingly, for anxious attachment in the daily measures a positive relationship between anxious attachment and disclosure through rumination was noted but this did not reach significance. This research contrasts with previous studies that emphasize those with avoidant

attachment styles may be more likely to self report as secure. Further work is needed in this area, particularly to replicate the findings from the experience sampling results.

The Impact of Mentalization

Mentalization is the process of understanding that others have their own motivations, goals and experiences which allows us to make sense of people's behaviour. Through early social relationships, children start to develop a 'theory of mind' which allows them to understand and predict behaviour (Fonagy & Target, 1997). In supporting the relationship between attachment and mentalizing ability, Rosso et al (2015) have shown that child and maternal mentalizing ability are correlated. Children with high levels of mentalizing ability also tend to have mothers with secure attachment styles, suggesting that secure attachment fosters mentalizing ability. It has also been reported that anxious attachment and mentalization predict emotion dysregulation (Marszal & Janezak, 2018). More recently, Gambin et al (2020) reported that attachment styles significantly predict emotion regulation strategies, and attachment to father but not mother was a significant predictor of mentalizing abilities. In looking further at this relationship, mentalizing abilities were found to partially mediate the relationship between attachment to father and emotion regulation. Collectively these studies point towards a relationship between attachment and mentalizing ability which has also been explored in clinical populations.

Fonagy and colleagues have specifically examined the concept of mentalization in relation to Borderline Personality Disorder (BPD) which they argue is a mental health condition resulting from a difficulty mentalizing in close relationships. In one study examining attachment, mentalization and BPD symptoms in a group of adolescents it was demonstrated that lower mentalization scores and an insecure attachment style were associated with higher BPD scores (Fossati et al., 2014). This was replicated by Sharp et al (2016) who also reported a mediating role for hypermentalizing and emotion dysregulation in the relationship between attachment and BPD. Both of

these studies therefore reflect earlier literature with nonclinical samples, supporting the relationship between attachment styles and mentalization.

The role mentalization plays in other mental health conditions has also been explored and in relation to psychotic experiences it has been demonstrated that lower mentalizing scores are associated with individuals meeting UHR criteria when compared to a similar group of inpatient participants who did not meet UHR criteria (Boldrini et al., 2020). Additionally, in a first episode psychosis sample, participants with secure or preoccupied attachment styles had significantly greater scores of mentalization in comparison to dismissing attachment (MacBeth et al, 2011). With these accumulating findings across borderline personality disorder and early psychosis, it is clear mentalization is a factor across many symptoms and is therefore not just specific to one condition. This is evident when looking more broadly at mental health wellbeing where mentalization has been shown to mediate the relationship between attachment and interpersonal problems (Hayden et al., 2019) as well as peer problems (Venta & Sharp, 2019). It has also been demonstrated in studies that have examined the impact of mentalization based therapy, for example one recent systematic review reported evidence of reduced psychological distress and increasing mentalizing ability in MBT interventions for children, young people and their families (Byrne et al., 2020).

Research into the links between attachment styles, mentalization and emotion regulation is still developing, particularly in applying these concepts to further mental health symptoms and outcomes. However, research available to date emphasizes the ability to mentalize develops through caregiving relationships and it is a factor that appears to mediate the relationship between attachment and several mental health outcomes. This chapter aims to build on one area of research by looking specifically at the impact of mentalization on emotion regulation. Despite theoretical arguments for these concepts to be related there is limited empirical research exploring both mentalization and emotion regulation (Schwarzer et al., 2021). Most studies have explored these concepts more indirectly for example by examining mentalizing and emotion regulation in relation to clinical symptoms such as BPD

(e.g. Sharp et al., 2016). Further research is required to explore these concepts empirically and examine how they are related. Although it has been advocated that mentalizing enhances emotion regulation it has also been argued that adaptive emotion regulation may contribute to more mentalization (Schultheis et al., 2019) and therefore it is possible these concepts are more dynamically related.

Experience Sampling and Emotion Regulation Strategies

While the attachment literature has expanded to examine the impact on emotion regulation and subsequent mental health outcomes, advances in the emotion regulation literature are allowing for a more reflective understanding of how people manage their emotions. This is particularly the case through the use of experience sampling which gives a more nuanced understanding of emotion regulation in daily life. For example, experience sampling has shown that people may use more than one strategy at a time, and strategies vary depending on whether regulating negative or positive emotions (Brans et al., 2013; Silva et al., 2018a). One study reports that individuals use an average of seven emotion regulation strategies to regulate both positive and negative emotions (Heiy & Cheavens, 2014). In one of the few experience sampling studies to explore high numbers of regulation strategies (twenty strategies each for positive and negative emotion) it was emphasized that some strategies may be more effective when used in conjunction with other strategies. Research by Lennarz et al (2019) in an adolescent population emphasized that adolescents use 1.2 strategies on average at each timepoint suggesting that adolescents may use less strategies to regulate their emotions, however it should be noted that this study asked about nine strategies in total and therefore may have missed strategies that are relevant to young people.

In examining strategy use in young adolescents, Lennarz et al (2019) found that acceptance was the most used strategy, followed by problem-solving, rumination and distraction. A number of adaptive strategies resulted in down regulation of negative emotion when compared to rumination, namely acceptance, problem-solving and reappraisal. Interestingly, social sharing was not found to down regulate negative emotion when compared to rumination, and may instead be an example of

young people co-ruminating, or talking about problems while focusing on negative emotions. This contrasts with an earlier study where neither primary strategies (such as problem solving or emotional expression) nor secondary control strategies (e.g. acceptance or distraction) were associated with higher or lower levels of emotion regulation (Silk et al., 2003). Instead, disengagement (e.g. denial or avoidance) and involuntary engagement strategies (e.g. rumination or impulsive action) were associated with lower regulation of anger and sadness. It is possible that young people in this study reported using both primary and secondary strategies that may have been helpful in some cases and not in others, and therefore cancelled each other out in the analysis. The impact of disengagement and involuntary engagement strategies on negative mood is of note, and the authors postulate this could be related to a passive stance that adolescents take to prevent them adapting to the situation. This is particularly appealing to consider from an attachment perspective, as a potentially higher prevalence of dismissive attachment styles within this adolescent population may influence the passive stance suggested to be behind these results.

It is evident from these experience sampling studies that the breadth of understanding of emotion regulation has been further expanded using experience sampling techniques. However, there is a gap in the literature examining attachment and daily measures of emotion regulation. One study has been published that provides a tentative link by examining the association between adult carer and adolescent use of regulation strategies. In this case, a positive association between adolescents use of emotion regulation strategies and that of their mother but not the father was reported (Silva et al., 2018b). To the authors knowledge there are no previous studies exploring attachment style with daily measures of emotion regulation and therefore this chapter aims to fill the gap in this literature.

This chapter will explore two areas of research firstly examining the relationship between attachment, emotion regulation and mentalization and secondly examining attachment styles and daily reports of emotion regulation. This chapter will therefore explore several hypotheses. Regression analyses will examine the relationship

between attachment, emotion regulation and mentalization and it is expected that attachment security will have a positive relationship with the problem focused subscale of the ACS, while a negative relationship with the non productive coping subscale of the ACS is hypothesized. Secure attachment is also hypothesized to have a negative relationship with emotion regulation difficulties measured on the DERS. To examine further the potential relationship between attachment, emotion regulation and mentalization a series of mediation analyses will be conducted. It is expected that mentalization with mediate the relationship between attachment and problem focused coping, non productive coping and difficulties in emotion regulation.

A final set of analyses will examine the daily use of emotion regulation strategies using multilevel models (MLMs) to explore attachment security and emotion regulation measured through ESM. The first set of MLMs will examine attachment and emotion regulation strategies in daily life. The second set of MLMs will examine strategy use in relation to negative emotions. It is hypothesized participants with secure attachment styles will report using more adaptive emotion regulation strategies, specifically reappraisal, social sharing and calming to regulate momentary levels of negative emotion. Participants with insecure attachment styles are expected to use more maladaptive strategies; suppression, rumination and distraction to regulate momentary negative emotion.

4.3 Data analysis

Overview

Regression analyses explored the relationship between attachment and coping styles reported on the ACS and emotion regulation difficulties reported on the DERS. SPSS v25 was used to conduct these analyses. Using an online calculator for regression analyses, a sample size calculation demonstrated that with a power level of 0.8, 1 predictor variable and a probability level of 0.05, the sample size required was 54 to detect a medium effect size (Soper, 2022).

Following the regression analyses, the possible mediating role of mentalization was examined through a series of mediation analyses. The mediation analyses were conducted in SPSS 25 using the PROCESS macro by Hayes (2018). The bootstrap method was used with 5000 replications. Multilevel modelling using the R statistical package was then employed to examine the relationship of attachment style with the daily regulation strategies collected through experience sampling. Following Fritz & MacKinnon (2007), sample size calculations demonstrated that with a power of 0.8 and a medium size effect between attachment and mentalization (alpha path) and a medium size effect between mentalization and emotion regulation/coping (beta path) using bias-corrected bootstrapping would require a sample of 71. With a beta path with a large effect and alpha path with a medium effect using bias-corrected bootstrapping this would require a sample size of 53. An alpha path with a large effect and beta path with a medium effect would lead to a sample size of 54. The mediation analyses in this thesis demonstrated both medium effects and large effects for the alpha and beta paths respectively leading to a recommended sample size of 53.

Variables in the Analysis

Variable	Measurement
Attachment style	Attachment style was measured as a continuous variable based on the coherence of mind score from the AAI
Mentalization	Reflective function score from the AAI
Problem focused coping	Coping strategies from the Adolescent Coping Scale which are based on working at solving the problem or worry through staying positive and remaining in touch with friends and family
Non productive coping	Coping strategies from the Adolescent Coping Scale which are avoidance based and related to an inability to cope
Emotion regulation difficulties	Total score from the Difficulties in Emotion Regulation Scale
Negative affect	The mean score of the ESM questions; 'Right now I feel; anxious, lonely, irritated, sad, guilty' Cronbach's α = 0.75

Calming	Response to ESM question ‘Since your last report, how much have you been doing the following to manage your emotions - trying to keep calm by taking deep breaths or relaxing your muscles’
Social sharing	Response to ESM question ‘Since your last report, how much have you been doing the following to manage your emotions - talking about your feelings and reactions with others’
Reappraisal	Response to ESM question ‘Since your last report, how much have you been doing the following to manage your emotions - changing the way you think about the situation you are in’
Rumination	Response to ESM question ‘Since your last report, how much have you been doing the following to manage your emotions - thinking about your feelings over and over’
Distraction	Response to ESM question ‘Since your last report, how much have you been doing the following to manage your emotions - turning your attention away from what is making you feel emotional’
Suppression	Response to ESM question ‘Since your last report, how much have you been doing the following to manage your emotions - trying not to show your emotions on the outside’

4.4 Results

Demographics

55 participants consented to take part in this study recruited through the community and clinical services. Summary demographics for all participants are provided in table 17 below.

Table 17: Summary demographics for participants

	Count
Gender - M/F	12/43
Mean age (SD)	21.98 (4.18)
Employment status:	
Student	45
Full time employment	4
Part time employment	2
Voluntary work	1
Unemployed	2
Missing	1

Participants completed the ACS, the DERS and the AAI. Two subscales from the ACS were used in the current study; problem focused coping and non-productive coping. The total score of the DERS was also used, while the coherence of mind score from the AAI was used as a measure of attachment security and RF score from the AAI as a measure of mentalization. Descriptive statistics of these measures are displayed in table 18.

Table 18: Descriptive statistics of the ACS, DERS and AAI

	Mean	SD
ACS problem focused coping	19.92	4.27
ACS non-productive coping	20.06	5.72
DERS total score	97.73	21.81
RF score (AAI)	2.73	1.65
CoM score (AAI)	5.32	1.41

Regression analyses

In the following regression analyses coherence of mind (CoM) score was the predictor variable while the subscales of the ACS and the DERS total score were the outcome variables. Results are displayed in table 19 (models 1 - 3).

Table 19: Regression analyses of emotion regulation and attachment

	B	SE	β	95% confidence interval	p
Model 1 - Outcome: Problem focused coping					
Constant	16.51	2.33			
Attachment - CoM	0.62	0.43	0.20	-0.24, 1.47	0.16
Model 2 - Outcome: Non productive coping					
Constant	24.48	3.02			
Attachment - CoM	-0.77	0.55	-0.20	-1.87, 0.33	0.17
Model 3 - Outcome: Emotion regulation difficulties					
Constant	119.62	12.57			
Attachment - CoM	-4.05	2.26	-0.26	-8.59, 0.49	0.08

Table 19 demonstrates there an no significant relationships between coherence of mind scores and the subscales of the ACS and total DERS score. However, the relationships reported an in the expected direction with a positive relationship between coherence of mind score and problem focused coping (ACS) and negative relationships between coherence of mind score and non productive coping (ACS) and emotion regulation difficulties (DERS). The association between coherence of mind and emotion regulation difficulties was close to significance with $p = 0.08$ (model 3).

Mediation analyses

As the regression analyses above are in the expected directions and significant relationships are not required to conduct mediation analyses (Hayes, 2018) the

above variables were examined again in a series of mediations to establish whether mentalization was a mediator between attachment and emotion regulation variables. The results are depicted in the following figures.

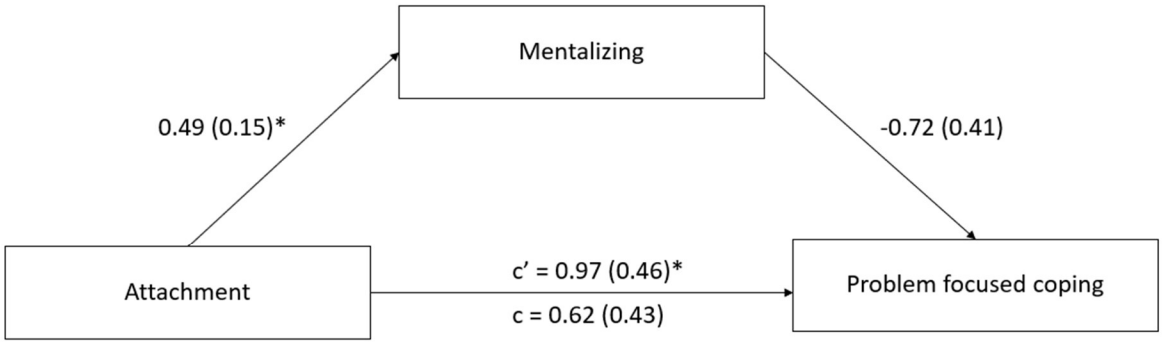

Figure 2: Mediation analysis of the effect of mentalizing in the relationship between attachment and problem focused coping. Effects are unstandardized with error terms in brackets. c' is the direct effect of attachment on problem focused coping, c is the total effect of attachment on problem focused coping. *p < .05

Figure 2 demonstrates that greater attachment security (measured through the coherence of mind scale) was positively associated with problem focused coping. When mentalizing was added as a mediator, attachment security was associated with higher mentalization (a = 0.49, p = 0.002) and mentalization was just out with significance in the relationship with problem focused coping (b = -0.72, p = 0.08). A 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that the indirect effect (ab = -0.36) was below zero (-0.74 to -0.03), therefore attachment was indirectly related to problem focused coping through its relationship with mentalization.

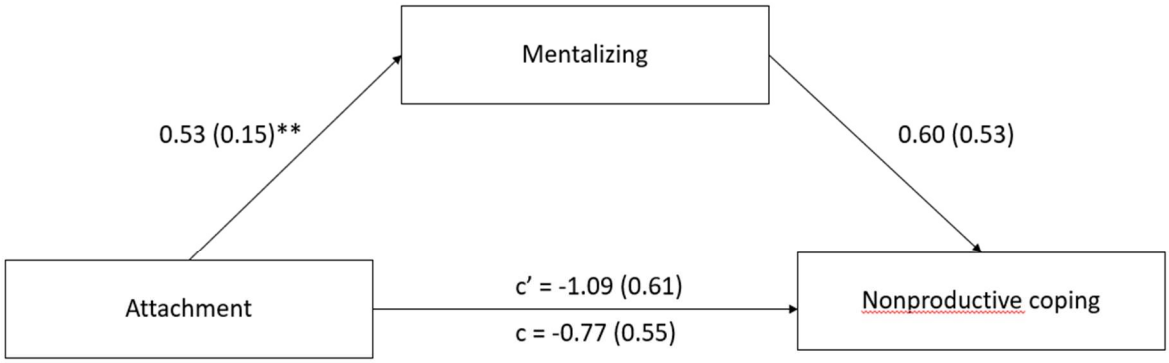

Figure 3: Mediation analysis of the effect of mentalizing in the relationship between attachment and nonproductive coping. Effects are unstandardized with error terms in brackets. c' is the direct effect of attachment on nonproductive coping, c is the total effect of attachment on nonproductive coping. **p < .001

Figure 3 demonstrates that attachment and nonproductive coping are negatively associated and the direct effect was just out with significance (p = 0.08). In this analysis, again attachment security was associated with greater mentalizing (a = 0.53, p <0.001) and mentalization was positively related to nonproductive coping but this relationship was not significant (b =0.60, p = 0.26). A 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that the indirect effect (ab = 0.32) included zero (-0.18 to 1.02) and therefore mentalization does not mediate the relationship between attachment and nonproductive coping.

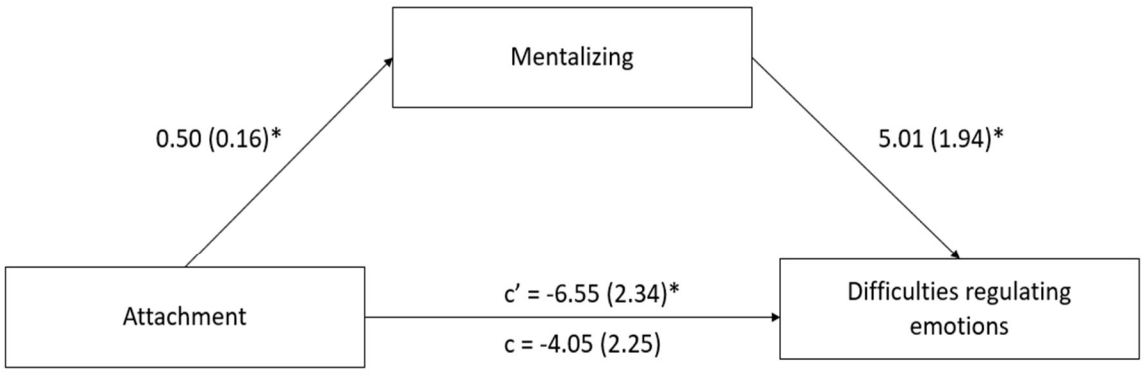

Figure 4: Mediation analysis of the effect of mentalizing in the relationship between attachment and difficulties regulating emotions. Effects are unstandardized with error terms in brackets. c' is the direct effect of attachment on difficulties regulating emotions, c is the total effect of attachment on difficulties regulating emotions. *p < .05

In the final mediation analysis shown in figure 4, greater attachment security was negatively associated with difficulties regulating emotions. When mentalizing was added as a mediator, attachment security was associated with higher mentalization (a = 0.50, p = 0.0035). Higher mentalization scores were also related to greater difficulties regulating emotions (b = 5.01, p = 0.013). A 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that the indirect effect (ab = 2.50) was above zero (0.44 to 5.66) therefore attachment was indirectly related to difficulties regulation emotions through its relationship with mentalization.

Multilevel models

The impact of six emotion regulation strategies reported in daily life were examined in two sets of multilevel models. The first set (models 4 - 9) compared attachment with emotion regulation strategies where the outcome variables were the individual regulation strategies and the predictor was attachment. In the second set of models (models 10 - 15) attachment and emotion regulation strategies were examined in relation to managing negative affect. The outcome variable was negative affect and the predictors were emotion regulation strategies and attachment. Results of the first set of analyses are reported in the two tables below, emotion regulation strategies are split into adaptive and maladaptive strategies in tables 20 and 21 respectively.

Table 20: Attachment and adaptive emotion regulation strategies

	B	SE	95% confidence interval	p
Model 4 (AIC: 3838.33; BIC: 3858.38)				
Outcome: Calming				
Intercept	2.48	0.20	2.10, 2.87	<0.001
Attachment - CoM	-0.12	0.15	-0.42, 0.17	0.41
Model 5 (AIC: 4191.01; BIC: 4211.06)				
Outcome: Social sharing				
Intercept	2.30	0.12	2.07, 2.53	<0.001
Attachment - CoM	-0.0002	0.09	-0.18, 0.18	1.00
Model 6 (AIC: 3958.23, BIC: 3978.28)				
Outcome: Reappraisal				
Intercept	2.75	0.18	2.40, 3.10	<0.001
Attachment - CoM	0.08	0.13	-0.19, 0.35	0.54

Results of the adaptive regulation strategies (models 4 - 9) show there are no significant associations between the use of calming, social sharing, reappraisal and coherence of mind scores.

Table 21: Attachment and maladaptive emotion regulation strategies

	B	SE	95% confidence interval	p
Model 7 (AIC: 4137.74; BIC: 4157.80)				
Outcome: Rumination				
Intercept	2.81	0.16	2.51, 3.12	<0.001
Attachment - CoM	-0.04	0.12	-0.27, 0.19	0.74
Model 8 (AIC: 4241.06; BIC: 4261.12)				
Outcome: Distraction				
Intercept	3.19	0.18	2.83, 3.54	<0.001
Attachment - CoM	-0.13	0.13	-0.40, 0.14	0.35
Model 9 (AIC: 4273.50, BIC: 4293.55)				
Outcome: Suppression				
Intercept	3.12	0.22	2.68, 3.56	<0.001
Attachment - CoM	-0.23	0.17	-0.56, 0.11	0.19

The results of the maladaptive emotion regulation strategies and coherence of mind scores are displayed in 21 (models 7 - 9). There are no significant results from these analyses therefore coherence of mind does not influence the use of rumination, distraction or suppression.

The second set of analyses where negative emotion is the outcome variable are shown in table 22 and table 23. In these models, coherence of mind score and each emotion regulation strategy are predictor variables. The interaction of coherence of mind score and the regulation strategies are also included to establish whether attachment security impacts on strategy use in managing negative emotion.

Table 22 (models 10 - 12) display the adaptive regulation strategies and demonstrate a main effect in model 10 and 12 for regulation strategy suggesting that as negative emotion increases, calming and reappraisal also increase. There is an interaction effect in model 12 where attachment weakens the relationship between

reappraisal and negative affect. Therefore, attachment security inhibits the positive relationship between reappraisal and negative affect.

Table 22: Adaptive regulation strategies and attachment on negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 10 (AIC: 2916.56; BIC: 2946.63)				
Intercept	2.27	0.11	2.06, 2.48	<0.001
Calming	0.09	0.02	0.05, 0.13	<0.001
Attachment - CoM	-0.06	0.08	-0.22, 0.10	0.42
Calming x CoM	0.02	0.01	-0.01, 0.04	0.25
Model 11 (AIC: 2938.41; BIC: 2968.47)				
Intercept	2.26	0.11	2.05, 2.48	<0.001
Social sharing	0.03	0.02	-0.007, 0.06	0.12
Attachment - CoM	-0.07	0.08	-0.24, 0.09	0.38
Social sharing x CoM	-0.005	0.01	-0.03, 0.02	0.69
Model 12 (AIC: 2931.48, BIC: 2961.54)				
Intercept	2.27	0.11	2.05, 2.48	<0.001
Reappraisal	0.04	0.02	0.007, 0.08	0.02
Attachment - CoM	-0.06	0.08	-0.23, 0.10	0.44
Reappraisal x CoM	-0.03	0.01	-0.05, -0.004	0.02

Models 13 - 15 display the maladaptive regulation strategies and results in table 23 show a main effect for strategies (rumination, distraction, suppression). In each model there is a positive relationship between the emotion regulation strategy and negative affect. Therefore, as negative affect increases the use of rumination, distraction and suppression also increase. There is no main effect of attachment or interaction effects in these models.

Table 23: Maladaptive strategies and attachment on negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 13 (AIC: 2774.87; BIC: 2804.93)				
Intercept	2.26	0.10	2.07, 2.45	<0.001
Rumination	0.22	0.02	0.18, 0.25	<0.001
Attachment - CoM	-0.07	0.07	-0.21, 0.08	0.36
Rumination x CoM	0.001	0.01	-0.02, 0.02	0.90
Model 14 (AIC: 2909.21; BIC: 2939.28)				
Intercept	2.27	0.10	2.07, 2.46	<0.001
Distraction	0.09	0.02	0.06, 0.13	<0.001
Attachment - CoM	-0.06	0.08	-0.21, 0.09	0.42
Distraction x CoM	-0.004	0.01	-0.03, 0.02	0.71
Model 15 (AIC: 2871.30, BIC: 2901.36)				
Intercept	2.27	0.09	2.09, 2.45	<0.001
Suppression	0.14	0.02	0.11, 0.17	<0.001
Attachment - CoM	-0.04	0.07	-0.18, 0.10	0.53
Suppression x CoM	0.01	0.01	-0.01, 0.03	0.27

4.5 Discussion

In relation to the first hypothesis suggesting attachment security and self-reported coping and emotion regulation scores would be related, this prediction was not supported from the results of the current study as there were no significant relationships in the regression analyses. The association of the variables was in the predicted direction (greater attachment security and increasing problem focused coping, decreasing non productive coping and decreasing difficulties in emotion regulation) however only the relationship between attachment security and reducing difficulties in emotion regulation was close to significance. The negative association between attachment security and the DERS aligns with the work of Owens et al (2013) who emphasized insecure attachment was correlated with the total scores on the DERS (greater difficulties regulating emotions).

Despite the lack of significant findings in the initial regression analyses, mediations were carried out as significant relationships are not necessary for exploration of mediating relationships (Hayes, 2018). In these analyses two indirect relationships were reported. Attachment was indirectly related to problem focused coping through its relationship with mentalization. In addition, attachment was indirectly related to difficulties with emotion regulation through its relationship with mentalization. In both cases though the nature of these relationships was unexpected, therefore providing mixed results in relation to the study hypotheses. For the first indirect relationship, greater attachment security was positively related to mentalization while mentalization was negatively related to problem focused coping that is less problem focused coping. A similar pattern was reported for difficulties with emotion regulation where higher mentalization scores were associated with higher scores on the DERS that is more difficulties regulating emotions. There is little evidence for the reasons behind these findings, it could be postulated that the level of mentalization in this sample is more like hypermentalizing whereby young people are trying to understand their mental states and that of others but are unable to reach clear conclusions which in turn makes it more difficult to regulate emotions. It is also possible that the sample population influenced these results. Adolescence is a developmental period associated with increasing emotions and change in many areas as young people become more reliant on peer groups and develop their sense of self, their ability to mentalize and to understand other's behaviour. As these abilities and understandings are developing it may be difficult to successfully regulate emotions and this related to less problem focused coping and more difficulties with emotion regulation.

In relation to the final hypothesis of this chapter examining emotion regulation strategies in daily life, it was demonstrated in the first set of analyses (exploring attachment and emotion regulation strategies) attachment security did not impact on the use of emotion regulation strategies. When exploring regulation strategies specifically in managing negative emotions there was also no main effect of attachment security on any of the regulation strategies in daily life. Therefore, these results do not support the study hypotheses. In the analyses with negative affect there is a significant interaction for the use of reappraisal, therefore greater

attachment security weakened the positive relationship between negative emotion and increasing use of reappraisal. It is unclear reasons for this result, it could be postulated that young people with greater attachment security may feel more safe or confident in themselves and are more comfortable with negative emotion and therefore do not need to regulate emotions to the same extent as young people with more insecure attachment styles. However, as discussed previously current research points towards more adaptive regulation strategies such as reappraisal being associated with attachment security.

Limitations

A number of limitations should be highlighted from the current study. The sample size is modest and is just within requirements of sample size calculations, findings should therefore be replicated in future research. Additionally, coherence of mind scores were used as a measure of attachment security which provided a dimensional variable and therefore analyses are not conducted with the traditional groups of attachment categories (secure, preoccupied, dismissive) which prevented comparisons between attachment categories. Coherence of mind score has however been used in previous literature as a measure of attachment security (e.g. Bosquet & Egeland, 2001; Milligan et al., 2015; Shlafer et al., 2015). The current study also asked young people about six emotion regulation strategies in the ESM which are only a small number of the available strategies. Other studies have included different regulation strategies and there is an omission of the strategy of acceptance, given its reported role as a common strategy for young people in previous literature (Lennarz et al., 2019).

4.6 Conclusion

Overall, the current study demonstrates limited findings for the relationship between attachment, mentalization and emotion regulation in this adolescent sample using self-report measurements. In a mediation analysis there was evidence that higher mentalization scores were associated with greater difficulties regulating emotions, possibly as a result of exploring these constructs in an adolescent sample, where

young people are still developing understanding of themselves and others and how this may influence affective states. In using daily measurements of emotion regulation through ESM, there was no evidence of a main effect for attachment security on regulation strategies. Attachment security was shown to weaken the relationship between increasing negative emotion and increasing reappraisal. It is possible that in this adolescent sample the role of attachment styles and mentalization are still developing and this may have impacted on the results of the current study.

Chapter 5 – The Relationship between Attachment, Stress Sensitivity and Experiences of Psychosis

5.1 Research objectives

This chapter aims to explore stress sensitivity in a group of young people. Stress sensitivity is a measure of how individuals react to daily hassles or stressors. The objective of this chapter is to examine whether there is a relationship between attachment styles and stress sensitivity in this sample. An additional aim is to explore the relationship between psychotic experiences and stress sensitivity, to examine whether these experiences influence the way individuals respond to stressors in daily life.

5.2 Introduction

Stress Sensitivity and Emotion Regulation

Stress sensitivity can be viewed as a measure of how individuals tolerate or perceive stress in everyday environments. Early research into stress sensitivity is believed to have originated in the study of depression (Hammen, 2015) although a number of studies have now highlighted the significance of stress sensitivity in the development of psychosis (Myin-Germeys et al., 2003; Myin-Germeys & van Os, 2007; Palmier-Claus et al., 2012; van der Steen et al., 2017). This literature has referred to a number of concepts including emotional reactivity, affective reactivity as well as emotional stress reactivity. Emotional reactivity has been defined as a change in both positive and negative affect (Myin-Germeys et al., 2003) while affective reactivity has been defined as a change in negative affect in response to daily life stress (van der Steen et al., 2017). Emotional stress reactivity has been defined as a change in positive and negative affect in response to daily events (Myin-Germeys et al., 2004). Stress sensitivity has been defined as emotional responses to minor stressors (Reininghaus et al., 2016) or heightened responses to daily hassles (Ruzibiza et al., 2018). There is considerable cross over between these terms with the difference focusing on whether both positive and negative emotion or only

negative emotion will be explored. For continuity, stress sensitivity will be the term used in this chapter and will be defined as decreasing positive emotion or increasing negative emotion in response to daily stressors. Daily stressors will involve three different types of stress; event stress (a recent stressor that participants self-report as significant to them); activity stress (the current activity of the participant) and social stress (whether an individual is with others or alone and how positive they find this context).

Although stress sensitivity and emotion regulation are terms that are often explored independently in the literature (e.g. Lincoln et al., 2015) it is possible to view these concepts as measuring elements of the same underlying phenomenon. In particular, the emotion regulation literature refers to several features which draw clear comparisons between these two concepts. Gross (1998) emphasizes that emotion regulation involves regulating both positive and negative emotion, and that maintenance through increasing and decreasing emotions is at the very start of the process of regulation. This is clearly in parallel to the definition of stress sensitivity provided at the start of this chapter involving a subjective increase in negative affect and decrease in positive affect. Additionally, the way in which individuals perceive stress is argued to be a core component of emotion regulation (Laurent, 2014) and from this viewpoint it is argued that stress sensitivity can therefore be operationalized as emotion regulation in daily life.

Attachment Styles, Emotional Experiences and Stress Sensitivity

Despite attachment theory providing a framework for how individuals interact in social environments, limited research has explored attachment in daily life and how this relates to stress sensitivity. This appears to be counterintuitive as the nature of attachment theory rests on individual interactions and how these are interpreted, and is therefore context dependent. Theory suggests that dismissing attachment styles will be associated with deactivating or distancing emotion regulation strategies while preoccupied styles will be associated with hyperactivating or emotion-focused strategies (Simpson & Rholes, 2017). To the authors knowledge, there are only a small number of studies that have explored the impact of attachment styles in daily

life, either through experience sampling, or in the case of earlier work, using methods very similar to experience sampling such as the Rochester Interaction Record (RIR). The RIR originated in social psychology and involves participants completing set questions regarding their social life using event contingent sampling, after a specified type of social interaction (usually one lasting 10 minutes or more) participants are required to answer questions in relation to that interaction (Reis & Wheeler, 1991). Much of this earlier work has looked specifically at the relationships between attachment styles and individual emotional experiences in everyday environments.

In one of the most comprehensive studies to explore associations between attachment style and emotional responses in daily life, Pietromonaco & Feldman Barrett (1997) reported differences between the four attachment styles in a sample of undergraduate students. In this case, dismissing attachment styles were associated with less positive emotion and fearful attachment styles reported more positive emotion in daily interactions. Dismissing attachment styles were also associated with greater negative emotion in comparison to secure attachment styles. This study additionally examined specific responses in high conflict situations where arguably the attachment system would be more likely to be activated. In this case, it was reported that preoccupied attachment styles were associated with more positive emotion and dismissing attachment styles reported less positive emotion than fearful styles, and more negative emotion than secure attachment styles. The authors conclude that during high conflict interactions, there is an opportunity for individuals to achieve interpersonal goals that may reflect these results. In particular, preoccupied attachment styles are associated with a level of intimacy and involvement with another individual and in high conflict situations others are potentially more likely to provide this type of support to reach a resolution. In comparison, distance from others is desired in dismissive attachment styles to keep the attachment system deactivated however in high conflict situations, this is unlikely, leading to increased levels of negative emotion felt by individuals with dismissive attachment styles. This early study therefore highlighted that attachment styles can influence emotional experiences in daily life.

Further research by Kafetsios and Nezlek (2002) has also produced results that support attachment styles relating to differences in emotional experience particularly for secure attachment. In this study, a secure attachment style was shown to be associated with more positive feelings, and positive models of the self and others after social interactions particularly in comparison to dismissing attachment styles. This study again used a methodology based on the Rochester Interaction Record similar to Pietromonaco and Feldman Barrett (1997) where participants reported on significant interactions in diaries and completed ratings (e.g. emotional reactions, quality of interactions) on these situations. This study is likely to be impacted to some degree by retrospective reporting as it involved reporting at the end of the day rather than in the moment. Despite this however both of these early studies provide evidence for people responding differently to social interactions based on their attachment style.

Two studies have examined attachment styles in daily life using experience sampling. In one study no difference in positive affect between participants categorised into secure and insecure groups was reported (Torquati & Raffaelli, 2004). However, when exploring context in addition to attachment, secure participants reported greater levels of positive affect when with familiar people in comparison to insecure participants. This study used a self-report measure of attachment (adapted from the Collins & Read (1990) attachment style measure) and did not use multilevel modelling for the experience sampling data so further work to replicate these findings with attachment interviews and more intensive statistical methods is required.

Sheinbaum et al (2015) included an interview measure of attachment (Attachment Style Interview) in their experience sampling study in a group of undergraduate students. In this study differences between attachment styles reflected different patterns of responding to daily interactions. Anxious attachment styles were associated with higher negative affect and lower positive affect compared to secure attachment styles. There was no difference reported on negative affect between

dismissing and secure groups however, a dismissing attachment style was associated with less reported happiness when compared to secure attachment (Sheinbaum et al., 2015). This is in contrast to Pietromonaco and Feldman Barrett (1997) who reported that preoccupied attachment styles were associated with more positive emotion. It is possible that the different methodologies influenced these results as the RIR requires participants report after selecting interactions that they feel are salient while ESM asks individuals to report in the moment at random time points. Further work with ESM studies is required to build on these results further.

Stress Sensitivity and Experiences of Psychosis

The role of stress in the development of psychosis is a prominent finding in the literature and often involves reference to the stress vulnerability model. This model proposes that individuals have their own level of vulnerability to stress and once this interacts with environmental stressors and a threshold is reached, episodes of psychosis are more likely to occur (Nuechterlein & Dawson, 1984). Despite the clear links between levels of stress through life events and trauma, research has also examined the role of sensitization. Sensitization to stress is argued to develop through a process of exposure to stressors, such as specific traumas, which make individuals more susceptible to stressors in the future (Collip et al., 2013). These future stressors include relatively low level or daily hassles, such as having an argument with a loved one or missing a deadline in work. Therefore, stress sensitivity can be viewed as a mechanism for how sensitization develops. For example, as individuals experience more trauma their reported stress sensitivity increases which results in smaller stressors becoming more pertinent in future.

Research has repeatedly shown there are individual differences in how people respond to daily hassles, and this is associated with experiences of psychosis. For example, in exploring activity and event stress with intensity of psychotic experiences, Myin-Germeys et al (2005) reported that both types of stressor were related to psychotic experiences. As vulnerability for psychosis increased (from controls, relatives of people with psychosis to those with psychosis) a larger increase in psychotic experiences was reported in response to activity stress. For event stress

people with psychosis reported greater intensity of psychotic experiences than control participants. In a further study, all three types of stressor (activity, event, and social) were associated with a greater increase in negative emotion in a group who reported persistent experiences of subclinical psychosis when compared with a group who reported lower levels of subclinical psychosis experiences (Collip et al., 2013). More recently, Reininghaus et al (2016) also reported that increased stress sensitivity was associated with increased intensity of psychotic experiences in a group of young people and concluded that stress sensitivity is relevant across the different stages of psychosis development from low level less frequent experiences to experiences which are more intense and distressing.

Similar results have also been reported with at-risk mental state groups, for example in one study participants meeting ARMS criteria reported more negative emotion in response to daily stressors when compared to controls (Palmier-Claus et al., 2012). Furthermore, in this study the ARMS group was more responsive to stress when compared to a psychosis group, a finding replicated in a more recent study by van der Steen et al (2017). In this latter study, there was a stronger association between negative affect and activity related stress in an at-risk mental state group when compared to a psychosis group. In addition, momentary symptoms of psychosis were associated with activity related stress and this association was stronger in the at-risk group. Collectively these findings suggest experiences of psychosis can compound to be more distressing in at-risk mental state groups where these experiences are more novel, as well as provide further support for the process of sensitization as results show increased response to daily stressors in at-risk mental state groups before the development of a first episode of psychosis.

In addition to ESM research, similar results have also been reported in studies that have used self-report measurements of daily hassles. For example, DeVylder and colleagues (2013) argue that stress sensitivity is a core component of psychosis as they report associations with at-risk mental states, negative symptoms, poor functioning and affective symptoms. This link has also been reported in lower and middle income countries which are currently underrepresented in the literature but

also show that stress sensitivity is associated with increased reporting of psychotic experiences (DeVylder et al., 2016). In addition to the impact of stress sensitivity, studies with self-report measures have also demonstrated the process of sensitization, with Trotman et al (2014) reporting stress from life events predicted current stress from daily hassles in both controls and young people with at-risk mental states. Additionally, Grattan and Linscott (2019) also reported that baseline and current life events increase sensitivity to stress in future in a group of undergraduate students. Taking these studies together they build support for the process of sensitization from studies using self report measures by showing earlier stressors can impact the way individuals respond to future stressors.

One area where there has been accumulating evidence for the process of sensitization is in the study of childhood trauma. In exploring the association between childhood trauma and experiences of psychosis, work by Rossler and colleagues (2016) suggests that specific types of trauma (emotional abuse, emotional neglect, and physical neglect) are related to experiences of psychosis and this relationship is fully mediated by stress sensitivity, therefore providing direct evidence for the process of sensitization following exposure to certain stressors. It should be noted that this study did not use experience sampling, instead using self-report questionnaires. Similar findings were however reported when exploring the relationship between traumatic life events (measured on the childhood trauma questionnaire) and psychotic like experiences through perceived stress (Gibson et al., 2019) These authors concluded that following trauma, increased levels of perceived stress lead to feelings of less control and predictability which subsequently leads to an increase in experiences of psychosis. There is clearly building evidence for the process of sensitization within the development of psychotic experiences, however more research is required to understand the specific mechanisms involved in this process such as changes in perceived control.

Attachment Styles and Experiences of Psychosis

The development of psychosis is known to involve the interaction of a number of factors with attachment style being one such factor. There is evidence that

dismissing attachment styles are associated with psychosis in comparison to reoccupied and secure attachment styles (Gumley et al., 2014; Harder, 2014; Korver-Nieberg et al., 2015). This has been reported when looking specifically at symptoms of psychosis, namely positive and negative symptoms (Gumley et al., 2014) and positive and general symptoms (Korver-Nieberg et al., 2015) as well as overall scores that measure psychosis more broadly as a diagnosis. Despite this accumulating research it should be noted that the link between dismissing attachment and psychosis has not always been replicated. For example, in a recent meta-analysis fearful attachment was reported as the most prevalent attachment style (pooled estimate of 38%) in a group of people with psychotic experiences followed by avoidant (23%) and anxious attachment (17%; Carr et al., 2018). This meta-analysis included studies of both community and clinical samples, as well as at-risk mental state and early psychosis groups and therefore includes a broad range of participants. Based on these limited studies, dismissing attachment styles seem to be more prevalent in psychosis samples but early experiences of psychosis need to be further examined to understand the link of attachment style across all experiences of psychosis.

It is evident that attachment styles provide a framework for how individuals manage their emotions. Emotion regulation has typically been examined through self-report measures rather than daily life measures employing experience sampling. This chapter aims to examine the relationship between attachment and emotion regulation further through employing experience sampling and hypothesizes that; attachment styles will be related to stress sensitivity, specifically insecure attachment styles will be associated with greater stress sensitivity (i.e. increased reporting of negative affect and decreased reporting of positive affect in response to daily hassles). Secondly, the current study will also examine the impact of experiences of psychosis and hypothesizes that psychotic experiences will be associated with increased stress sensitivity, therefore as psychotic experiences increase participants will report increasing negative affect and decreasing positive affect in response to daily hassles.

5.3 Data Analysis

Overview

Multilevel models will explore the relationships between stress sensitivity, attachment styles and psychotic experiences. In the following models attachment style will be examined by three different variables. All the variables in the following analyses are listed below.

Variables in the Analysis

Variable	Measurement
Attachment style	Attachment style was measured in three ways all calculated from the AAI; a) A categorical variable based on 2 way coding of the AAI; secure and insecure (category) b) A continuous variable based on the coherence of mind score from the AAI (CoM) c) A continuous variable based on the subcategories of the AAI (dimension)
Positive affect	The mean score of the ESM questions; 'Right now I feel; happy, satisfied, enthusiastic, relaxed' Cronbach's α = 0.86
Negative affect	The mean score of the ESM questions; 'Right now I feel; anxious, lonely, irritated, sad, guilty' Cronbach's α = 0.75
Event stress	Score taken from the ESM item: 'what is the most important event that has happened since your last report'. This item was reversed, so higher scores reflected greater stress.
Activity stress	The mean score of four ESM items; 'it takes a lot of effort to do this activity'; 'I would prefer to do something else right now'; 'I like what I am doing right now' and 'I have the ability to do this activity'. The last two ESM items were reversed, therefore for all questions higher scores reflect higher stress.
Social stress	Based on four ESM items; a) 'right now, I enjoy being alone'/'right now I enjoy being with others' b) 'right now I'd prefer to be with others'/'right now I'd prefer to be alone'. The ESM items at a) were reversed scored so higher values were equal to more stress. The mean of these questions was taken as the measure of social stress.

CAARMS severity	Global and frequency scores for each of the 4 positive symptoms subscales (unusual thought content, non bizarre ideas, perceptual abnormalities, disorganised speech) of the CAARMS were multiplied to provide 4 scores. These 4 scores were combined to create one score for severity of psychotic experiences.

5.4 Results

Demographics

55 young people consented to take part in the current study, recruited from community and clinical services. Participant demographics are noted below in table 24. Descriptive statistics for the attachment measurements and psychotic experiences are displayed in table 25.

Table 24: Summary demographics for study participants

	Count
Gender - M/F	12/43
Mean age (SD)	21.98 (4.18)
Employment status:	
Student	45
Full time employment	4
Part time employment	2
Voluntary work	1
Unemployed	2
Missing	1

Table 25: Descriptive statistics for attachment and psychotic experiences scores

	Mean	SD
CoM score (AAI)	5.32	1.41
Subcategory dimension score (AAI)	4.19	1.03
CAARMS severity score	19.02	21.67

Multilevel models - Stress Sensitivity and Attachment Style

In the first group of analyses, negative affect was entered into multilevel models as the outcome variable, while stress type (activity, event or social) and attachment style based on the categorical variable were entered as predictors. The interaction between stress type and attachment style was also examined to establish whether there were differences in stress sensitivity between attachment styles. In these models (1 - 3) all three stress variables were centred using grand mean centring and results are displayed in table 26.

Table 26 shows that all three types of stressor significantly increased negative affect, therefore as young people found daily hassles more stressful their reported level of negative affect increased. When looking at the potential impact of attachment style, there was no evidence for a significant main effect of attachment. There was also no evidence of any interaction effects in these models.

Table 26: Daily stressors and attachment category on negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 1 (AIC: 2669.9; BIC: 2709.98)				
Intercept	2.17	0.12	1.94, 2.40	<0.001
Activity stress	0.31	0.03	0.24, 0.38	<0.001
Attachment category	0.35	0.24	-0.13, 0.83	0.14
Activity stress x attachment category	-0.03	0.07	-0.17, 0.12	0.71
Model 2 (AIC: 2810.91; BIC: 2850.97)				
Intercept	2.18	0.12	1.93, 2.42	<0.001
Event stress	0.16	0.02	0.12, 0.20	<0.001
Attachment category	0.35	0.25	-0.16, 0.86	0.17
Event stress x attachment category	-0.01	0.05	-0.10, 0.08	0.81
Model 3 (AIC: 2658.28, BIC: 2698.36)				
Intercept	2.19	0.12	1.96, 2.42	<0.001
Social stress	0.25	0.03	0.19, 0.31	<0.001
Attachment category	0.23	0.24	-0.25, 0.71	0.34
Social stress x attachment category	0.06	0.06	-0.07, 0.18	0.37

In the next set of models (4 - 6) positive affect was entered as the outcome variable and a similar pattern of results emerged. There is evidence of stress sensitivity, as young people reported more stress (activity, event and social) they also reported a reduction in positive affect. There was no significant main effect for attachment style or interactions for attachment style and stressor, these results are reported in table 27.

Table 27: Daily stressors and attachment category on positive affect

	B	SE	95% confidence interval	p
Outcome: Positive affect				
Model 4 (AIC: 3024.31; BIC: 3064.39)				
Intercept	3.99	0.11	3.78, 4.20	<0.001
Activity stress	-0.41	0.04	-0.49, -0.33	<0.001
Attachment category	-0.22	0.22	-0.66, 0.22	0.31
Activity stress x attachment category	0.04	0.09	-0.13, 0.21	0.67
Model 5 (AIC: 3199.95; BIC: 3240.02)				
Intercept	3.97	0.12	3.74, 4.20	<0.001
Event stress	-0.22	0.03	-0.27, -0.17	<0.001
Attachment category	-0.20	0.24	-0.68, 0.27	0.39
Event stress x attachment category	0.05	0.05	-0.06, 0.16	0.34
Model 6 (AIC: 3125.47, BIC: 3165.56)				
Intercept	3.97	0.12	3.74, 4.21	<0.001
Social stress	-0.29	0.04	-0.37, -0.22	<0.001
Attachment category	-0.13	0.24	-0.62, 0.36	0.60
Social stress x attachment category	0.03	0.07	-0.11, 0.17	0.69

Therefore, in comparing attachment styles with a categorical variable there is no evidence of attachment impacting on stress sensitivity. Given that using a categorical variable of attachment reduces all participants into two groups and reduces the variance in exploring differences between attachment styles, attachment was also examined as a dimensional variable through the coherence of mind score on the AAI. In the case of coherence of mind scores, greater coherence of mind scores reflect greater attachment security. These analyses are displayed below and as before the outcome variables are negative and positive affect while the three types of stressor and coherence of mind score were entered as predictors. All predictor variables were grand mean centred. Results for negative affect are displayed in table 28 (models 7 - 9).

Table 28: Daily stressors and coherence of mind scores on negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 7 (AIC: 2701.54; BIC: 2731.60)				
Intercept	2.27	0.10	2.06, 2.47	<0.001
Activity stress	0.30	0.02	0.26, 0.34	<0.001
Coherence of mind	-0.08	0.08	-0.24, 0.07	0.29
Activity stress x coherence of mind	0.03	0.01	-0.002, 0.05	0.06
Model 8 (AIC: 2820.90; BIC: 2850.95)				
Intercept	2.27	0.11	2.06, 2.49	<0.001
Event stress	0.16	0.01	0.13, 0.19	<0.001
Coherence of mind	-0.06	0.08	-0.23, 0.10	0.43
Event stress x coherence of mind	0.01	0.01	-0.004, 0.03	0.13
Model 9 (AIC: 2696.23, BIC: 2726.29)				
Intercept	2.27	0.10	2.06, 2.47	<0.001
Social stress	0.26	0.02	0.23, 0.29	<0.001
Coherence of mind	-0.07	0.08	-0.22, 0.09	0.40
Social stress x coherence of mind	0.004	0.01	-0.02, 0.03	0.75

From table 28 results show evidence of stress sensitivity so again as all three types of stressor increase so too does negative emotion. There is no evidence of a main effect for coherence of mind scores or interaction effects in relation to any of the three stressors, therefore CoM score does not influence negative emotion. However, the interaction of coherence of mind and activity stress on negative affect is close to significance at p = 0.06 (model 7). In this case, coherence of mind is a positive moderator of the relationship between activity stress and negative affect, therefore attachment security enhances the positive relationship between activity stress and negative affect.

Turning to positive affect table 29 shows stress sensitivity with all three types of stressor and decreasing positive emotion. Table 29 shows there is no significant main effect of coherence of mind in any of the models (10 - 12). There is however a

significant interaction between coherence of mind and social stress on positive affect (model 12). In this model attachment security is a negative moderator of the relationship between social stress and positive affect.

Table 29: Daily stressors and coherence of mind scores on positive affect

	B	SE	95% confidence interval	p
Outcome: Positive affect				
Model 10 (AIC: 3053.50; BIC: 3083.56)				
Intercept	3.92	0.09	3.74, 4.10	<0.001
Activity stress	-0.41	0.02	-0.46, -0.37	<0.001
Coherence of mind	0.10	0.07	-0.04, 0.24	0.14
Activity stress x coherence of mind	-0.02	0.02	-0.05, 0.01	0.27
Model 11 (AIC: 3210.49; BIC: 3240.54)				
Intercept	3.92	0.10	3.72, 4.12	<0.001
Event stress	-0.22	0.02	-0.25, -0.18	<0.001
Coherence of mind	0.07	0.08	-.0.08, 0.22	0.34
Event stress x coherence of mind	-0.01	0.01	-0.03, 0.01	0.39
Model 12 (AIC: 3148.93, BIC: 3179.00)				
Intercept	3.92	0.10	3.72, 4.12	<0.001
Social stress	-0.30	0.02	-0.34, -0.26	<0.001
Coherence of mind	0.08	0.08	-0.08, -0.26	0.31
Social stress x coherence of mind	-0.04	0.02	-0.07, -0.007	0.02

Exploratory analyses with attachment dimension scoring

Exploratory multilevel models were repeated as before using the attachment score from the subcategories of the AAI. The scoring of the subcategories of the AAI is referenced in the methodology section 2.6.5. In this case higher scores are associated with greater attachment security. It should be noted that this scoring method has not be validated in previous research and therefore these results are more exploratory. Results of the analyses with negative affect as the outcome variable are reported in table 30. In this case, stress sensitivity is reported with all three types of stressor. There is no main effect for attachment in any of the models

(13 - 15). There is a significant interaction effect for attachment and activity stress on negative affect in model 13. In this model greater attachment security is a positive moderator of the relationship between activity stress and negative affect.

Table 30: Daily stressors and attachment dimension on negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 13 (AIC: 2697.60; BIC: 2727.66)				
Intercept	2.27	0.10	2.07, 2.47	<0.001
Activity stress	0.30	0.02	0.27, 0.34	<0.001
Attachment dimension	-0.16	0.10	-0.36, 0.05	0.14
Activity stress x attachment dimension	0.04	0.02	0.005, 0.08	0.03
Model 14 (AIC: 2820.26; BIC: 2850.31)				
Intercept	2.27	0.11	2.06, 2.48	<0.001
Event stress	0.16	0.01	0.13, 0.19	<0.001
Attachment dimension	-0.16	0.11	-0.38, 0.06	0.14
Event stress x attachment dimension	0.005	0.01	-0.02, 0.03	0.73
Model 15 (AIC: 2693.59, BIC: 2723.65)				
Intercept	2.27	0.10	2.07, 2.47	<0.001
Social stress	0.26	0.02	0.23, 0.29	<0.001
Attachment dimension	-0.14	0.20	-0.35, 0.06	0.16
Social stress x attachment dimension	-0.009	0.02	-0.04, 0.02	0.55

The models for positive affect as the outcome variable are displayed in table 31. Results again demonstrate stress sensitivity for all three types of stressor. There is a main effect of attachment therefore attachment security was associated with increasing positive affect. There is a significant interaction of attachment on the relationship of activity stress on positive affect (model 16) therefore attachment security is a negative moderator of the relationship between activity stress and positive affect. There is also a significant interaction in model 18 where attachment

security is a negative moderator of the relationship between social stress and positive affect.

Table 31: Daily stressors and attachment dimension on positive affect

	B	SE	95% confidence interval	p
Outcome: Positive affect				
Model 16 (AIC: 3044.22; BIC: 3074.29)				
Intercept	3.92	0.09	3.75, 4.08	<0.001
Activity stress	-0.42	0.02	-0.46, -0.37	<0.001
Attachment dimension	0.23	0.09	0.06, 0.40	0.009
Activity stress x attachment dimension	-0.05	0.02	-0.09, -0.002	0.04
Model 17 (AIC: 3204.06; BIC: 3234.11)				
Intercept	3.91	0.10	3.73, 4.10	<0.001
Event stress	-0.22	0.02	-0.25, -0.18	<0.001
Attachment dimension	0.23	0.10	0.04, 0.43	0.02
Event stress x attachment dimension	-0.02	0.02	-0.05, 0.02	0.31
Model 18 (AIC: 3143.26, BIC: 3173.32)				
Intercept	3.91	0.10	3.72, 4.10	<0.001
Social stress	-0.30	0.02	-0.34, -0.26	<0.001
Attachment dimension	0.23	0.10	0.03, 0.42	0.02
Social stress x attachment dimension	-0.05	0.02	-0.09, -0.01	0.01

Multilevel Models - Attachment Styles, Experiences of Psychosis and Stress Sensitivity

Multilevel models were also conducted to explore the relationship between attachment style, experiences of psychosis and stress sensitivity. In these models, again negative and positive affect were entered as the outcome variables, while the three types of stressor, attachment style and CAARMS severity scores entered as predictors. Attachment style was again explored using the three different variables (category, coherence of mind and dimension). All continuous predictors were grand mean centred in the following analyses.

In the first set of models (19 - 21) exploring attachment category there is a main effect of stressor and attachment. Therefore, all three types of stressor are associated with increased negative affect and insecure attachment is also associated with increased negative affect. There is a main effect of CAARMS severity score, therefore as psychotic experiences increase negative affect also increases. There is a significant interaction effect of CAARMS severity score on the positive relationship between social stress and negative affect in model 21, therefore psychotic symptoms are a positive moderator of the relationship of social stress on negative emotion (stress sensitivity). Results are displayed in table 32.

Table 32: Daily stressors, attachment category and CAARMS severity on negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 19 (AIC: 2665.07; BIC: 2704.99)				
Intercept	2.15	0.11	1.94, 2.36	<0.001
Activity stress	0.31	0.02	0.26, 0.35	<0.001
Attachment category	0.51	0.23	0.05, 0.97	0.03
CAARMS severity	0.02	0.005	0.007, 0.03	<0.01
Activity stress x attachment category	-0.07	0.05	-0.16, 0.03	0.17
Activity stress x CAARMS severity	0.0008	0.0008	-0.0009, 0.002	0.34
Model 20 (AIC: 2778.96; BIC: 2818.86)				
Intercept	2.15	0.11	1.93, 2.37	<0.001
Event stress	0.16	0.02	0.12, 0.19	<0.001
Attachment category	0.56	0.23	0.08, 1.03	0.02
CAARMS severity	0.02	0.005	0.008, 0.03	<0.001
Event stress x attachment category	-0.02	0.04	-0.09, 0.05	0.52
Event stress x CAARMS severity	0.001	0.0006	-0.00008, 0.002	0.07
Model 21 (AIC: 2645.19, BIC: 2685.11)				
Intercept	2.16	0.10	1.96, 2.36	<0.001
Social stress	0.24	0.02	0.20, 0.27	<0.001
Attachment category	0.47	0.22	0.03, 0.90	0.04
CAARMS severity	0.02	0.004	0.008, 0.03	<0.001
Social stress x attachment category	0.06	0.04	-0.02, 0.14	0.13
Social stress x CAARMS severity	0.003	0.0007	0.002, 0.004	<0.001

With positive affect as the outcome variable, again there is a significant effect of all three types of stressor and CAARMS severity score whereby increasing psychotic experiences are associated with decreasing positive emotion. There is no main effect of attachment category and there are no interaction effects in these models (22 - 24) shown in table 33.

Table 33: Daily stressors, attachment category, CAARMS severity on positive affect

	B	SE	95% confidence interval	p
Outcome: Positive affect				
Model 22 (AIC: 3015.41; BIC: 3055.32)				
Intercept	3.99	0.09	3.80, 4.17	<0.001
Activity stress	-0.42	0.03	-0.47, -0.37	<0.001
Attachment category	-0.17	0.20	-0.58, 0.23	0.39
CAARMS severity	-0.01	0.004	-0.02, -0.004	<0.01
Activity stress x attachment category	0.03	0.06	-0.08, 0.14	0.59
Activity stress x CAARMS severity	-0.00002	0.001	-0.002, 0.002	0.99
Model 23 (AIC: 3170.18; BIC: 3210.08)				
Intercept	3.99	0.11	3.78, 4.20	<0.001
Event stress	-0.23	0.02	-0.27, -0.19	<0.001
Attachment category	-0.23	0.23	-0.68, 0.23	0.32
CAARMS severity	-0.01	0.005	-0.02, -0.005	<0.01
Event stress x attachment category	0.05	0.04	-0.03, 0.14	0.21
Event stress x CAARMS severity	-0.0002	0.0008	-0.002, 0.001	0.76
Model 24 (AIC: 3114.53, BIC: 3154.44)				
Intercept	3.97	0.11	3.76, 4.18	<0.001
Social stress	-0.30	0.02	-0.35, -0.26	<0.001
Attachment category	-0.14	0.23	-0.60, 0.32	0.55
CAARMS severity	-0.01	0.005	-0.02, -0.004	<0.01
Social stress x attachment category	0.03	0.05	-0.07, 0.12	0.59
Social stress x CAARMS severity	-0.001	-0.0009	-0.003, 0.0008	0.29

The next set of models include coherence of mind as the attachment variable and are summarised in table 34, where there is a significant main effect of the three stressors on negative affect. There is also a main effect of CAARMS severity score therefore as the severity of psychotic experiences increases negative affect also increases. There is however no main effect of CoM score.

There is a significant interaction effect of coherence of mind score on the impact of activity stress on negative affect (model 25). In this case, coherence of mind is a positive moderator of the relationship between activity stress and negative affect. Another significant interaction is also reported with CAARMS severity and the relationship between social stress and negative affect (model 27). In this model experiences of psychosis is a positive moderator of the relationship between social stress and negative affect. For event stress both the interaction with coherence of mind and CAARMS severity were just out with significance with coherence of mind at $p = 0.09$ and CAARMS severity at $p = 0.07$. This would suggest coherence of mind and CAARMS severity are positive moderators on the relationship between event stress and negative affect.

Table 34: Daily stressors, coherence of mind and CAARMS severity on negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 25 (AIC: 2669.73; BIC: 2709.64)				
Intercept	2.28	0.10	2.09, 2.47	<0.001
Activity stress	0.29	0.02	0.26, 0.33	<0.001
Coherence of mind	-0.13	0.07	-0.28, 0.02	0.09
CAARMS severity	0.02	0.005	0.006, 0.003	<0.01
Activity stress x coherence of mind	0.03	0.01	0.00003, 0.06	0.05
Activity stress x CAARMS severity	0.0008	0.0008	-0.0009, 0.002	0.35
Model 26 (AIC: 2784.31; BIC: 2824.21)				
Intercept	2.29	0.10	2.09, 2.49	<0.001
Event stress	0.15	0.01	0.12, 0.18	<0.001
Coherence of mind	-0.12	0.08	-0.27, 0.04	0.14
CAARMS severity	0.02	0.005	0.007, 0.03	<0.01
Event stress x coherence of mind	0.02	0.01	-0.003, 0.04	0.09
Event stress x CAARMS severity	0.001	0.0006	-0.0001, 0.002	0.07
Model 27 (AIC: 2653.78, BIC: 2693.70)				
Intercept	2.28	0.09	2.10, 2.46	<0.001
Social stress	0.25	0.02	0.22, 0.28	<0.001
Coherence of mind	-0.12	0.07	-0.26, 0.03	0.11
CAARMS severity	0.02	0.005	0.007, 0.03	<0.001
Social stress x coherence of mind	-0.0003	0.01	-0.03, 0.03	0.98
Social stress x CAARMS severity	0.003	0.0007	0.001, 0.004	<0.001

Table 35 reports the models of daily stress, coherence of mind and CAARMS severity with positive affect. Results again show that all three types of stressor and CAARMS severity score had a significant impact on positive affect. For all three types of stressor, as they increased positive affect decreased. As psychotic experiences increased, positive affect also decreased. A significant interaction between coherence of mind and social stress sensitivity (model 30) shows that coherence of mind is a negative moderator of the relationship between social stress and positive affect.

Table 35: Daily stressors, coherence of mind and CAARMS severity on positive affect

	B	SE	95% confidence interval	p
Outcome: Positive affect				
Model 28 (AIC: 3018.61; BIC: 3058.52)				
Intercept	3.94	0.08	3.78, 4.10	<0.001
Activity stress	-0.41	0.02	-0.46, -0.37	<0.001
Coherence of mind	0.09	0.06	-0.04, 0.22	0.16
CAARMS severity	-0.01	0.004	-0.02, -0.004	<0.01
Activity stress x coherence of mind	-0.01	0.02	-0.05, 0.02	0.46
Activity stress x CAARMS severity	-0.00003	0.001	-0.002, 0.002	0.98
Model 29 (AIC: 3176.06; BIC: 3215.96)				
Intercept	3.93	0.09	3.75, 4.11	<0.001
Event stress	-0.21	0.02	-0.25, -0.18	<0.001
Coherence of mind	0.07	0.07	-0.07, 0.22	0.31
CAARMS severity	-0.01	0.005	-0.02, -0.005	<0.01
Event stress x coherence of mind	-0.008	0.01	-0.03, 0.02	0.50
Event stress x CAARMS severity	-0.0004	0.0008	-0.002, 0.001	0.61
Model 30 (AIC: 3114.01, BIC: 3153.92)				
Intercept	3.93	0.09	3.75, 4.12	<0.001
Social stress	-0.30	0.02	-0.34, -0.26	<0.001
Coherence of mind	0.08	0.07	-0.07, 0.22	0.29
CAARMS severity	-0.01	0.005	-0.02, -0.005	<0.01
Social stress x coherence of mind	-0.03	0.02	-0.07, -0.003	0.03
Social stress x CAARMS severity	-0.0007	0.0009	-0.003, 0.001	0.42

Exploratory analyses with attachment dimension scoring

When using the attachment dimensions scores the results are broadly similar to those reported in models 25 - 27 with CoM as the measurement of attachment. In the analyses with the attachment dimension variable there is a main effect for each stressor and CAARMS severity but there is no main effect of attachment (models 31 - 33). There is a significant interaction between attachment, activity stress and negative affect (model 31) where attachment security is a positive moderator of the

relationship between activity stress and negative affect. There is a further significant interaction between CAARMS severity, event stress and negative affect (model 32) where CAARMS severity score is a positive moderator of the relationship between event stress and negative affect. There is another significant interaction in model 33 where CAARMS severity is a positive moderator of the relationship between social stress and negative affect. Results are displayed in table 36. The last two interaction effects (models 32 and 33) demonstrate stress sensitivity in relation to increasing psychotic experiences.

Table 36: Daily stressors, attachment dimension, CAARMS severity and negative affect

	B	SE	95% confidence interval	p
Outcome: Negative affect				
Model 31 (AIC: 2664.27; BIC: 2704.19)				
Intercept	2.28	0.10	2.09, 2.47	<0.001
Activity stress	0.29	0.02	0.26, 0.33	<0.001
Attachment dimension	-0.16	0.10	-0.36, 0.05	0.13
CAARMS severity	0.01	0.005	0.004, 0.02	<0.01
Activity stress x attachment dimension	0.06	0.02	0.02, 0.10	<0.01
Activity stress x CAARMS severity	0.001	0.0008	-0.0004, 0.003	0.15
Model 32 (AIC: 2784.31; BIC: 2824.21)				
Intercept	2.29	0.10	2.09, 2.49	<0.001
Event stress	0.15	0.01	0.12, 0.18	<0.001
Attachment dimension	-0.17	0.10	-0.38, 0.04	0.11
CAARMS severity	0.01	0.005	0.005, 0.02	<0.01
Event stress x attachment dimension	0.02	0.02	-0.01, 0.05	0.29
Event stress x CAARMS severity	0.001	0.0006	0.00009, 0.003	0.04
Model 33 (AIC: 2652.65, BIC: 2692.56)				
Intercept	2.28	0.09	2.10, 2.46	<0.001
Social stress	0.25	0.02	0.22, 0.28	<0.001
Attachment dimension	-0.16	0.10	-0.35, 0.04	0.11
CAARMS severity	0.01	0.005	0.006, 0.02	<0.01
Social stress x attachment dimension	0.0006	0.02	-0.03, 0.03	0.97
Social stress x CAARMS severity	0.003	0.0007	0.001, 0.004	<0.001

Arguably the greatest impact of the dimensional attachment variable is in relation to positive affect (results are shown in table 37). There is a main effect of attachment in model 34 and trend level in models 35 and 36 where greater attachment security is associated with greater positive affect. The interaction of attachment on social stress sensitivity is also statistically significant in model 36 whereby attachment security is a negative moderator of the relationship between social stress and positive emotion. A trend level interaction relationship is reported with activity stress (model 34) where attachment security is a negative moderator of the relationship between activity stress and positive emotion.

Table 37: Daily stressors, attachment dimension, CAARMS severity and positive affect

	B	SE	95% confidence interval	p
Outcome: Positive affect				
Model 34 (AIC: 3012.44; BIC: 3052.36)				
Intercept	3.93	0.08	3.78, 4.09	<0.001
Activity stress	-0.41	0.02	-0.46, -0.37	<0.001
Attachment dimension	0.17	0.08	0.0009, 0.34	0.05
CAARMS severity	-0.01	0.004	-0.02, -0.003	0.007
Activity stress x attachment dimension	-0.05	0.02	-0.09, 0.003	0.07
Activity stress x CAARMS severity	-0.0002	0.001	-0.002, 0.002	0.80
Model 35 (AIC: 3171.48; BIC: 3211.38)				
Intercept	3.92	0.09	3.74, 4.10	<0.001
Event stress	-0.21	0.02	-0.25, -0.18	<0.001
Attachment dimension	0.19	0.09	-0.005, 0.38	0.06
CAARMS severity	-0.01	0.004	-0.02, -0.004	0.007
Event stress x attachment dimension	-0.02	0.02	-0.05, 0.02	0.34
Event stress x CAARMS severity	-0.0005	0.0008	-0.002, 0.001	0.50
Model 36 (AIC: 3109.19, BIC: 3149.10)				
Intercept	3.92	0.09	3.75, 4.10	<0.001
Social stress	-0.30	0.02	-0.34, -0.26	<0.001
Attachment dimension	0.18	0.10	-0.02, 0.37	0.07
CAARMS severity	-0.01	0.004	-0.02, -0.003	0.008
Social stress x attachment dimension	-0.05	0.02	-0.10, -0.01	0.01
Social stress x CAARMS severity	-0.001	0.0009	-0.003, 0.0005	0.17

5.5 Discussion

Results of the current study therefore do not support the primary hypothesis as there was no evidence for a clear relationship between insecure attachment style and stress sensitivity. It was expected that insecure attachment styles would be associated with greater stress sensitivity and results are instead more relevant to secure attachment styles, with a key finding that attachment security acts as a buffer to reduce the impact of social stress on positive affect. This supports the work of Kafetsios and Nezlek (2002) and Sheinbaum et al (2015) who both reported that secure attachment styles were associated with more positive feelings and positive views of self and others in daily interactions. It can therefore be summarised that in daily life, the attachment framework allows for individuals with secure attachment styles to be less effected by the impact of social stress and the associated reduction in positive affect.

From the key findings of the current study, it was reported that insecure attachment was associated with negative affect (models 19 – 21) when attachment was measured by a categorical variable. This largely supports the earlier work by Pietromonaco and Feldman Barrett (1997) where dismissing attachment was associated with less positive emotion and more negative emotion compared to secure attachment styles in daily interactions as well as high conflict situations. Pietromonaco and Feldman Barrett (1997) reported that preoccupied attachment was associated with positive emotion in high conflict environments which reflects a deviation from the current study, however given the current study explored daily events and did not explicitly examine high conflict interactions there may be a difference due to the type of context.

An unexpected finding in the current study was the enhancing effect of attachment security on the positive relationship between activity stress and negative affect. It can therefore be speculated that the type of stressor may be important in

understanding how attachment styles relate to reactions in daily life. The activities of the young people in the current study could vary widely and this variability could have influenced these results. This finding is in contrast to the work of Sheinbaum et al (2015) who reported differences between attachment styles and current activities in the moment. Results would therefore need to be replicated in future work. It may be necessary to explore in greater detail the current activity young people are completing to understand these associations further.

Turning to experiences of psychosis, in the analyses including CAARMS severity scores, the current study reported that as experiences of psychosis increased negative affect increased, and positive affect decreased demonstrating the impact of psychotic experiences on affective states. In relation to the impact of psychotic experiences on stress sensitivity, results demonstrate social stress sensitivity where psychotic experiences were a positive moderator of the relationship between social stress and negative affect. Stress sensitivity was not reported in relation to activity stress or event stress in the main results of the current study. Taken together, these results therefore partially support the study hypotheses.

The relationship between psychotic experiences and stress sensitivity has been well replicated in the previous literature (e.g. Collip et al., 2013; Myin-Germeys et al., 2005; Reininghaus et al., 2016). In the current study, participants reported a range of experiences of psychosis which is likely to have influenced the reported results. If more participants with a greater intensity of psychotic experiences were included in the current study this may have led to greater stress sensitivity across all three types of stressor (activity, event and social). Results therefore point to the potential importance of social stress for young people with experiences of psychosis, and results support previous literature which suggests there is a role for stress sensitivity across a wide spectrum of psychotic experiences including at-risk mental states (Palmier-Claus et al., 2012; van der Steen et al., 2017). The importance of social stress was also reflected in the results in relation to attachment styles where coherence of mind was a negative moderator of the relationship of social stress and positive affect. Collectively these results highlight the significance of social

environments in attachment relationships as well as in young people with experiences of psychosis. In the next chapter, social context will be explored in greater detail to establish if particular aspects of a young person's social environment relate to attachment styles and mentalization scores.

Exploratory analyses

In relation to the exploratory analyses in the current study, findings were similar to those reported in the main results where attachment security was a moderator in the relationship between activity stress and negative affect. Additionally, attachment security buffered the negative relationship between social stress and positive affect. In a deviation from the key results, the exploratory analyses emphasized a positive relationship between attachment security and positive affect which supports findings from previous literature (e.g. Kafetsios & Nezlek, 2002). The reader is reminded that this variable has not been validated and results should be interpreted with caution. It would be necessary that these results are replicated in further work using dimensional variables of attachment from the AAI.

Limitations

Several limitations of the current study should be highlighted. Firstly, in analysing the direction of the effect between severity of psychotic experiences on the relationship between social stress and negative affect, it is also possible that psychotic experiences themselves cause the change in social interaction and because of these experiences social interactions become more stressful. Secondly, it could be argued that the approach taken to the attachment measurement in this study could be more reliable by not using several measures from the one interview namely the AAI. However, given the known challenges with measuring attachment on a categorical and dimensional basis, it is argued that the approach taken here is more exploratory and inclusive, and allows for more detailed examination of the role of attachment styles in psychological research. In addition, the validity (van Ijzendoorn, 1995) and reliability (Bakermans-Kranenburg & van Ijzendoorn, 1993) of the AAI has been previously reported.

5.6 Conclusion

In conclusion, the current study has demonstrated the buffering effect of a secure attachment style. It has been reported that secure attachment style is a negative moderator of the relationship between social stress and positive affect. It has also been demonstrated that insecure attachment is associated with increasing negative affect. . Results therefore support attachment theory as a theory of resilience. The current study also demonstrated the role of emotions in psychotic experiences by showing that increasing psychotic experiences are associated with increasing negative affect and reducing positive affect in a group of young people. In addition, increasing psychotic experiences were also shown to be associated with social stress sensitivity. Results of this chapter therefore reinforce the importance of social context in relation to attachment styles and experiences of psychosis.

Chapter 6 - The Impact of Attachment Styles, Mentalization and Psychotic Experiences on Social Context

6.1 Research Objectives

This chapter aims to examine aspects of social context to establish whether a young person's appraisal of their environment is influenced by their attachment style and mentalization ability. To do this, the impact of a young person reporting enjoyment being alone or with others as well as their preference to be alone or with others will be explored. The relationship between psychotic experiences and reported enjoyment and social preference will also be included in the following analyses to examine whether psychotic experiences impact on appraisals of social context. Additionally, this chapter will investigate the contextual relationship between enjoyment and social preference and negative affect using an exploratory time series analysis to establish whether enjoyment and social preference persist over time. To set this chapter in context, social functioning will initially be discussed to provide a broader overview of the importance of the social environment and social experiences for young people with experiences of psychosis.

6.2 Introduction

Adolescence, Social Functioning and Experiences of Psychosis

Adolescence can be a particularly challenging time during which individuals develop their interpersonal skills and relationships, extend their independence from their families and build peer relationships. Although this is often a transitional phase for the majority of young people, it can become more challenging for others and can lead to more enduring problems with social functioning as well as overall mental health wellbeing. Research has shown difficulties in social functioning are associated with experiences of psychosis in those with a first episode of psychosis (Ortega et al., 2020), those who have had multiple episodes of psychosis (Addington et al., 2008) as well as young people with at-risk mental states (Addington et al., 2008; Jang et al., 2011; Kimhy et al., 2016). In fact, recent research shows young people

meeting criteria for ARMS report difficulties in emotion awareness and emotion regulation which are related to lower social functioning, a finding which was more pertinent in an ARMS group when compared to a group of participants with Schizophrenia (Kimhy et al., 2016). Declining social functioning has also been highlighted as a risk factor for transitioning from ARMS to FEP (Addington et al., 2017; Jang et al., 2011; Velthorst et al., 2013). Therefore, changes in social functioning are often advocated as one of the early warning signs of declining mental health in young people and as a target for intervention (Addington et al., 2017; Cotter et al., 2014).

Social functioning is a broad concept that refers to several aspects of a young person's life, with one definition including 'quantity and quality of peer relationships, level of peer conflict, age-appropriate intimate relationships and involvement with family members' (Cornblatt et al., 2007, p691). In the context of psychosis, social functioning is often explored in relation to negative symptoms, neurocognition or social cognition and rarely in relation to attachment styles (Kielan-Cebo et al, 2021). This is surprising given the importance of attachment styles in how individuals interact with others in social environments. In studies that have examined the association between attachment and social functioning links between these concepts have been demonstrated. Couture et al (2007) reported significant associations between factors from the Attachment Styles questionnaire (avoidance, confidence and discomfort with closeness) and social functioning domains (Couture et al., 2007). In addition, Kielan-Cebo et al (2021) reported a number of associations between attachment styles and domains of social functioning (social engagement, interpersonal behaviour, pro-social activities and independence performance) in participants with Schizophrenia. In this latter study, avoidant attachment in particular was shown to significantly predict lower social engagement and interpersonal behaviour. This supports findings from a current synthesis of the attachment and psychosis literature where avoidant attachment was associated with greater interpersonal problems and experiences of psychosis (Gumley et al., 2014). Although links between attachment and social functioning have been reported, this is only from a small literature base, and has therefore led to suggestions that other mechanisms may be involved in this relationship. One such mechanism is social

cognition with Palmier-Claus et al (2019) suggesting that attachment styles may influence social functioning through aspects of social cognition.

Social Cognition as a Mechanism

Social cognition is a broad term that involves a number of different elements such as emotion processing, theory of mind, attributional style and social perception (Green et al., 2005) and effectively 'enables individuals to act appropriately in response to their social environment' (Palmier-Claus et al., 2019, p. 87). The study of social cognition is particularly challenging as researchers often use different concepts and measures to explore similar constructs and different disciplines such as neuroscience, psychiatry and psychology have all been involved in examining social cognition in psychosis (Javed & Charles, 2018).

Despite it being advocated that social cognition links to social functioning, there is limited research which has supported this suggestion. For example, Fett et al (2011) conducted a meta-analysis exploring the links between social cognition and neurocognition in social functioning and reported that although both social cognition and neurocognition contributed to functional outcomes, the majority of the variance in the analysis was still unexplained. In addition, Woolverton et al (2018) also reported limited associations when exploring five aspects of social cognition (attribution style, emotion processing, social knowledge, social perception and theory of mind) with social functioning in a group of FEP participants. In this study where associations were reported this was often a negative relationship therefore greater social cognition was related to reduced social functioning. Additionally, when exploring these concepts longitudinally, there was no significant association between social cognition measured at baseline and social functioning 6 months later. These authors therefore suggest social cognition may in fact be negatively related to social functioning and therefore as people become more aware of the negative impact or stigma related to their experiences of psychosis they begin to withdraw from social environments (Woolverton et al., 2018). It is also possible that by exploring two broad concepts which include a number of different elements (e.g. social cognition referring to theory of mind or emotion processing, and social functioning referring to

interacting with different peers or different family members) it is difficult to examine associations with several different aspects.

Therefore, research has also explored whether elements of social cognition provide a link between attachment and social functioning. For example, in a recent study specifically exploring metacognition and social functioning it was noted that greater metacognition was associated with improved social functioning. Metacognition has been defined as 'the reflections people form about themselves and others' (Lysaker & Dimaggio, 2014, p. 487) and is therefore narrower than the term social cognition. In further research however it was noted that greater metacognitive ability reduced the effect of psychotic symptoms on social functioning (Fischer et al., 2020) therefore suggesting that metacognition could influence social functioning through psychotic symptoms. It has been emphasized that it is unclear whether social cognition directly influences social functioning or whether these concepts are related through psychotic symptoms (Heins et al., 2019). It is therefore difficult to reach a clear conclusion on whether social cognition acts as a mechanism between attachment and social functioning. To understand more about how individuals' function in social environments it is also necessary to look at aspects of social context to explore whether there are differences in how young people experience or appraise social situations. In understanding more about how individuals appraise their social environments it is suggested this can contribute to literature on social functioning by establishing how young people experience their social interactions and wider context.

ESM Studies of Social Context and Experiences of Psychosis

ESM studies are allowing researchers to understand how the social context influences interactions between psychotic experiences and affective states. It has been demonstrated that when individuals with psychosis are in familiar environments (such as participant's own home, home of their family or friends) greater psychotic experiences are associated with a decrease in depression and anxiety (Husky et al., 2004). More recently, in a comparison study it has been shown that both patients with Schizophrenia and Schizoaffective disorder and a control group reported an

increase in positive affect and reduction in negative affect when in the presence of others (Oorschot et al., 2013). In a further ESM study exploring levels of schizotypy and social context it was also demonstrated that higher scores on the Schizotypy personality questionnaire were associated with spending less time socialising compared to lower scores on this questionnaire. Lower scores on the Schizotypy personality questionnaire were also associated with increased positive affect when socialising (Minor et al., 2020). A recent ESM systematic review supports several of these findings by concluding that people with Schizophrenia more often report a preference to be alone however they also tend to report more positive emotion when they are with others compared to when they are alone (Mote & Fulford, 2020). Therefore, ESM studies are demonstrating that when people with psychosis are in environments in which they feel comfortable or are in the presence of others this can impact in their emotions in the moment.

When examining the social context of individuals in early psychosis there are similarities in results however there are also some interesting nuances which could provide avenues for intervention and further research. In one study, FEP participants reported greater increases in positive affect in the presence of others when compared to control participants (Hermans et al., 2020). This study also reported that FEP participants spent more time alone compared to control and ARMS participants and FEP participants also preferred to have company when alone more than control participants. This differs from earlier work in two ways, first by suggesting that FEPs have greater improvements in positive affect when surrounded by others, and secondly by demonstrating that FEPs may prefer company more than control participants when they are alone. It is therefore possible that there are specific appraisals and aspects of the social context that are relevant in early psychosis which could provide opportunities to intervene to support social functioning in this group.

Although conducted with an adult population it has been demonstrated that appraisals of social situations play a role in individual functioning in the context of psychosis. Granholm et al (2013) reported that greater positive affect was associated

with recent social interactions that were assessed as worthwhile and where the participant perceived others viewed them positively. In this sample of individuals with psychosis, positive affect also predicted the number of social interactions at the next timepoint but there was no association between current levels of socialisation predicting future positive affect. This study therefore demonstrates the importance of cognitive appraisals but also their role jointly with positive emotion in supporting social functioning in people with psychosis. This research therefore points to the importance of both appraisals and emotion in influencing social interactions in people with psychosis. As attachment theory provides a framework for how we understand social interactions and given the association of attachment security and positive emotion (as demonstrated in the previous chapter of this thesis) it is suggested that it is important to also look at the role attachment and mentalization play in understanding how people experience their social environment.

ESM Study of Attachment and Social Context

In one of the only ESM studies to include a measure of attachment, Sheinbaum et al (2015) found that the amount of time people reported spending with others did not differ by attachment style, however avoidant attachment was associated with an increased preference to be alone when in the company of others as well as a decreased preference to be with others when alone. In addition, anxious attachment was also associated with preference to be alone when in the company of others. In the interaction analysis however, this finding appears to be related to when individuals with anxious attachment are in the presence of others they do not feel close to leading the authors to conclude that subjective appraisals of the social environment may be crucial for the application of attachment style in social contexts. Although this study was conducted with a student population it is one of the only studies currently available that has examined attachment with daily measures of stress and social context through ESM. The current study aims to build on this work further by applying a similar analysis to a group of young people with varying experiences of psychosis and understand possible links between specific aspects of social context and attachment styles.

In this chapter, social context variables will be explored for possible relationships with attachment and mentalization. The following analysis will build on the previous chapter of this thesis by examining specific elements of an individuals' environment. In the preceding chapter attachment style was related to social stress when measured in daily life. The social stress variable is made up of two components of social context, namely enjoyment when alone or with others, and preference to be alone or with others. To examine whether attachment style influences specific aspects of how someone appraises their environment both enjoyment and social preference will be explored in this chapter. In addition to attachment styles, mentalization will also be examined to establish whether there is a relationship between mentalization and enjoyment and social preference. It is suggested that by understanding further about how young people with varying experiences of psychosis appraise and experience their social environment this can contribute to establishing whether there are differences in early psychosis that could become targets of intervention to improve social functioning.

It is hypothesized that enjoyment when alone or with others will not be influenced by attachment style or mentalization score and there will be no relationship between these variables. Social preference however is hypothesized to differ by attachment style with secure attachment expected to be associated with a preference to be with others when alone. Mentalization score is also expected to be associated with social preference and greater mentalization score will be related to a preference to be with others when alone. Further hypotheses will examine the impact of psychotic experiences on social context where it is expected that as psychotic experiences increase participants will report decreasing enjoyment (whether alone or with others) and a greater preference for company when alone. Interactions will also be examined exploring both attachment or mentalization with psychotic experiences on enjoyment and social preference. It is expected that secure attachment and greater mentalization score will buffer the negative relationship of psychotic experiences on enjoyment and social preference.

In addition to these primary hypotheses this chapter will also examine an exploratory time series analysis where the impact of reported enjoyment and social preference on negative affect will be examined. This will allow for testing whether contextual variables can influence wellbeing or negative affect. The time series analyses will also examine how much enjoyment and social preference persist from one timepoint to the next therefore establishing whether these appraisals linger over time. It is expected that both enjoyment and preference to be with others or alone, will persist over time.

6.3 Data Analysis

Overview

Multilevel models will explore the relationships between attachment, mentalization, psychotic experiences in relation to the social context variables of enjoyment and social preference. Following this, exploratory time series analyses will examine the relationship between enjoyment and social preference with negative emotion across timepoints to establish whether reported enjoyment and social preference persist over time.

Variables in the Analysis

Variable	Measurement
Attachment style	Attachment style was measured in three ways all calculated from the AAI; a) A categorical variable based on 2 way coding of the AAI; secure and insecure (category) b) A continuous variable based on the coherence of mind score from the AAI (CoM) c) A continuous variable based on the subcategories of the AAI (dimension) (See Methodology section 2.6.5 for further detail)
Mentalization	RF score from the AAI
Enjoyment with others	ESM score from item ‘Right now, I enjoy being with others’
Enjoyment being alone	ESM score from item ‘Right now, I enjoy being alone’

Social preference prefer alone	ESM score from item 'Right now, I'd prefer to be alone'
Social preference prefer others	ESM score from item 'Right now, I'd prefer to be with other people'
Social stress	Based on four ESM items above regarding enjoyment and social preference. The two enjoyment items were reversed scored so higher values are equal to more stress. The mean of these questions was taken as the measure of social stress.
CAARMS severity	Global and frequency scores for each of the 4 positive symptoms subscales (unusual thought content, non bizarre ideas, perceptual abnormalities, disorganised speech) of the CAARMS were multiplied to provide 4 scores. These 4 scores were combined to create one score for severity of psychotic experiences.

6.4 Results

Demographics

55 young people consented to take part in the current study, recruited from community and clinical services. Participant demographics are noted below in table 38.

Table 38: Summary demographics for participants

	Count
Gender - M/F	12/43
Mean age (SD)	21.98 (4.18)
Mean GAF score (SD)	64.71 (12.76)
Employment status:	
Student	45
Full time employment	4
Part time employment	2
Voluntary work	1
Unemployed	2
Missing	1

Descriptive statistics for the developmental measurements and psychotic experiences are displayed in table 39.

Table 39: Descriptive statistics for attachment, RF scores and psychotic experiences

	Mean	SD
CoM score (AAI)	5.32	1.41
Subcategory dimension score (AAI)	4.19	1.03
RF score (AAI)	2.73	1.65
CAARMS severity score	19.02	21.67

Multilevel models

Multilevel regression models were conducted to explore whether attachment and mentalization scores were associated with reported enjoyment being alone or with others and preference to be with others (when alone) and preference to be alone (when with others). Analyses were conducted with three attachment variables (categorical, coherence of mind and dimension) as predictors. The RF score from the AAI was used as a measure of mentalization. All continuous predictor variables were grand mean centred.

Results of the first analysis are displayed below, where enjoyment when with others is the outcome variable. Table 40 shows that there are no significant relationships between attachment and mentalization on whether young people report enjoyment when with others. In addition, there are no significant interaction effects in these models.

Table 40: Multilevel regression models of enjoyment when with others

	B	SE	95% confidence interval	p
Outcome: Enjoyment when with others				
Model 1 (AIC: 4911.33; BIC: 4940.90)				
Intercept	2.30	0.71	0.90, 3.70	0.001
CAARMS severity	0.03	0.05	-0.07, 0.13	0.54
Attachment category	0.22	0.58	-0.96, 1.39	0.71
CAARMS severity x Attachment category	-0.03	0.05	-0.12, 0.06	0.50
Model 2 (AIC: 4914.79; BIC: 4944.36)				
Intercept	2.55	0.21	2.13, 2.96	<0.001
CAARMS severity	-0.008	0.01	-0.03, 0.01	0.45
Coherence of mind	0.04	0.18	-0.32, 0.40	0.83
CAARMS severity x Coherence of mind	0.02	0.01	-0.006, 0.04	0.14
Model 3 (AIC: 4914.27, BIC: 4943.84)				
Intercept	2.66	0.21	2.24, 3.08	<0.001
CAARMS severity	-0.00007	0.01	-0.02, 0.02	0.99
Attachment dimension	0.07	0.23	-0.40, 0.54	0.76
CAARMS severity x Attachment dimension	0.02	0.02	-0.01, 0.06	0.22
Model 4 (AIC: 4917.13; BIC: 4946.70)				
Intercept	2.55	0.21	2.14, 2.97	<0.001
CAARMS severity	-0.005	0.01	-0.03, 0.02	0.64
Mentalization	-0.04	0.13	-0.30, 0.22	0.75
CAARMS severity x Mentalization	0.009	0.007	-0.005, 0.02	0.20

Further multilevel models were conducted to examine reported enjoyment when alone and the association with attachment styles and mentalization score. Results are reported in table 41 for the outcome variable enjoyment when alone (models 5 - 8). In these models there are no main effects for any of the attachment variables or experiences of psychosis however two interaction effects are noted. In model 8 there is a significant interaction for mentalization score on the relationship between psychotic experiences and enjoyment being alone. In this model, as psychotic experiences increase enjoyment when alone decreases, mentalization score acts as a buffer and weakens this relationship. A similar result is reported in model 6 and

although just out with significance at p = 0.06 this model suggests as psychotic experiences increase, enjoyment when alone decreases and coherence of mind score inhibits or buffers this relationship. Therefore, coherence of mind (or attachment security) acts as a buffer on the relationship between psychotic experiences and decreasing enjoyment when alone.

Table 41: Multilevel regression models of enjoyment when alone

	B	SE	95% confidence interval	p
Outcome: Enjoyment when alone				
Model 5 (AIC: 4825.93; BIC: 4855.56)				
Intercept	3.13	0.72	1.72, 4.54	<0.001
CAARMS severity	-0.04	0.05	-0.14, 0.06	0.38
Attachment category	-0.27	0.58	-1.44, 0.91	0.65
CAARMS severity x Attachment category	0.03	0.05	-0.06, 0.12	0.50
Model 6 (AIC: 4828.47; BIC: 4858.10)				
Intercept	2.86	0.21	2.44, 3.27	<0.001
CAARMS severity	-0.003	0.01	-0.02, 0.02	0.78
Coherence of mind	-0.18	0.18	-.0.54, 0.18	0.31
CAARMS severity x Coherence of mind	-0.02	0.01	-0.05, 0.001	0.06
Model 7 (AIC: 4830.10, BIC: 4859.73)				
Intercept	2.73	0.22	2.31, 3.16	<0.001
CAARMS severity	-0.01	0.01	-0.03, 0.01	0.28
Attachment dimension	-0.04	0.24	-0.52, 0.43	0.86
CAARMS severity x Attachment dimension	-0.01	0.02	-0.05, 0.03	0.49
Model 8 (AIC: 4827.42; BIC: 4857.05)				
Intercept	2.88	0.20	2.48, 3.28	<0.001
CAARMS severity	-0.007	0.01	-0.03, 0.01	0.50
Mentalization	0.03	0.12	-0.22, 0.28	0.80
CAARMS severity x Mentalization	-0.02	0.007	-0.03, -0.004	0.01

The next set of models demonstrate whether attachment and mentalization scores are associated with young people reporting a preference to be with others when alone. Results are reported in table 42 (models 9 - 12) where there are no main effects for psychotic experiences, attachment or mentalization score. In model 12

however, there is a significant interaction for mentalization score. In this model, as psychotic experiences increase preference for company increases, and mentalization weakens this relationship.

Table 42: Multilevel regression models of preference for company when alone

	B	SE	95% confidence interval	p
Outcome: Preference for company when alone				
Model 9 (AIC: 4242.63; BIC: 4272.26)				
Intercept	1.37	0.41	0.56, 2.18	<0.001
CAARMS severity	-0.03	0.03	-0.09, 0.03	0.30
Attachment category	0.32	0.34	-0.36, 1.00	0.35
CAARMS severity x Attachment category	0.03	0.03	-0.03, 0.08	0.31
Model 10 (AIC: 4245.98; BIC: 4275.61)				
Intercept	1.78	0.12	1.54, 2.02	<0.001
CAARMS severity	0.002	0.006	-0.01, 0.01	0.80
Coherence of mind	-0.12	0.10	-0.33, 0.08	0.24
CAARMS severity x Coherence of mind	-0.01	0.007	-0.03, 0.003	0.11
Model 11 (AIC: 4246.67, BIC: 4276.31)				
Intercept	1.74	0.12	1.50, 1.99	<0.001
CAARMS severity	-0.001	0.006	-0.01, 0.01	0.88
Attachment dimension	-0.04	0.14	-0.32, 0.23	0.76
CAARMS severity x Attachment dimension	0.007	0.01	-0.02, 0.03	0.57
Model 12 (AIC: 4244.07; BIC: 4273.71)				
Intercept	1.79	0.12	1.56, 2.02	<0.001
CAARMS severity	0.0009	0.006	-0.01, 0.01	0.87
Mentalization	-0.07	0.07	-0.21, 0.08	0.35
CAARMS severity x Mentalization	-0.009	0.004	-0.02, -0.001	0.03

Models 13 - 16 are reported in table 43 and explore the association between attachment and mentalization scores with preference to be alone when in the company of others. None of these models reached significance and there is no main effect for psychotic experiences or any of the attachment variables. There are also no interaction effects in these models.

Table 43: Multilevel regression models of preference to be alone when with others

	B	SE	95% confidence interval	p
Outcome: Preference to be alone when with others				
Model 13 (AIC: 3906.62; BIC: 3936.18)				
Intercept	0.77	0.41	-0.04, 1.57	0.06
CAARMS severity	0.005	0.03	-0.05, 0.06	0.87
Attachment category	0.36	0.33	-0.31, 1.04	0.28
CAARMS severity x Attachment category	0.002	0.03	-0.05, 0.06	0.93
Model 14 (AIC: 3910.62; BIC: 3940.19)				
Intercept	1.19	0.12	0.95, 1.43	<0.001
CAARMS severity	0.005	0.006	-0.007, 0.02	0.40
Coherence of mind	-0.06	0.10	-0.27, 0.15	0.55
CAARMS severity x Coherence of mind	0.007	0.007	-0.008, 0.02	0.34
Model 15 (AIC: 3909.64, BIC: 3939.20)				
Intercept	1.24	0.12	1.00, 1.47	<0.001
CAARMS severity	0.007	0.006	-0.005, 0.02	0.25
Attachment dimension	-0.09	0.13	-0.36, 0.18	0.50
CAARMS severity x Attachment dimension	0.01	0.01	-0.01, 0.03	0.38
Model 16 (AIC: 3912.67; BIC: 3942.24)				
Intercept	1.17	0.12	0.93, 1.41	<0.001
CAARMS severity	0.005	0.006	-0.007, 0.02	0.38
Mentalization	-0.01	0.07	-0.16, 0.14	0.90
CAARMS severity x Mentalization	0.006	0.004	-0.003, 0.01	0.19

Therefore, findings of these MLMs demonstrate as psychotic experiences increase reported enjoyment when alone decreases, and mentalization buffers this relationship. Additionally, as psychotic experiences increase preference for company (when alone) increases and mentalization buffers this relationship also. To understand further about the role of these contextual variables and the potential impact on negative affect, and whether enjoyment and social preference linger over time, time series analyses were also conducted.

Time Series Analyses

To examine the contextual relationship of reported enjoyment and social preference, random intercepts and slopes models were fitted with an autocorrelation. Autocorrelations examine the relationship of a variable across timepoints and effectively measure how much carry over there is on a variable between different timepoints. In these analyses, time is measured by observations with each ESM beep equivalent to one timepoint or observation. The autocorrelation is an AR(1) model therefore variables are compared one timepoint apart. These models will explore the relationship between negative affect and the context variables which will also allow for examining whether contextual variables influence wellbeing in terms of emotional states.

Summary statistics of model 17 are reported in table 44 examining the impact of negative affect on enjoyment when alone and examines whether there is an autocorrelation of enjoyment when alone. Results suggest a negative relationship between negative affect and enjoyment when alone however this relationship was not significant. In examining the autocorrelation, results suggest enjoyment when alone persists from time 0 to time 1 with an autocorrelation of 0.22.

Table 44: Random intercepts and slopes model with autocorrelation for enjoyment when alone

	Estimate	SE	95% confidence interval	p
Outcome: Enjoyment when alone				
Model 17 (AIC:4860.39; BIC:4895.11)				
Fixed effects				
Intercept	2.75	0.21	2.34, 3.16	<0.001
Negative affect	-0.14	0.12	-0.37, 0.10	0.25
	Estimate	SD	95% confidence interval	
Random effects				
Intercept		1.23	0.91, 1.66	
Negative affect		0.52	0.30, 0.90	
Cor(AR1)	0.22		0.16, 0.29	
Residual		2.35		

The second autocorrelation model (model 18) explores the impact of negative affect on enjoyment when with others and examines whether there is an autocorrelation of enjoyment when with others. Results suggest a negative relationship between negative affect and reported enjoyment when with others. In examining the autocorrelation results suggest that enjoyment when with others from time 0 to time 1 lingers with an autocorrelation of 0.18.

Table 45: Random intercepts and slopes model with autocorrelation for enjoyment with others

	Estimate	SE	95% confidence interval	p
Outcome: Enjoyment when with others				
Model 18 (AIC:4889.82; BIC:4924.47)				
Fixed effects				
Intercept	2.68	0.22	2.24, 3.12	<0.001
Negative affect	-0.64	0.11	-0.86, -0.43	<0.001
	Estimate	SD	95% confidence interval	
Random effects				
Intercept		1.35	1.03, 1.76	
Negative affect		0.44	0.24, 0.83	
Cor(AR1)	0.18		0.12, 0.25	
Residual		2.42		

The third autocorrelation model (model 19) examines the impact of negative affect on preference for company and explores the autocorrelation of preference for company. Results in table 46 show a positive relationship for negative affect and preference for company therefore as negative affect increases preference for company also increases. In examining the autocorrelation, results suggest that preference for company from time 0 to time 1 lingers slightly with an autocorrelation of 0.12.

Table 46: Random intercepts and slopes model with autocorrelation for preference for company

	Estimate	SE	95% confidence interval	P
Outcome: Preference for company				
Model 19 (AIC:4199.16; BIC:4233.88)				
Fixed effects				
Intercept	1.78	0.12	1.54, 2.03	<0.001
Negative affect	0.57	0.10	0.36, 0.77	<0.001
	Estimate	SD	95% confidence interval	
Random effects				
Intercept		0.69	0.51, 0.94	
Negative affect		0.51	0.35, 0.74	
Cor(AR1)	0.12		0.06, 0.19	
Residual		1.69		

The final autocorrelation model (model 20) examines the relationship between preference to be alone and negative affect and whether there is an autocorrelation of preference to be alone. Results are shown in table 47 where preference to be alone and negative affect are positively related therefore as negative affect increases preference to be alone increases. Additionally, there is an autocorrelation of 0.22 suggesting a preference to be alone lingers from time 0 to time 1.

Table 47: Random intercepts and slopes model with autocorrelation for preference to be alone

	Estimate	SE	95% confidence interval	P
Outcome: Preference to be alone				
Model 20 (AIC:3877.73; BIC:3912.38)				
Fixed effects				
Intercept	1.18	0.11	0.97, 1.38	<0.001
Negative affect	0.23	0.09	0.06, 0.41	<0.01
	Estimate	SD	95% confidence interval	
Random effects				
Intercept		0.55	0.39, 0.77	
Negative affect		0.43	0.30, 0.63	
Cor(AR1)	0.22		0.16, 0.29	
Residual		1.52		

Results of these autocorrelation models therefore suggest that reported enjoyment when alone and preference to be alone are enduring over time and that these appraisals persist over time.

6.5 Discussion

Results of the current study suggest enjoyment when alone or with others is not influenced by attachment in line with the first hypothesis. Mentalization also did not have a significant effect on enjoyment when alone or with others. In relation to preference for company or preference to be alone attachment and mentalization score were not related to these variables which contrasts with study hypotheses. Similar findings were reported for psychotic experiences which were also shown not to influence reported enjoyment or social preference which contrasts with the study hypotheses. It is therefore likely that the relationships between attachment, mentalization, psychotic experiences and context are more complex than explored in

these analyses. This can also be reflected in the significant interaction effects that were reported in the current study.

There was evidence of a significant interaction effect where mentalization buffered the negative relationship between psychotic symptoms and enjoyment when alone. There is a similar finding with the coherence of mind variable where attachment security acts a buffer to the negative relationship between social enjoyment when alone and psychotic experiences. This interaction effect was however just out with significance at $p = 0.06$. It is postulated that mentalizing ability is associated with young people feeling more secure in themselves and perhaps this contributes to them feeling more comfortable in contexts where they are alone. A recent ESM study provides some support for the possibility that young people with higher mentalization scores are more comfortable being alone. Achterhof et al (2022) demonstrated that global parental bonding quality was associated with feeling safe when participants were alone. Global parental bonding quality is defined as high care and low control in parent and child relationships with care referring to affection and warmth while control refers to control and autonomy (Achterhof et al, 2022). Parental bonding and attachment are both involved in how children learn to socialise. This study recruited adolescent twins and their siblings and therefore recruited a different group from the current study however, jointly results from Achterhof et al (2022) and the current study suggest further research should examine whether feelings of safety are associated with mentalization and reported enjoyment being alone in daily life.

A further significant interaction was reported where higher mentalization scores buffered the positive relationship of psychotic experiences and preference for company when alone. It is also possible that a feeling of security or feeling comfortable being alone contributed to these results. If young people with higher mentalization scores felt more secure being alone then it can be postulated that they may not have the same preference to be with others when alone, leading to the buffering effect reported in these findings. Replication of these results would be required but it does point to the possibility of supporting young people to develop

their mentalizing ability to support their sense of self and to encourage feelings of safety when alone.

Results are therefore in contrast to the study by Sheinbaum et al (2015) where insecure attachment styles were associated with a preference to be alone when with others. In the current study, there were no significant results for preference to be alone. Although the study by Sheinbaum et al (2015) was conducted with a student population comparison here is still useful in understanding differences between these results. Sheinbaum et al (2015) emphasized that the level of closeness may be important in these interactions which was not measured in the current study. Additionally, Sheinbaum et al (2015) used the Attachment Style Interview to assess attachment styles. This interview focuses on current adult attachment relationships and allows researchers to categorise participants into attachment styles but also examine the wider support context and quality of relationships for an individual (Bifulco et al., 2008). The current study used the AAI which examines states of mind in relation to attachment and explores childhood experiences. These different approaches to the measurement of attachment may have impacted on the reported results and require replication to confirm findings.

Results from the exploratory time series analysis suggested that context variables can persist across timepoints, and in this study this was particularly the case in contexts where young people reported enjoyment being alone or a preference to be alone. These results suggest further ESM research into understanding the implications of young people being alone would be important. For example, if a feeling of safety is associated with reported enjoyment when alone or whether young people feel threatened when they report a preference to be alone. The relationship between social context and appraisal is likely to be more complex than has been explored in the current study, however results suggest contextual factors can endure over time. A further ESM study has shown a bidirectional relationship between social difficulties and experiences of psychosis (Heins et al., 2019) which is also possible in the current study where appraisals and social context may impact on each other. Therefore, if a young person appraises a situation as threatening they may avoid that

situation in future and choose environments that are less threatening. Further ESM studies to examine these relationships are required especially in relation to contextual factors and their impact on affective states and psychotic experiences over time.

Limitations

There are a number of limitations that should be highlighted in the current study. Given the suggestion by Husky et al (2004) that individuals with greater levels of psychotic experiences may select less stressful social environments it may be the case that individuals in this study may have actively selected environments that they feel are more secure and safe for them. This may have reduced the impact of attachment styles as the attachment system may not be activated in these environments. Granholm et al (2013) also suggested that both cognitive appraisals and improvements in affect could work in unison to improve functioning and social behaviour. The current study was unable to tap into more specific cognitive appraisals for example whether young people felt close to the people they were with or whether they felt safe in their current context. It has recently also been highlighted that more research particularly from qualitative studies into social experiences in psychosis is required to develop more relevant and specific questions for ESM studies (Myin-Germeys, 2020) and therefore this area of research is likely to evolve further once more information is gathered on how people's appraisals, emotions and symptoms interact in social situations.

6.6. Conclusion

In conclusion, the current study aimed to explore the role of attachment style and mentalization on social context in a group of young people with varying experiences of psychosis. Although attachment, mentalization and psychotic experiences did not impact on reported enjoyment and social preference independently there was evidence of interaction effects. Mentalization was shown to act as a buffer in reducing the negative relationship of psychotic experiences and reported enjoyment when alone. It is possible that higher mentalization scores are associated with participants feeling safer in situations where they are alone, however further

research is required to examine these potential associations. The time series analysis demonstrated that reported enjoyment being alone and preference to be alone persisted across timepoints suggesting a more complex role for interactions where young people are alone or would like to be alone. Further research exploring how young people appraise their social interactions is required to build on results and establish whether other aspects of social experience (for example, feelings of safety or feelings of threat) play a role in early psychosis.

Chapter 7 - Emotion Regulation Strategies and Social Stress in First Episode Psychosis: A Case Series Analysis

7.1 Research Objectives

This chapter aims to explore emotion regulation strategies in response to social stressors in daily life. It will specifically examine strategy use in a subsample of participants who meet criteria for a first episode of psychosis and whether strategy use changes over time. To set this chapter in context a critical overview of studies which have examined emotion regulation in psychosis will be discussed paying particular attention to how emotion regulation is assessed and how experience sampling methodology has contributed to findings in this area.

7.2 Introduction

Emotion Regulation and Experiences of Psychosis

The way in which individuals manage or regulate their emotions is an important aspect of a number of mental health problems and has subsequently become a target for intervention (Painter et al., 2019; Silva et al., 2020; Spidel et al., 2018). The strategies people can use to manage their emotions are numerous, however some of the more common ones have been broadly divided into adaptive and maladaptive strategies based on associations with psychopathology, with adaptive strategies generally viewed as a protective factor while maladaptive strategies are typically viewed as a risk factor for psychopathology (Aldao et al., 2010).

Two meta-analytic studies have examined emotion regulation strategies specifically in relation to experiences of psychosis. In the first of these studies, maladaptive strategies were positively associated with psychosis with a large effect for attentional deployment, moderate to large effect for rumination, and a small to medium effect for suppression and distraction (O'Driscoll et al., 2014). Cognitive reappraisal reported a small to moderate negative effect with psychosis. A later meta-analysis similarly reported evidence of a small to moderate effect size in the use of suppression, a moderate to large effect size in the use of rumination as well as a moderate effect

size in self-blaming where individuals with psychosis used all of these strategies more often (Ludwig et al., 2019). Additionally, this latter study reported that individuals with psychosis used distraction and cognitive reappraisal less often (at a moderate effect size) when compared to control participants. Although not specific to psychosis, a further meta-analysis demonstrated similar results with avoidance, suppression and rumination positively associated with psychopathology while problem solving and reappraisal negatively related with psychopathology (Aldao et al., 2010). This study examined emotion regulation strategies in individuals with anxiety, depression, substance use and eating disorders however given these experiences are highly relevant to those in early psychosis these findings are still relevant, and also reinforce emotion regulation as a transdiagnostic mechanism. Collectively, these studies all emphasize the significance of maladaptive emotion regulation strategies in psychosis.

Given the link between maladaptive strategies and psychosis, research has also attempted to examine whether the use of certain strategies is associated with specific phases of psychosis. Individuals with psychotic-like experiences have reported using significantly less reappraisal and more suppression when compared to control participants (Chapman et al., 2020). In comparison, individuals with a diagnosis of Schizophrenia and those meeting ARMS criteria reported significantly less reappraisal than a control group but there were no differences in the use of suppression. Chapman and colleagues (2020) therefore suggest that reappraisal is associated with vulnerability for psychosis and that once a threshold of psychotic experiences has been reached there are no differences in the reported use of reappraisal suggesting a specific difficulty implementing this strategy in the development of psychosis. Further research has also examined other emotion regulation strategies with one community sample reporting suppression of negative emotion (sadness and anxiety) was associated with hallucinatory experiences and suppression of anxiety was associated with delusional experiences (Prochwicz et al., 2018) therefore suggesting a specific role for suppression. Furthermore, in a study of participants with Schizophrenia and Bipolar disorder, both groups reported greater use of rumination, catastrophising and self-blame (Rowland et al., 2013). Although it has been argued that there is a specific role for certain emotion regulation strategies

in the development of psychosis more research is required to confirm this suggestion, as there are more nuanced findings when exploring emotion regulation through experimental studies. In addition, this area of research is compounded by the fluidity of experiences of psychosis which also make it difficult to establish whether the use of a specific strategy is a risk factor for psychosis.

Another way to examine emotion regulation strategies is to look more closely at the context in which they are used. Although it is useful to group emotion regulation strategies into adaptive and maladaptive it is likely that the way in which individuals manage their emotions is more complex. When taking into consideration context, it is suggested that emotion regulation strategies can be viewed as either adaptive or maladaptive. For example, distraction is often conceptualised as a maladaptive strategy however in certain therapy approaches such as Dialectic Behaviour Therapy (DBT) it has been advocated that distraction is an appropriate way to regulate difficult emotions. DBT suggests that when distraction is associated with an accepting approach to difficult emotions it can be an adaptive way to deal with emotions (Wolgast & Lundh, 2017). When distraction is combined with an avoidance of emotion this is a more maladaptive way to deal with emotions. It is likely that aspects of an individual's context influence the approach they take to manage their emotions and it is likely this is the case for many emotion regulation strategies. To examine aspects of context further it is necessary to turn to more experimental designs as well as experience sampling studies.

Experimental Designs and the Example of Reappraisal

In experimental studies, negative emotion is often induced by asking participants to complete a specific task such as watching a sad movie clip. Following the induction of negative emotion participants are then requested to manage their emotions using a particular strategy. Results from experimental studies have led to more nuanced findings, for example in one study the use of reappraisal has been noted as equally effective in reducing negative emotion in participants with psychosis and controls (Grezellschak et al., 2015). Therefore, when instructed to use reappraisal individuals with psychosis can implement this strategy effectively however, from the literature

discussed above individuals reported using reappraisal less often than other regulation strategies. It can therefore be postulated that when self-reporting individuals do not actively identify using certain strategies or other strategies may be more salient when thinking about how emotions are managed and individuals therefore underreported using reappraisal.

This finding was replicated in a further experimental study where no significant difference between individuals with psychosis and control participants in the use of reappraisal was noted (Opoka et al., 2021). Individuals with psychosis also reported that the use of reappraisal when requested was as successful in reducing negative emotions as in the case of control participants. These results point towards a more detailed picture of the use of emotion regulation strategies and are in contrast to the findings of Chapman and colleagues (2020) who suggested reappraisal is specifically related to the intensity of psychotic experiences. Therefore, findings from experimental designs are producing more detailed information not only about emotion regulation strategies individuals use but also how effective these strategies are at managing negative emotion.

Experience Sampling and Emotion Regulation Strategies in Psychosis

Results from experience sampling studies also point towards a more complex picture of emotion regulation strategies and experiences of psychosis. For example, Ludwig, Mehl, Krkovic et al (2020) reported that individuals with psychosis did not differ from a control group in the use of social sharing, acceptance and awareness, and reported using cognitive reappraisal, distraction, rumination and suppression more often than control participants. The use of several strategies (reappraisal, awareness, suppression, rumination) resulted in a decrease in negative affect in the whole sample. In a moderation analysis between the groups only suppression moderated the relationship in negative affect across timepoints, suggesting suppression significantly reduced negative affect in those with psychosis when compared to the control group. These authors have emphasized that such a finding may relate to the short-term impact of a regulation strategy where suppression can

reduce negative affect initially but the longer term impact may be more detrimental to mental health.

A further ESM study has also shown that distraction, reappraisal, suppression, soothing and situation modification were used more often by a group of individuals with psychosis when compared to a control group (Visser et al., 2018). These authors also noted that individuals with psychosis reported using emotion regulation strategies at a lower intensity of emotion when compared to controls. Visser et al (2018) suggest that the lower threshold leads to more instances of emotion that need to be regulated and therefore more regulation is required to return to baseline levels of emotion. Therefore, individuals with psychosis may not necessarily use more maladaptive strategies and less adaptive ones but instead use a range of strategies to manage greater levels of emotion.

In addition to exploring emotion regulation strategies in daily life, ESM studies also allow for examining relationships over time. In relation to psychotic experiences, Nittel et al (2018) examined the use of emotion regulation strategies at one timepoint and the level of paranoia at the next timepoint. A significant finding was reported for suppression whereby the use of this strategy at the previous timepoint predicted paranoia at the next timepoint when controlling for negative emotions. In a further analysis, it was demonstrated that individuals who reported high negative affect and use rumination were at a higher risk of paranoia. This study noted no significant associations with adaptive emotion regulation strategies. From these ESM studies it can be concluded that people with psychosis use a range of strategies to manage their emotions and there is evidence that these strategies are successful at reducing negative emotion. These ESM studies also emphasize the importance of negative affect in psychosis where it is suggested that increasing levels of negative affect lead to greater efforts to regulate these emotions and the use of maladaptive strategies contributes to the development of psychotic experiences.

Across the different methodologies (self-report; experimental and ESM) it appears that experiences of psychosis are generally associated with maladaptive emotion

regulation strategies. The literature suggests a particular role for suppression and rumination, however research from experimental designs potentially provides a more nuanced understanding where individuals with psychosis report successfully using a range of emotion regulation strategies to reduce negative emotions. This chapter aims to examine emotion regulation strategies in daily life in a small sample of first episode psychosis participants. To allow for results to be compared, initially analyses will be conducted with participants recruited in the current study who did not report any experiences of psychosis (n = 22). This chapter will therefore explore two hypotheses, the primary hypothesis is that FEP participants will report using more maladaptive strategies (suppression, rumination, distraction) to regulate their emotions, in comparison to a group of participants who did not report any experiences of psychosis. Additionally, it is hypothesized that FEPs will use maladaptive strategies more over time, therefore there will be an effect of time of the use of suppression, rumination and distraction.

7.3 Data Analysis

Overview

Multilevel models will be examined to explore strategy use in response to social stress, as well as the impact of time on strategy use and the interaction between social stress and time. Results for the comparison group will be presented first followed by the results for the FEP participants. The participants selected for the case studies are based on those FEP participants who completed 6 consecutive days of experience sampling and completed more than 33% of the timepoints to allow for a closer examination of the effect of time on strategy use. Descriptive data for both the comparison group and the first episode psychosis participants will be initially presented followed by the multilevel models.

Variables in the Analysis

Variable	Measurement
Social stress	Based on four ESM items above regarding social enjoyment and social preference. The 2 social enjoyment items were reversed scored so higher values were equal to more stress. The mean of these questions was taken as the measure of social stress.
Time	Observations from ESM numbered consecutively over the 6 day assessment period
Suppression	ESM score between 1 to 7 on question 'Since your last report how much have you been doing the following to manage your emotions - trying not to show your emotions on the outside'.
Rumination	ESM score between 1 to 7 on question 'Since your last report how much have you been doing the following to manage your emotions - thinking about your feelings over and over'.
Distraction	ESM score between 1 to 7 on question 'Since your last report how much have you been doing the following to manage your emotions - turning your attention away from what is making you feel emotional'.
Reappraisal	ESM score between 1 to 7 on question 'Since your last report how much have you been doing the following to manage your emotions - changing the way you think about the situation you are in'.
Calming	ESM score between 1 to 7 on question 'Since your last report how much have you been doing the following to manage your emotions - trying to keep calm by taking deep breaths or relaxing your muscles'.
Social sharing	ESM score between 1 to 7 on question 'Since your last report how much have you been doing the following to manage your emotions - talking about your feelings and reactions with others'.

7.4 Results

Demographics

22 participants in the comparison group and 3 FEP participants completed the experience sampling methodology. Questions regarding stress, emotions and emotion regulation strategies were completed. The following analyses will be split

into the comparison group analyses (consisting of all participants in the current study who did report experiences of psychosis) and the case series analysis (participants meeting criteria for FEP). An overview of the demographics of the participants is provided in table 48 below.

Table 48: Demographics of participants in the group analysis and the case series

	Group	Case series
Number of participants	22	3
Gender - M/F	5/17	1/2
Mean age	21.73	20.33
Employment status: Student Unemployed Voluntary work	22	 1 1 1
Percentage currently receiving treatment for their mental health	0%	100%

Comparison Group Analyses

In the comparison group analyses three types of model were explored, first the impact of social stress on one of six emotion regulation strategies (reappraisal, social sharing, calming, suppression, rumination or distraction). Secondly, the impact of time on the use of that strategy and finally the interaction of social stress and time. In all models the social stress predictor variable was grand mean centred.

Table 49 shows the models with suppression as the outcome variable. In this case, model 1 demonstrates a significant positive relationship suggesting that as young people in the comparison group report more social stress they also report using more suppression in daily life. Model 2 shows no significant relationship between time and suppression. Model 3 shows the interaction of time and social stress on the

use of suppression where there is no significant relationship between these variables.

Table 49: Multilevel model of social stress, time and the interaction on suppression

	B	SE	95% confidence interval	P
Outcome: Suppression				
Model 1 (AIC:2002.06; BIC:2019.32)				
Intercept	2.39	0.23	1.95, 2.84	<0.001
Social stress	0.10	0.04	0.01, 0.19	0.03
Model 2 (AIC:2007.70; BIC:2024.96)				
Intercept	2.22	0.25	1.73, 2.72	<0.001
Time	0.01	0.007	-0.002, 0.03	0.09
Model 3 (AIC:2019.55; BIC:2045.42)				
Intercept	2.23	0.25	1.75, 2.72	<0.001
Social stress	0.16	0.09	-0.01, 0.32	0.07
Time	0.01	0.007	-0.002, 0.03	0.09
Social stress x Time	-0.004	0.005	-0.01, 0.006	0.42

Table 50 shows the results of rumination, where model 4 demonstrates a significant positive relationship suggesting that as social stress increases young people report using more rumination. Model 5 demonstrates a significant positive relationship of time suggesting that the use of rumination increases with time. In model 6, the effect of social stress and time are still significant but there is no significant interaction effect.

Table 50: Multilevel model for social stress time and the interaction on rumination

	B	SE	95% confidence interval	p
Outcome: Rumination				
Model 4 (AIC:1963.38; BIC:1980.64)				
Intercept	2.51	0.17	2.17, 2.84	<0.001
Social stress	0.22	0.04	0.13, 0.30	<0.001
Model 5 (AIC:1987.16; BIC:2004.42)				
Intercept	2.31	0.20	1.91, 2.70	<0.001
Time	0.01	0.007	0.0007, 0.03	0.04
Model 6 (AIC:1980.0; BIC:2005.87)				
Intercept	2.33	0.20	1.94, 2.71	<0.001
Social stress	0.16	0.08	-0.002, 0.32	0.05
Time	0.01	0.007	-0.0003, 0.03	0.05
Social stress x Time	0.003	0.005	-0.006, 0.01	0.45

The analyses with distraction as the outcome variable are shown in table 51, where model 7 demonstrates there is no main effect for social stress. There is a significant relationship of time and distraction in model 8 therefore as time continues distraction increases. In model 9, social stress and distraction have a significant positive relationship with distraction and there is a significant interaction of social stress and time. This finding suggests that time weakens the positive relationship between social stress and distraction.

Table 51: Multilevel model for social stress, time and the interaction on distraction

	B	SE	95% confidence interval	p
Outcome: Distraction				
Model 7 (AIC:2065.30; BIC: 2082.56)				
Intercept	2.75	0.17	2.41, 3.09	<0.001
Social stress	0.09	0.05	-0.007, 0.18	0.07
Model 8 (AIC:2061.07; BIC:2078.34)				
Intercept	2.41	0.20	2.01, 2.81	<0.001
Time	0.03	0.008	0.01, 0.04	<0.001
Model 9 (AIC:2071.04; BIC:2096.91)				
Intercept	2.42	0.20	2.03, 2.81	<0.001
Social stress	0.24	0.09	0.06, 0.41	<0.01
Time	0.03	0.008	0.01, 0.04	<0.001
Social stress x Time	-0.01	0.005	-0.02, -0.0003	0.04

The results with reappraisal as the outcome variable are shown in table 52 below. In this table there are no significant effects of social stress, time or the interaction of social stress and time on the use of reappraisal in the comparison group.

Table 52: Multilevel model of social stress, time and the interaction on reappraisal

	B	SE	95% confidence interval	p
Outcome: Reappraisal				
Model 10 (AIC:2032.80; BIC:2050.07)				
Intercept	2.76	0.23	2.32, 3.20	<0.001
Social stress	0.06	0.05	-0.03, 0.15	0.18
Model 11 (AIC:2037.99; BIC:2055.26)				
Intercept	2.81	0.24	2.33, 3.29	<0.001
Time	-0.004	0.007	-0.02, 0.01	0.60
Model 12 (AIC:2053.26; BIC:2079.13)				
Intercept	2.82	0.25	2.33, 3.30	<0.001
Social stress	0.07	0.09	-0.10, 0.24	0.43
Time	-0.004	0.007	-0.02, 0.01	0.58
Social stress x Time	-0.0005	0.005	-0.01, 0.009	0.92

For the emotion regulation strategy of calming (shown in table 53) there is no significant relationship between social stress and calming (model 13). Both models 14 and 15 demonstrate a time effect, as time increases the use of calming also increases, however model 15 suggests that there is no interaction effect.

Table 53: Multilevel model for social stress, time and the interaction on calming

	B	SE	95% confidence interval	p
Outcome: Calming				
Model 13 (AIC:1748.81; BIC: 1766.07)				
Intercept	1.92	0.24	1.44, 2.40	<0.001
Social stress	0.03	0.04	-0.03, 0.10	0.33
Model 14 (AIC:1744.16; BIC:1761.42)				
Intercept	1.69	0.25	1.20, 2.19	<0.001
Time	0.02	0.006	0.006, 0.03	<0.01
Model 15 (AIC:1761.57; BIC:1787.44)				
Intercept	1.70	0.25	1.20, 2.20	<0.001
Social stress	0.03	0.07	-0.10, 0.16	0.63
Time	0.02	0.006	0.006, 0.03	<0.01
Social stress x Time	-0.00005	0.004	-0.007, 0.007	0.99

The final table (54) shows the analyses for the emotion regulation strategy of social sharing where there are no significant main effects for social stress or time and there is no significant interaction effect social stress on time.

Table 54: Multilevel model for social stress, time and the interaction on social sharing

	B	SE	95% confidence interval	p
Outcome: Social sharing				
Model 16 (AIC:2049.45; BIC:2066.71)				
Intercept	2.27	0.16	1.95, 2.59	<0.001
Social stress	0.03	0.05	-0.06, 0.12	0.51
Model 17 (AIC:2050.93; BIC:2068.19)				
Intercept	2.43	0.19	2.06, 2.80	<0.001
Time	-0.01	0.008	-0.03, 0.003	0.11
Model 18 (AIC:2067.37; BIC: 2093.24)				
Intercept	2.43	0.19	2.06, 2.80	<0.001
Social stress	0.06	0.09	-0.12, 0.23	0.52
Time	-0.01	0.008	-0.03, 0.003	0.10
Social stress x Time	-0.002	0.005	-0.01, 0.008	0.75

Therefore, in the comparison group analyses participants reported using more suppression, rumination and distraction in response to social stress. There was also a time effect where participants increasingly reported using rumination, distraction and calming over time. There was one interaction effect is the use of distraction, where increasing time weakened the relationship between social stress and distraction.

Case Series Analyses

In looking more specifically at participants with a first episode psychosis several MLMs were conducted. Although ESM is typically used to examine group and individual differences, multilevel models have been used for the study of single cases and advocated as acceptable to the exploration of relationships in individual cases (Manolov & Moeyaert, 2017; Moeyaert et al., 2014). The following analyses will be made up of 3 participants. In this thesis, 5 FEP participants completed 33% of the ESM notifications however 2 of these participants completed the ESM over more

than 6 days. As the following analyses explore the effect of time, comparisons are made with participants that completed 6 consecutive days of ESM. Before examining the multilevel models a brief overview and background to three first episode cases (labelled participant 1, 2, 3) will be discussed. To allow for a comparison of the self-report measures the scores of each of the FEP participants as well as the comparison group are displayed in table 55.

Table 55: Comparison group means and individual participant scores on the ACS and DERS

Variable	Group mean	Participant 1 total	Participant 2 total	Participant 3 total
DERS total score	83.05	120	136	120
DERS nonacceptance	14.45	14	21	24
DERS difficulties with goal-directed behaviour	15.41	19	23	18
DERS Impulse control difficulties	10.05	14	18	17
DERS Lack of emotional awareness	14.20	28	21	17
DERS Limited access to emotion regulation strategies	15.86	23	32	29
DERS Lack of emotional clarity	11.36	22	21	15
ACS Problem focused coping	20.68	11	13	22
ACS nonproductive coping	17.50	22	30	27

Participant 1

Participant 1 was receiving psychological therapy and was prescribed antipsychotic medication. In relation to the self-report measures, this participant scored above the comparison group mean in the current study for the total score on the DERS as well as the DERS subscales lack of emotional awareness and lack of emotional clarity. In relation to the ACS, participant 1 reported a lower score on the problem focused

coping subscale and similar to the group mean for the nonproductive coping subscale.

Participant 2

Participant 2 was currently receiving psychological therapy and was prescribed an antipsychotic and mood stabilising medication. In relation to the self-report measures, this participant also scored above the comparison group mean in the current study for the total score on the DERS in addition to several of the DERS subscales with the greatest differences on the limited access to emotion regulation strategies and lack of emotion clarity subscale. For the ACS, this participant reported a lower score on the problem focused coping subscale and higher than the group mean on the nonproductive coping subscale.

Participant 3

Participant 3 was also currently receiving psychological therapy and was prescribed antianxiety medication. In relation to the self-report measures participant 3 scored higher on the DERS compared to the comparison group mean in the current study. This participant scored higher on the DERS subscale of limited access to emotion regulation strategies as well as nonacceptance of emotional responses subscale. For the ACS, participant 3 scored close to comparison group mean on the problem focused coping subscale and higher on the nonproductive coping subscale.

The multilevel models of the 3 first episode psychosis participants are shown in the following 2 tables (table 56 and 57), the first one displays maladaptive strategies and the second adaptive strategies. Again 3 models are examined, the impact of social stress, the impact of time and the interaction of social stress and time.

Table 56: Multilevel models of maladaptive strategies for participants meeting first episode psychosis criteria

	PARTICIPANT 1				PARTICIPANT 2				PARTICIPANT 3			
	B	SE	95% CI	p	B	SE	95% CI	p	B	SE	95% CI	p
	SUPPRESSION				**SUPPRESSION**				**SUPPRESSION**			
Model 1 (AIC: 100.38; BIC: 104.16)					AIC: 185.28; BIC: 191.73				AIC: 120.31; BIC: 125.77			
Intercept	5.86	1.41	2.90, 8.81	<0.001	2.87	1.09	0.66, 5.08	0.01	4.58	0.75	3.04, 6.12	<0.001
Social stress	0.09	0.27	-0.48, 0.66	0.75	-0.14	0.30	-0.74, 0.46	0.65	0.11	0.18	-0.27, 0.48	0.57
Model 2 (AIC: 102.38; BIC: 106.16)					AIC: 181.03; BIC: 187.48				AIC: 121.98; BIC: 127.45			
Intercept	5.21	1.66	1.75, 8.68	<0.01	4.78	1.14	2.46, 7.10	<0.001	3.87	0.86	2.11, 5.63	<0.001
Time	0.06	0.08	-0.11, 0.23	0.48	-0.10	0.03	-0.16, -0.03	0.003	0.04	0.03	-0.01, 0.10	0.13
Model 3 (AIC: 110.02; BIC: 115.02)					AIC: 189.87; BIC: 199.20				AIC: 129.82; BIC: 137.60			
Intercept	4.68	1.79	0.91, 8.45	0.02	5.12	1.20	2.69, 7.54	<0.001	4.06	0.85	2.32, 5.81	<0.001
Social stress	0.61	0.63	-0.71, 1.94	0.34	0.68	0.68	-0.70, 2.06	0.32	0.68	0.39	-0.12, 1.48	0.09
Time	0.09	0.09	-0.10, 0.28	0.33	-0.11	0.03	-0.18, -0.04	0.002	0.04	0.03	-0.02, 0.10	0.17
Social stress x Time	-0.04	0.05	-0.15, 0.07	0.45	-0.03	0.03	-0.09, 0.02	0.26	-0.04	0.02	-0.09, 0.005	0.07
	RUMINATION				**RUMINATION**				**RUMINATION**			
Model 1 (AIC: 90.23; BIC: 94.01)					AIC: 159.64; BIC: 166.09				AIC: 115.98; BIC: 121.45			
Intercept	3.00	1.08	0.74, 5.26	0.01	3.46	0.77	1.90, 5.02	<0.001	4.71	0.70	3.28, 6.14	<0.001
Social stress	0.57	0.21	0.13, 1.01	0.01	0.31	0.21	-0.12, 0.73	0.15	0.40	0.17	0.05, 0.75	0.03
Model 2 (AIC: 97.97; BIC: 101.75)					AIC: 165.65; BIC: 172.09				AIC: 112.76; BIC: 118.23			
Intercept	3.79	1.47	0.70, 6.87	0.02	3.77	0.93	1.89, 5.66	<0.001	3.21	0.73	1.71, 4.71	<0.001
Time	-0.07	0.07	-0.22, 0.08	0.33	-0.02	0.02	-0.07, 0.03	0.53	0.09	0.02	0.04, 0.14	<0.001
Model 3 (AIC: 101.04; BIC: 106.04)					AIC: 172.84; BIC: 182.17				AIC: 119.45; BIC: 127.22			
Intercept	2.74	1.37	-0.16, 5.63	0.06	4.16	0.94	2.26, 6.07	<0.001	3.49	0.70	2.05, 4.93	<0.001
Social stress	1.04	0.48	0.02, 2.05	0.05	0.93	0.53	-0.15, 2.01	0.09	0.69	0.32	0.03, 1.34	0.04
Time	0.006	0.07	-0.14, 0.15	0.93	-0.03	0.03	-0.09, 0.02	0.22	0.08	0.02	0.03, 0.13	0.002
Social stress x Time	-0.05	0.04	-0.13, 0.04	0.28	-0.03	0.02	-0.07, 0.02	0.23	-0.03	0.02	-0.07, 0.01	0.16
	DISTRACTION				**DISTRACTION**				**DISTRACTION**			
Model 1 (AIC: 97.30; BIC: 101.07)					AIC: 169.70; BIC: 176.14				AIC: 109.46; BIC: 114.93			
Intercept	2.90	1.30	0.18, 5.63	0.04	3.13	0.88	1.34, 4.92	0.001	4.16	0.62	2.88, 5.44	<0.001
Social stress	-0.08	0.25	-0.61, 0.45	0.75	0.30	0.24	-0.19, 0.78	0.22	-0.12	0.15	-0.44, 0.19	0.43
Model 2 (AIC: 98.22; BIC: 102.0)					AIC: 175.49; BIC: 181.94				AIC: 112.98; BIC: 118.45			
Intercept	3.93	1.48	0.83, 7.04	0.02	3.25	1.06	1.10, 5.40	0.004	3.81	0.74	2.31, 5.32	<0.001
Time	-0.09	0.07	-0.25, 0.06	0.21	-0.006	0.03	-0.06, 0.05	0.83	0.02	0.02	-0.03, 0.07	0.38
Model 3 (AIC: 105.86; 110.86)					AIC: 183.88; BIC: 193.21				AIC: 123.47; BIC: 131.25			
Intercept	3.96	1.58	0.62, 7.29	0.02	3.54	1.10	1.31, 5.77	0.003	3.74	0.76	2.19, 5.29	<0.001
Social stress	0.16	0.56	-1.01, 1.33	0.78	0.72	0.62	-0.55, 1.99	0.26	-0.03	0.34	-0.74, 0.67	0.93
Time	-0.11	0.08	-0.28, 0.06	0.19	-0.02	0.03	-0.08, 0.04	0.54	0.03	0.03	-0.02, 0.08	0.29
Social stress x Time	-0.04	0.05	-0.14, 0.06	0.43	-0.02	0.03	-0.07, 0.03	0.48	-0.009	0.02	-0.05, 0.03	0.66

Table 57: Multilevel models of adaptive strategies for participants meeting first episode psychosis criteria

	PARTICIPANT 1				PARTICIPANT 2				PARTICIPANT 3			
	B	SE	95% CI	p	B	SE	95% CI	p	B	SE	95% CI	p
	REAPPRAISAL				**REAPPRAISAL**				**REAPPRAISAL**			
Model 1 (AIC: 78.58; BIC: 82.36)					AIC: 118.46; BIC: 124.90				AIC: 63.87; BIC: 69.34			
Intercept	2.14	0.80	0.48, 3.81	0.01	1.36	0.44	0.46, 2.25	0.004	1.13	0.28	0.55, 1.71	<0.001
Social stress	0.22	0.15	-0.10, 0.54	0.16	-0.07	0.12	-0.31, 0.18	0.59	-0.09	0.07	-0.23, 0.05	0.21
Model 2 (AIC: 80.86; BIC: 84.64)					AIC: 121.35; BIC: 127.79				AIC: 65.45; BIC: 70.92			
Intercept	2.90	0.94	0.93, 4.87	0.006	1.72	0.51	0.68, 2.75	0.002	1.47	0.32	0.81, 2.13	<0.001
Time	-0.07	0.05	-0.17, 0.03	0.15	-0.02	0.01	-0.05, 0.009	0.19	-0.02	0.01	-0.04, 0.0007	0.06
Model 3 (AIC: 90.65; BIC: 95.65)					AIC: 134.26; BIC: 143.59				AIC: 77.14; BIC: 84.91			
Intercept	2.59	1.01	0.46, 4.72	0.02	1.63	0.54	0.53, 2.73	0.005	1.38	0.32	0.72, 2.03	<0.001
Social stress	0.32	0.35	-0.43, 1.07	0.38	-0.20	0.31	-0.82, 0.42	0.52	-0.28	0.15	-0.58, 0.02	0.07
Time	-0.05	0.05	-0.16, 0.06	0.38	-0.01	0.02	-0.04, 0.02	0.35	-0.02	0.01	-0.04, 0.004	0.10
Social stress x Time	-0.02	0.03	-0.08, 0.05	0.62	0.007	0.01	-0.02, 0.03	0.59	0.01	0.009	-0.003, 0.03	0.11
	CALMING				**CALMING**				**CALMING**			
Model 1 (AIC: 81.15; BIC: 84.93)					AIC: 140.29; BIC: 146.74							
Intercept	2.14	0.85	0.36, 3.92	0.02	1.92	0.59	0.72, 3.12	0.003	Participant did not report using calming as a strategy during ESM			
Social stress	-0.12	0.16	-0.46, 0.23	0.49	0.05	0.16	-0.27, 0.38	0.75				
Model 2 (AIC: 83.98; BIC: 87.76)					AIC: 141.90; BIC: 148.34							
Intercept	2.29	1.02	0.15, 4.42	0.04	2.53	0.67	1.17, 3.90	<0.001				
Time	-0.01	0.05	-0.12, 0.09	0.80	-0.03	0.02	-0.07, 0.006	0.10				
Model 3 (AIC: 93.55; BIC: 98.55)					AIC: 153.83; BIC: 163.16							
Intercept	2.36	1.10	0.03, 4.68	0.05	2.55	0.71	1.09, 4.00	0.001				
Social stress	0.03	0.39	-0.79, 0.84	0.95	0.06	0.41	-0.77, 0.88	0.89				
Time	-0.03	0.06	-0.14, 0.09	0.65	-0.03	0.02	-0.07, 0.009	0.13				
Social stress x Time	-0.02	0.03	-0.09, 0.05	0.60	0.001	0.02	-0.03, 0.03	0.94				
	SOCIAL SHARING				**SOCIAL SHARING**				**SOCIAL SHARING**			
Model 1 (AIC: 81.94; BIC: 85.72)					AIC: 153.88; BIC: 160.32				AIC: 106.44; BIC: 111.91			
Intercept	1.43	0.87	-0.39, 3.25	0.12	1.67	0.71	0.22, 3.11	0.02	1.71	0.59	0.50, 2.92	0.007
Social stress	0.004	0.17	-0.35, 0.36	0.98	0.07	0.19	-0.32, 0.46	0.72	0.15	0.15	-0.15, 0.45	0.31
Model 2 (AIC: 83.78; BIC: 87.56)					AIC: 157.66; BIC: 164.10				AIC: 111.14; BIC: 116.61			
Intercept	1.84	1.02	-0.28, 3.97	0.09	1.30	0.83	-0.39, 2.99	0.13	1.75	0.71	0.30, 3.21	0.02
Time	-0.04	0.05	-0.14, 0.07	0.46	0.02	0.02	-0.03, 0.06	0.41	-0.003	0.02	-0.05, 0.05	0.91
Model 3 (AIC: 92.27; BIC: 97.27)					AIC: 168.48; BIC: 177.81				AIC: 121.90; BIC: 129.68			
Intercept	2.24	1.06	0.005, 4.48	0.05	1.48	0.88	-0.31, 3.27	0.10	1.86	0.73	0.35, 3.37	0.02
Social stress	-0.53	0.37	-1.31, 0.26	0.18	0.38	0.50	-0.64, 1.39	0.46	0.17	0.33	-0.51, 0.86	0.61
Time	-0.06	0.05	-0.17, 0.06	0.31	0.01	0.02	-0.04, 0.06	0.66	-0.009	0.02	-0.06, 0.04	0.71
Social stress x Time	0.05	0.03	-0.02, 0.11	0.16	-0.01	0.02	-0.06, 0.03	0.48	-0.0006	0.02	-0.04, 0.04	0.98

For participant 1 in relation to the maladaptive strategies there is a significant effect of social stress on rumination, as social stress increases for this participant they report more rumination, however there is no effect of time or interaction of social stress and time. The relationship between social stress and rumination for this participant is displayed in figure 5. This figure shows the use of rumination at lower levels of social stress (rated at a 2) as well as greater levels of rumination at higher levels of social stress (rated as a 6 or 7). There are no other significant results for participant 1 in relation to any of the other strategies.

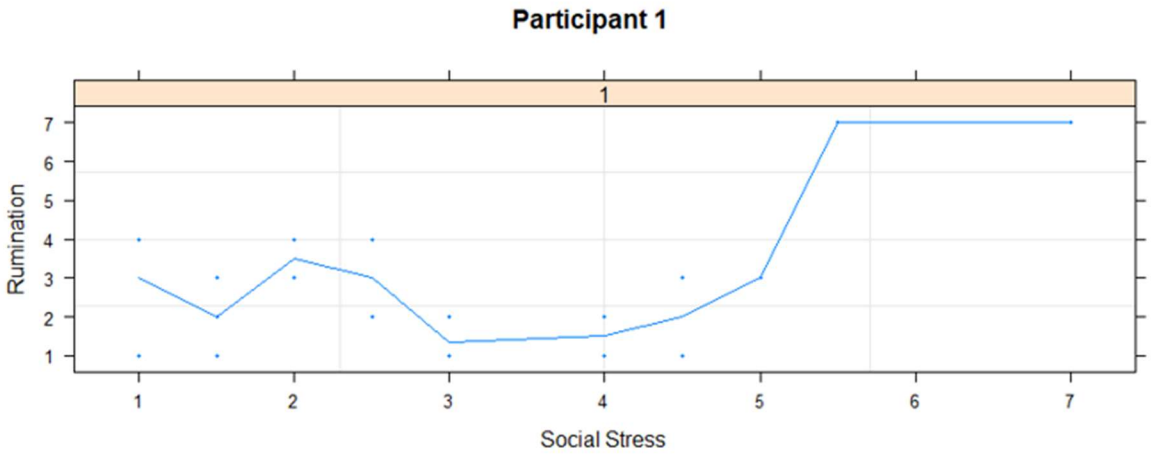

Figure 5: Rumination as a function of social stress for participant 1

For participant 2 there is a significant negative relationship of time on suppression (model 2) suggesting that as time increases this participant reported using less suppression. This relationship is displayed in figure 6 where it can be seen that suppression increases and decreases in succession at the start of the timeframe and then at the middle to the end of the time period the use of suppression reduces until the end of the time period where there is another uptick in reported suppression. There are no other significant results for participant 2 in relation to any of the other strategies.

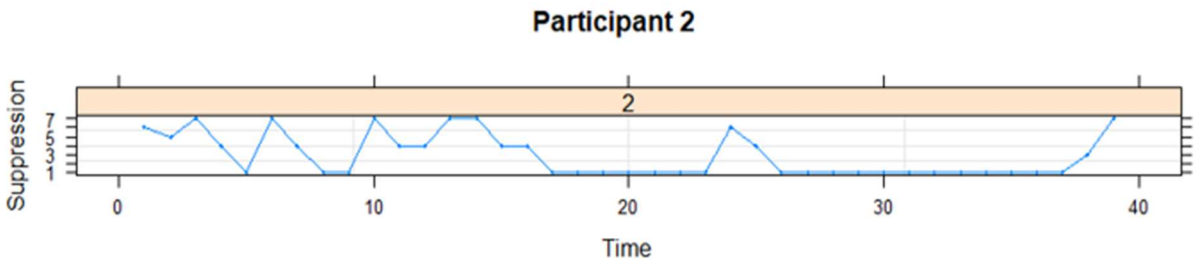

Figure 6: Suppression as a function of time for participant 2

For the final participant there is a significant main effect for the use of rumination in response to social stress in model 1 and time in model 2 however no significant interaction is reported. These relationships are displayed in figure 7 and figure 8 respectively. Figure 7 shows that as social stress increases there is a general increase in rumination apart from at the highest level of social stress (scored a 6) where there is a gradual decline in rumination.

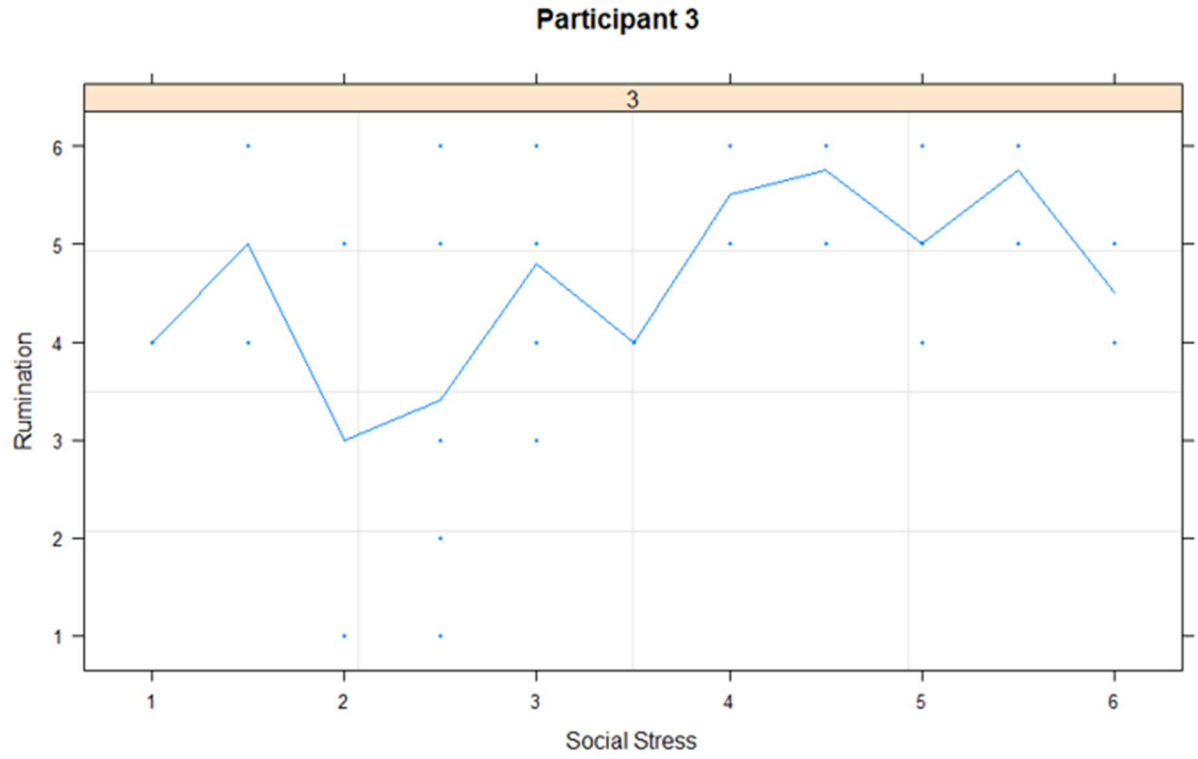

Figure 7: Rumination as a function of social stress for participant 3

In relation to time, figure 8 demonstrates there are declines in the use of rumination at specific points throughout the time period (notably around timepoint 3 and timepoint 12) however towards the end of the ESM time period the use of rumination stays relatively high.

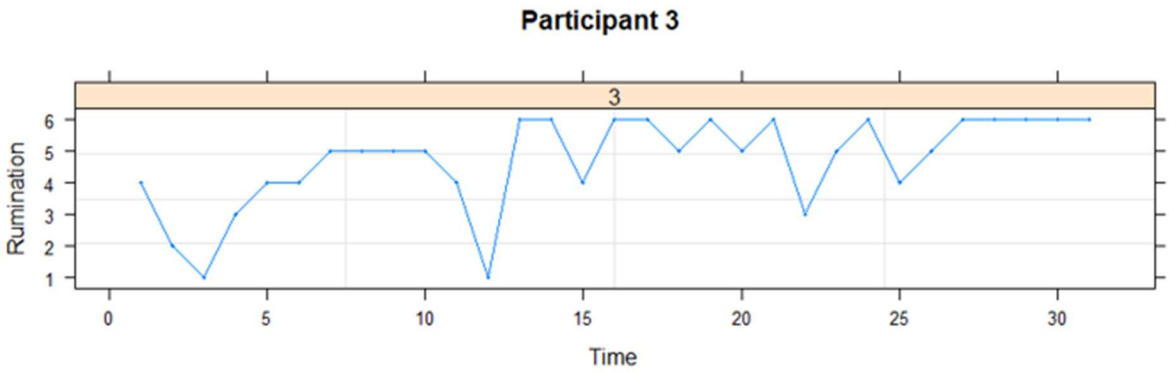

Figure 8: Rumination as a function of time for participant 3

The use of suppression for participant 3 demonstrated a possible interaction effect at p = 0.07. Although this model is just out with significance it is of note and suggests that time may act as a buffer on the relationship between social stress and suppression for this participant. Therefore, time reduces the impact of social stress on suppression. This relationship is depicted in figure 9 where the top panel shows time (observations) grouped into categories demonstrating increasing time moving from left to right across observations 1 to 31. The graphs below this demonstrate the relationship between suppression and social stress with each panel representing the relationship between suppression and social stress at each block of time. The black dotted line in each panel is the regression line which can be seen starts as a positive relationship in panel 1 and then changes to a negative relationship in panel 6, demonstrating that as time increases the use of suppression to manage social stress decreases.

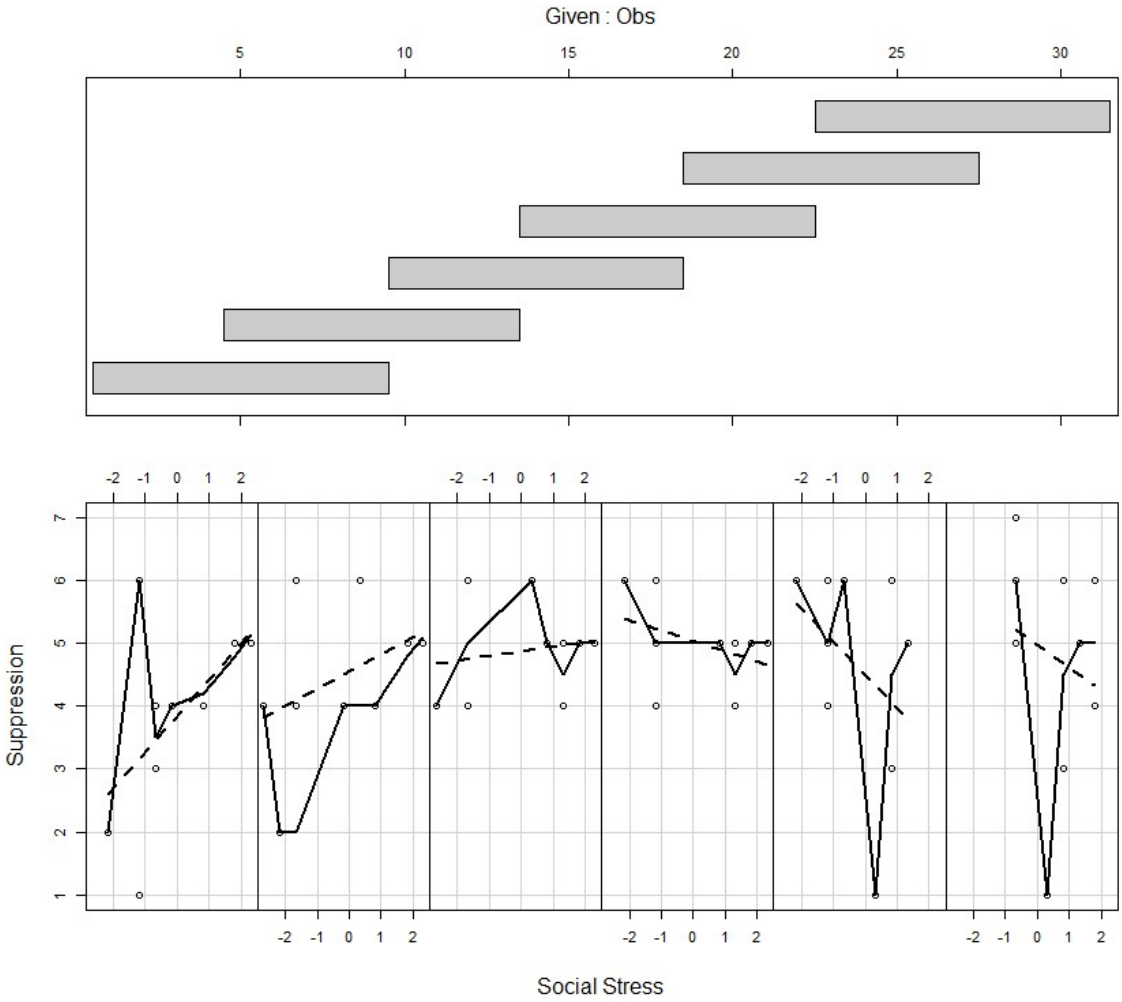

Figure 9: Impact of time on the relationship between social stress and suppression

Results of the case series analyses therefore show significant relationships for maladaptive strategies in particular rumination and suppression. There are no significant relationships for adaptive regulation strategies for any of the FEP participants.

7.5 Discussion

From results of the current study, the first hypothesis was partially supported as FEP participants reported using maladaptive regulation strategies particularly suppression and rumination. However, when comparing these strategies to the comparison group there is little difference as the comparison group also reported using suppression

and rumination, as well as distraction to manage social stress. Therefore, although the FEP participants did report using suppression and rumination, the comparison group also reported using these strategies in daily life. In terms of the FEP participants these results are in line with previous literature that emphasizes the use of maladaptive emotion regulation strategies in people with experiences of psychosis (e.g. Ludwig et al., 2019; Ludwig, Mehl, Krkovic et al., 2020; O'Driscoll et al., 2014). Although only three participants were explored in the case series, two participants reported using rumination. Nittel et al (2018) previously highlighted a possible relationship between rumination and paranoia, and although specific psychotic symptoms are not explored in this chapter, it may be the case that participants in the current study were experiencing more paranoid thoughts which could have influenced these results.

The comparison group in the current study was made up of young people who did not report experiences of psychosis and reported using maladaptive strategies to manage their emotions. It is of note that Ludwig, Mehl, Krkovic et al (2020) reported suppression and rumination resulted in a decrease of negative affect in their whole sample of participants including participants with psychosis and control participants therefore suggesting they also found participants without psychotic experiences reported using maladaptive regulation strategies. It may be the case that the group of participants in the current study were experiencing greater levels of negative affect which they were trying to manage through the use of suppression, rumination and distraction. A previous ESM study has also demonstrated that individuals tend to use more regulation strategies to manage negative emotions (Brans et al., 2013) and perhaps this contributed to findings in this chapter.

The second hypothesis predicted that FEP participants would use maladaptive strategies over time in the current study. There was limited support for this hypothesis as there were only two significant time relationships in the FEP analyses. Participant 3 reported in line with the hypothesis as they reported using more rumination over time. However, in relation to the second significant time relationship, participant 2 reported as time increased, they used less suppression therefore

findings of the current study provide limited evidence for FEPs using more maladaptive strategies over time. This latter finding in relation to suppression could reflect the earlier suggestion that suppression is successful at reducing negative emotion in the moment and therefore participant 2 found suppression was effective at reducing the emotional response and therefore they no longer reported using this strategy over time.

When looking at the comparison group however, there is some evidence for a time effect for rumination and calming, where it was reported that young people use these strategies over time. Both of these strategies emphasize different ways of dealing with stressors either through behaviour by trying to stay relaxed, or cognitively by thinking about a stressor over and over. Results therefore suggest that in the comparison group some strategies are used over time while others are not. In relation to calming, it can be postulated that by using this strategy over time this would help an individual to manage their emotions successfully and may therefore demonstrate an adaptive response to a stressor. For rumination, it is postulated that ruminating over time would be a maladaptive response, however as has been mentioned above it is possible that increasing levels of negative affect in this group require a variety of regulation strategies. It would be important for future research to examine further whether the use of maladaptive strategies does reduce negative affect across timepoints to understand how these strategies influence affective states over time.

Limitations

It should be noted that the current study has several limitations. Firstly, given the significant cross over between affective states and psychosis it would have been useful to examine the role of depression in this sample of participants to understand whether this confounded the results. In particular, rumination was reported in both the comparison group and the case series and previous literature has highlighted the role of rumination in depression (Ahadi et al., 2018). Secondly, the case series data is based on a small subsample of participants that were all receiving treatment at the time of completing experience sampling. It is unclear whether this would have

impacted on how young people reported managing their emotions in daily life. Additionally, participants were asked about six regulation strategies during the ESM. Given the number of strategies people can use to manage their emotions, it is likely that other strategies are important which were not investigated in the current study.

7.6 Conclusion

Results demonstrate that when measured through ESM, FEPs report using maladaptive emotion regulation strategies particularly suppression and rumination. Participants in the comparison group also reported using maladaptive strategies therefore demonstrating these strategies are prevalent in a group of young people with differing mental health experiences. Future work should explore further around the process of emotion regulation over time, it is unclear for example whether FEPs are regulating emotions earlier in the process but not managing to decrease emotions to more manageable levels. Additionally, as some strategies continue to be used over time while others are not, understanding how these strategies influence emotional responses over time (i.e. whether reductions in negative affect are reported) would contribute to further understanding how individuals regulate emotions in daily life.

Chapter 8 - Discussion of the Role of Developmental Factors and the Impact of Experience Sampling Methodology in the Study of Psychosis

8.1 Overview of Chapter

This thesis has explored relationships between developmental factors and how young people react to daily hassles and examined how young people manage their emotions in day-to-day life in the context of psychotic experiences. Analysis has centred around the relationships between stress sensitivity, attachment, emotion regulation and mentalization. A further key component of this thesis was the measurement of psychological constructs particularly emotion regulation where it has been emphasized that there is potential to move to more dynamic measurements in understanding aspects of mental health. The following discussion aims to consolidate the findings in each of the analysis chapters while providing avenues for future research. Chapters that examined developmental factors and stress sensitivity will be examined first, followed by discussion of the validity of experience sampling and wider measurement issues of psychological variables. This chapter will conclude with clinical implications drawn from the current study.

8.2 Developmental factors and stress sensitivity

Attachment, Emotion Regulation and Mentalization

Chapter 4 explored the developmental concepts of attachment, emotion regulation and mentalization through self-report measures. Although links between these concepts have been advocated theoretically, there is limited empirical research exploring all three constructs. In the current study, relationships between attachment, emotion regulation and mentalization were in the expected directions (attachment security positively associated with problem focused coping, attachment security negatively associated with nonproductive coping and difficulties with emotion regulation) although these relationships were not significant in regression analyses. However, in the mediation analyses attachment security and increasing problem focused coping as well as attachment security and decreasing difficulties regulating emotions were reported. Attachment security was also associated with increasing

mentalization score. It was demonstrated that there was a mediating role for mentalizing in the relationship between attachment and emotion regulation measured on the DERS. However, the nature of this relationship was in the opposite direction from that predicted, finding that increased mentalizing was associated with greater difficulties regulating emotions. It may be the case that the young people in this study were hypermentalizing which is associated with difficulties successfully regulating emotions (Bo et al., 2017; Sharp et al., 2011). Hypermentalizing can be defined as "a social cognitive process that involves making assumptions about other people's mental states that go so far beyond observable data that the average observer will struggle to see how they are justified" (Sharp et al., 2013, p.4). As hypermentalizing involves making assumptions about other people's mental states, this can be mistaken for effective mentalizing. However, as the inferences made about mental states are not derived from observable aspects of people's behaviour hypermentalizing therefore does not allow for a greater understanding of the thoughts and feelings of others and is associated with difficulties regulating emotions. It is possible that by exploring mentalization in a group of adolescents they are still developing their mentalizing ability and perhaps this relates to hypermentalizing in the current sample. It is also possible that by using self-report measures in this chapter this has impacted on the reported results. Emotion regulation is inherently difficult to measure and self-report measures are unable to take into account the dynamic nature of emotions or the context in which they are used. Therefore, the way in which young people reported regulating their emotions on the self-report questionnaires may have influenced findings from this chapter.

Furthermore, it is possible that the way these constructs are related is more complex and perhaps the relationship between mentalization and emotion regulation is bidirectional with mentalizing ability influencing emotion regulation but also emotion regulation impacting on mentalization. If young people are unable to reduce negative emotion through successful regulation this increasing negative emotion could influence the ability to mentalize which subsequently hinders effective regulation. This could also relate to the results from chapter 7. Participants without experiences of psychosis reported using maladaptive emotion regulation strategies during experience sampling. Participants in the current study may have experienced greater

levels of negative affect and therefore used more maladaptive strategies to manage their emotions. Perhaps the increasing levels of negative affect made it more difficult for participants to mentalize in the current study.

Attachment as a Protective Factor

Chapter 5 aimed to understand whether attachment styles would influence stress sensitivity and specifically examined whether insecure attachment styles would be associated with increased stress sensitivity. Results from this chapter were in fact more consistent with the notion of secure attachment as a key component of individual resilience where attachment security was associated with more positive emotion as well as reducing the impact of social stress sensitivity, as attachment security was a moderator in the relationship between social stress and positive affect. This finding therefore highlights one way a secure attachment style relates to positive mental health outcomes in a group of young people. Furthermore, this finding contributes to current literature by demonstrating that attachment security influences how young people respond to their environment in daily life. This finding has implications for empirical research exploring attachment and emotion regulation by specifically highlighting that attachment security influences the way young people manage their emotions in the moment. This builds on the work of Sheinbaum et al (2015) who also noted that attachment styles influenced how people reacted in everyday environments. This work therefore emphasizes that an intrinsic characteristic of the self can influence the way young people react in day-to-day life, providing evidence for attachment theory as relevant to everyday experiences and reinforcing the importance in adolescence and not only in childhood years.

In addition, the relationship between attachment security and social stress sensitivity has implications for the psychosis literature. Given the well replicated finding that stress sensitivity is common in people with psychosis (Palmier-Claus et al; Reininghaus et al., 2016; van der Steen et al 2017) attachment security can potentially become a target for intervention to help reduce the impact of social stress. Furthermore, these findings emphasize the role of attachment security as important for mental health resilience. Previously, it has been argued that little is known about

potential protective factors for the development of psychosis (e.g. Radua et al., 2018) and therefore results of the current study contribute to this gap in the literature by suggesting attachment security as a resilience factor.

The Significance of Stress

Chapter 5 demonstrated evidence of social stress sensitivity in relation to increasing experiences of psychosis whereby experiences of psychosis are a positive moderator in the relationship between social stress and negative affect. Stress sensitivity has been associated with psychosis in several previous studies (e.g. Cho et al., 2017; Palmier-Claus et al., 2012; van der Steen et al., 2017). Collectively these findings provide support for an affective pathway to psychosis where increasing negative affect at the momentary level relates to increasing experiences of psychosis (e.g. feelings of paranoia) which can accumulate over time into psychotic symptoms (Kramer et al., 2014).

It is of note that the impact of attachment security was specifically relevant to social stress in daily life and may therefore reflect the interpersonal nature of attachment relationships. This type of stress is also likely to be particularly pertinent to young people during the transition to adulthood as they rely more heavily on peer relationships. Further examination of different stressor types would be important to explore. Chapter 5 also reported that greater attachment security was associated with enhancing the positive relationship of activity stress and negative affect. Activity stress looks specifically at what the individual is currently doing and how confident they feel at completing this task. Further research should examine possible reasons for these differences across different types of stressor. It is unclear why attachment security would enhance this relationship, it is postulated that by exploring further aspects of the context and current activities of young people this may contribute to understanding this relationship in greater detail, for example by exploring whether there are differences between young people who report current activities they are doing with others or whether they are alone.

Social Context and Mentalization

Following the importance of social stress that was highlighted in chapter 5, social context and social stress were the focus of chapters 6 and 7. In chapter 6, social context was explored in greater detail to examine whether aspects of the environment would be influenced by attachment style and mentalizing ability. It was reported that higher mentalization weakened the negative relationship between psychotic experiences and reported enjoyment when alone. Therefore, higher mentalization scores buffered a decrease in enjoyment when alone as psychotic experiences increase. This finding adds to previous literature by highlighting that mentalizing ability is associated with aspects of an individual's daily social experience. To the authors knowledge, the role mentalization plays in daily measurements of social context has not been previously explored. Further work is needed to explore reasons for this finding but it is suggested that mentalizing ability may support a feeling of safety when alone in this population of young people. In addition, this finding is also significant to the study of psychosis as it demonstrates that mentalization can buffer an aspect of the social context of people with psychotic experiences. If this result was replicated it would be important to establish whether mentalization influences a feeling of safety perhaps through self-regulation when young people are alone.

It is likely that mentalization is more dynamic than has been studied in this thesis and in previous literature where it can vary over shorter time frames. It is possible that the ability to mentalize successfully varies over time and changes throughout the day for example. This change in mentalization ability may also be in response to stress. Although this thesis has examined the link between mentalization and other outcomes, it is possible that these relationships are bidirectional and stressors also impact on the ability to mentalize. To the authors knowledge the variation in mentalization ability has not been examined in ESM studies. One ESM study has examined attachment and stress in the moment where it was reported that activity stress impacted on feelings of attachment insecurity (Sitko et al., 2016). However, it is suggested that given attachment styles are generally constant across the lifespan it is likely that mentalization will be more amenable to change and may be more

affected by day-to-day changes in environment and emotional states. This could be an avenue for further research.

The Context of Emotion Regulation

The final analysis chapter (chapter 7) demonstrated that young people with experiences of psychosis and young people without experiences of psychosis used putatively maladaptive strategies to manage social stress. This points towards a more complex picture of emotion regulation than maladaptive strategies relating specifically to psychopathology. In another ESM study, it was reported that by increasing the use of suppression, rumination, awareness and cognitive reappraisal resulted in a greater reduction of negative affect between two timepoints (Ludwig, Mehl, Krkovic et al., 2020). Although the study by Ludwig, Mehl, Krkovic et al (2020) recruited a wider age range of participants than in the current study, collectively these studies emphasize that individuals without mental health conditions report using maladaptive strategies when reporting through ESM. It is possible that these strategies are adaptive in the short-term but in the long-term may have a negative impact on mental wellbeing. This could therefore signify more importance on the context specifically and the appraisal of the social environment. If maladaptive strategies are more commonly used across the spectrum of mental health it could therefore be the context itself or the appraisal of the context that combine with maladaptive strategies to relate to more negative mental health outcomes. For some young people if the long-term implications of using these strategies is negative it may be necessary to focus on supporting individuals to use more adaptive strategies to manage their emotions. Future research should build on these results by examining the time course of emotion regulation strategies and exploring whether strategy use continues to reduce negative emotions over time or whether negative emotions build up over time and these strategies become less successful at reducing negative emotion.

Mentalization and Emotion Regulation Interventions

The findings above generally point to secure attachment and higher mentalization supporting mental wellbeing consistent with previous work (Karreman & Vingerhoets, 2012; Kim et al., 2014; Schwarzer, et al., 2021). This thesis therefore advocates for promoting mentalization and emotion regulation strategies to target specific outcomes such as stress sensitivity in young people (as will be discussed further under the clinical implications). In relation to the findings of this thesis, it is important for future research to establish whether stress sensitivity can be reduced through adaptive emotion regulation and greater mentalizing ability. The next step from this would be to examine whether an improvement in stress sensitivity would relate to reducing psychotic experiences. Given that there is significant evidence of stress sensitivity affecting psychotic experiences, it is important to establish ways to reduce stress sensitivity and this thesis points towards improving mentalization and emotion regulation strategies as one avenue.

The promotion of mentalization may also contribute to supporting young people with how they appraise their social context. If mentalizing ability can promote feelings of security in interpersonal situations this could also be a specific outcome that can be explored. Previous literature has shown that individual mentalizing ability can be changed following intervention (Gullestad & Wilberg, 2011; Levy et al., 2006). Further exploration of whether changes in mentalization scores would improve individual appraisals of their social experiences would be valuable going forward in this area of research. Again, if this association can be achieved it would be important to examine whether this too could reduce psychotic experiences. For example, if promoting mentalization could support a feeling of safety or security that could subsequently influence paranoid feelings in the moment.

8.3 Measurement and Experience Sampling Methodology

Measurement of Emotion Regulation

The measurement of psychological constructs formed a further theme of this thesis where emotion regulation was examined across different methodologies. In exploring emotion regulation through ESM, it was demonstrated that ESM measures a construct which is conceptually different from emotion regulation measured through self-report questionnaires (as demonstrated in chapter 3). Given that ESM data is collected in context and in real-time it is argued that ESM therefore obtains information about an individual's subjective experience in the moment. This result joins with other outputs (e.g. Peters et al., 2012; So et al., 2013) to demonstrate that there are differences between psychological constructs measured through questionnaires and ESM. Therefore, it is suggested that there is more to learn from increasing the implementation of the experience sampling methodology in clinical psychology.

ESM studies to date have demonstrated that psychotic symptoms (Palmier-Claus et al., 2012), negative mood (Tsanas et al., 2016) and quality of life (Leendertse et al., 2018) are not fully related when measured through ESM and self-report or interview measures. Therefore, it is likely that many psychological constructs will be reported differently in ESM studies. The differences between measurement approaches would have implications for future research and clinical interventions. As current literature is often based on self-report static measurements it is argued that a much more granular understanding of mental health in action can be achieved through using ESM. This can be exemplified by results in chapter 7 where young people without mental health problems reported using maladaptive strategies through ESM which points to a more complex relationship than maladaptive strategies being associated with psychopathology. It suggests other factors are relevant, such as the specific context in which strategies are used or the appraisals an individual has in the moment. In addition to understanding the complexity of mental health experiences, ESM also takes into consideration that symptoms and experiences fluctuate over time. This may be particularly relevant to the study of affective states and experiences of psychosis (e.g. Brans et al., 2013; Muddle et al., 2021; Myin-

Germeys et al., 2001). Not only does ESM consider contextual information and take into account the flow of experiences and symptoms, it can also be used as a dynamic model of measurement. This is particularly important in prediction research which it has been argued to rely on using data from one timepoint to predict transition (for example from ARMS to FEP; Nelson & Hartmann, 2018).

At-Risk Mental States

One area where dynamic models would make a significant impact is in relation to psychotic experiences and how these are measured. At the start of this thesis, the importance of ARMS was discussed and it is evident that the concept has evolved since its inception in the mid-1990s. It has been argued that individuals meeting criteria for ARMS often report symptoms associated with other mental health disorders notably anxiety and depression (Albert et al., 2018). Additionally, long-term outcomes for individuals meeting ARMS criteria point towards continuing difficulties with mental health and functioning (Beck et al., 2019). It is also evident that ARMS criteria identify individuals at risk of developing psychosis however there are difficulties defining the ARMS state criteria and this is compounded by psychotic experiences often fluctuating and changing over time. Research is continuing to examine the outcomes of young people who meet ARMS criteria, for example to explore whether they transition to a first episode of psychosis several years after meeting criteria for an at-risk mental state.

The challenges with defining ARMS criteria also relate into difficulties in predicting transitions to a first episode of psychosis. It is the authors view that dynamic measurement of mental health can contribute further to this field and instead of focusing on the transition from an ARMS category to an FEP category the focus is instead on predicting changes in symptoms. Dynamic models have implications for both treatment and prediction with a focus on early warning signs and periods of risk (Nelson & Hartmann, 2018). By moving away from one time measurements (e.g. questionnaires, clinical interviews) and understanding processes of mental health it is the authors view that exploring more individualised approaches will lead to improved prediction of changes in mental health. One place where this would be

particularly noticeable is in the development of psychosis where the aim would be in understanding changes in symptoms and emotions rather than looking to meet criteria that signify a particular category of symptoms.

8.4 Clinical Implications

Attachment and Mentalization

This thesis has demonstrated the importance of attachment security and mentalization in supporting mental wellbeing. As an initial step, clinicians should assess attachment styles and mentalizing ability of young people attending services. It has been recently recommended that attachment styles are routinely assessed in ARMS patients to contribute to understanding how attachment influences psychotic experiences over time (Partridge et al., 2022). Not only will this information help develop understanding into the effects on psychotic experiences over time but it is also advocated that awareness of patient attachment style and mentalizing ability would help clinicians to personalise therapy approaches given the link between attachment styles and engagement with services (e.g. Gumley et al., 2014).

In addition to assessing attachment styles and mentalizing ability, both of these concepts should be promoted in therapy to support mental health outcomes such as stress sensitivity. Given the protective role of attachment security and the association with positive emotion in the current study, there is a clear benefit of promoting attachment security in clinical services. Although services tend to focus on negative emotion and reducing mental health difficulties for individuals, the current study points towards focusing on building resilience through attachment security and positive emotion. By working towards promoting attachment security and positive emotion the influence of social stress can be reduced. Attachment security can be promoted through adaptive emotion regulation strategies and promoting mentalization. It is postulated that by emphasizing these more positive aspects of mental health would be particularly beneficial to services targeting young people as there is need to reduce the possibility of stigma and also to create more positive and inclusive approaches to how support is provided to young people to manage their

mental health. Instead of seeking support for your mental health being associated with weakness perhaps focusing on building resilience can contribute to normalising the process of seeking support for mental health and creating a more positive and inclusive environment for young people.

Experience Sampling and Dynamic Measurement

On a fundamental level, learnings from previous ESM studies should be acknowledged to shape treatment and interventions in clinical services. It is evident that ESM studies into psychosis are confirming that symptoms are changing in response to cognitions and experiences in day-to-day life. By recognising these pathways, the way in which we approach mental health problems can change and also how we design and implement interventions can be improved. For example, it has been shown that decreasing self-esteem precedes experiential avoidance which is associated with increasing paranoia (Udachina et al., 2009). Targets for interventions can become more focused on earlier steps in pathways to developing psychotic symptoms and therefore in this example rather than focusing on reducing avoidance, interventions can aim to improve self-esteem to explore whether targeting earlier processes in the pathway can reduce symptoms of psychosis.

This thesis has also demonstrated that emotion regulation measured through ESM is conceptually different from emotion regulation measured through self report. It is therefore advocated that ESM is tapping into a different aspect of subjective experience. Together with other authors (e.g. Myin-Germeys et al., 2018; Nelson et al., 2017; van Os, 2013) the results of this thesis point towards understanding mental health as a dynamic system of changing cognitions, symptoms and emotions. This work has implications for clinical services as many assessment tools are based on self-report or interviews exploring retrospective experiences. Therefore, clinicians are unable to obtain the whole picture of an individual's experience. It is suggested that the integration of dynamic measurements should be considered in services to both help understand individual experience but also to allow for discussion and intervention to be developed around an individuals day-to-day experience. Arguably this is where the greatest impact to the individual can be made. Through supporting

individuals to manage their emotions and symptoms in their everyday environments they can also see real-time effects and potential benefits of focusing on their mental health in the moment and in context. This relates back to the previous discussions where using ESM can influence individuals to take greater ownership of their own mental health and contribute to feelings of empowerment (Myin-Germeys et al., 2018).

Although there are several significant challenges to implementing experience sampling methodologies and mobile technology more widely in clinical services, the outcome of this thesis joins with a number of authors who advocate that technology (Camacho et al., 2019; Torous et al., 2019) and the experience sampling methodology in particular (Myin-Germeys et al., 2018; Trull & Ebner-Priemer, 2009) can bring vast improvements to interventions and service delivery. The increasing difficulties that face mental health services of rising patient numbers require innovation and alternative strategies to increase opportunities for people to access support for their mental health. Digital technology can be part of the solution to improve access.

As one example, there is potential to use ESM interventions to bolster therapy and provide more individualised mental health care. Although the practicalities of such approaches have yet to be examined current research points towards the feasibility and acceptability of using experience sampling and digital resources for people with experiences of psychosis (e.g. Camacho et al., 2019; Rus-Calafell & Schneider, 2020). It is the authors view that approaches such as those proposed by Torous & Hsin (2018) referred to as a Digital Clinic is a step in this direction. Within the Digital Clinic framework, it has been suggested that technology can be used to support symptom monitoring, shared decision making and enhanced therapy (Rauseo-Ricupero et al., 2021). In this case series, it was demonstrated that mobile technology was successfully used to support therapy and to empower individuals to monitor and understand their own mental health. The integration of such approaches into mental health services should be examined in future work to establish if operational procedures can be tailored to support such innovations in services. If

digital technology can become more mainstream in services it is argued that access to support will be widened and individuals will have the opportunity to become more involved in understanding their mental health through digital technology.

8.5 Conclusion

This thesis supports attachment theory as a theory of resilience as attachment security buffered the impact of daily stress in a group of young people with varying experiences of psychosis. It is advocated that promoting mentalizing and adaptive emotion regulation in mental health services could contribute to building resilience in young people. The relationship between attachment, emotion regulation and mentalization has been explored where it has been shown that these constructs are linked, however future work needs to explore further the complexity of these relationships. This is particularly the case in relation to mentalization where efforts should focus on understanding how this capacity fluctuates in daily life and whether this ability is associated through other outcomes such as insight to emotion regulation strategies. The potential for supporting mental health outcomes through promoting mentalization and emotion regulation strategies has been discussed and is advocated from the results of this thesis.

The measurement of psychological constructs was a further theme in this thesis and the potential for employing experience sampling methodology more widely has been highlighted. The inclusion of more dynamic measurements in research and practice has been emphasized to develop a deeper understanding of an individual's mental health. It is through this increased understanding that targets of interventions can be altered to support young people in their daily lives. The case for increasing the use of mobile technology in clinical services to provide opportunities to move interventions into everyday life has been advocated. It is suggested that interventions can have greater impact to individuals when they are in everyday situations and in real-time.

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