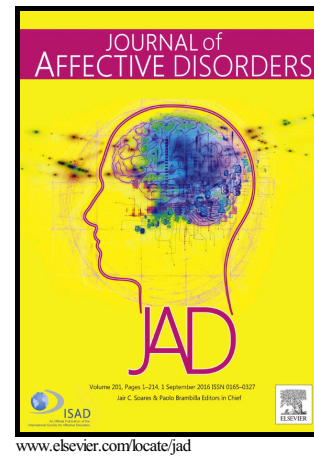# Author's Accepted Manuscript

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Investigation of associations between attachment, parenting and schizotypy during the postnatal period

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Abstract

Background

Parenting can be a stressful experience particularly for people with mental health problems or people who experienced abuse or attachment difficulties in their own childhoods. This study examined the relationships between earlier trauma, attachment, parenting and schizotypy in a non-clinical sample, with the specific hypothesis that parenting stress and competence would mediate any association between trauma, attachment and schizotypy.

Methods

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One hundred and thirty-four first time parents with a child under 12 months old completed the following questionnaires online: the Experiences of Close Relationships Scale – Short Form (ECR-S), the Schizotypal Personality Questionnaire – Brief, Revised (SPQ-BR) the Parenting Stress Scale, the Parenting Sense of Competence Scale (PSOC) and the Adverse Childhood Experiences (ACE) Questionnaire.

Results

Parenting stress mediated the association between attachment and schizotypy, though parenting competence did not have a significant effect as a mediator in a parallel model. Childhood trauma was associated with attachment and schizotypy but did not correlate with the parenting variables.

Limitations

The study utilised a cross-sectional design and self-report measures which limits the ability to make causal inferences from the results. However, findings warrant replication in clinical samples with psychosis.

Conclusions

The study adds to the understanding of what may exacerbate schizotypal symptoms in the first 12 months postpartum as parental attachment insecurity and parental stress together predicted elevated self-reported experiences of schizotypal symptoms.

Keywords: Attachment; Parenting; Schizotypy; Parenting stress

Introduction

Recent literature conceptualises psychosis as on a continuum, with disorder level psychosis at one extreme and experiences of psychosis that are transitory and sub-clinical at the other, namely schizotypy (Barrantes-Vidal et al., 2015; Nelson et al., 2013). Schizotypy and psychosis share many characteristics, with a factor analysis suggesting conceptual models of three factors for both schizotypy and psychosis: positive, negative and disorganised aspects (Wuthrich and Bates, 2006). Barrantes-Vidal et al. (2013) advocate the study of schizotypy to facilitate understanding of the development of clinical level psychosis. Investigating schizotypy may also contribute to the identification of protective factors, as the presence of schizotypy does not necessarily lead to the development of clinical symptoms (Debbane et al., 2015). Furthermore, research into schizotypy may facilitate a clearer understanding of the aetiology and trajectory of psychosis without debilitating extraneous variables being present, such as distress, hospitalisation and medication effects (Lenzenweger, 2015) which may be present in clinical level psychosis.

The aetiology of psychosis and schizotypy is multifaceted and includes possible genetic factors (Linney et al., 2003), early-life characteristics (e.g. low birth weight; Lahti et al., 2009) and environmental factors (Van Os et al., 2010). It is now well established that early relational trauma, such as sexual, physical and emotional abuse has a significant role in the development of psychosis and schizotypy (Velikonja et al., 2015). More recently, an increasing number of studies are looking at how subtler relational traumas, such as attachment difficulties and neglect in the context of earlier caregiving relationships may be associated with psychosis. Attachment theory was introduced by Bowlby (1969) who posited that children develop internal working models of the self and others through early relationships with caregivers. These internal working models persist throughout adulthood. Infants form secure attachments when their caregiver is consistently sensitive and appropriately responsive

to their needs and the attachment figure represents a secure base for children to begin to explore the world around them. Problems arise when these conditions are not met and the care received in childhood is suboptimal (Fraley et al., 2013). Attachment styles are relevant throughout the lifespan (Hazan and Shaver, 1987) and attachment in adulthood is conceptualised along two dimensions of anxiety and avoidance (Mikulincer and Shaver, 2003). Individuals who score highly on anxiety and/or avoidance on self-reported measures of attachment are considered to have insecure attachment styles.

Attachment anxiety refers to the desire for close relationships but an inability to be content, consistently seeking reassurance of care and a hypersensitivity to perceived rejection. In contrast, attachment avoidance is the tendency towards self-reliance and defensiveness, and individuals may resist becoming too close to others as this causes discomfort (Shaver and Mikulincer, 2007). Insecure attachment is considered to have potentially wide-ranging effects with studies linking insecure attachment with mental health outcomes (Morley and Moran, 2011) and personality difficulties (Fossati et al., 2003). Specifically, associations have been found between insecure attachment styles and the later development of psychosis, for example Korver-Nieberg et al. (2014) systematically reviewed studies of attachment and psychotic phenomenology and found that high levels of attachment anxiety and attachment avoidance were associated with increased reports of psychotic phenomenology in both clinical and non-clinical samples.

Research is now beginning to explore the underlying mechanisms that explain the association between insecure attachment and schizotypy/psychosis. One possibility is that insecure attachment is associated with difficulties in regulating affect and possibly negative beliefs about others and the self in relation to others (Mikulincer and Shaver, 2005), which are both key triggers for psychosis (Harder and Folke, 2012). One life event that can be highly

stressful and may be particularly pertinent for those with attachment difficulties and earlier trauma/neglect is becoming a parent for the first time. The transition to parenthood activates the caregiving system (Jones et al., 2015a) which coexists with the parent's attachment system. However, parents with insecure attachment styles may be more susceptible to activation of their attachment system, for example from perceived threats or stress, resulting in reduced activation of their caregiving system and thus their abilities to care for their children. For example, a new mother with an anxious attachment style may be overly concerned with seeking care from her attachment figure (her partner) to attempt to assuage her insecurity. This may affect her ability to respond to her infant's attachment seeking behaviours and result in negative beliefs about herself as a parent. Jones et al. (2015b) conducted a thorough review of research regarding self-reported attachment styles and parenting and their findings indicate that insecure attachment is associated with more negative parenting behaviours, emotions and cognitions. For instance, lower parental responsiveness and support, more punitive approaches to discipline and an increase in parenting stress.

The postpartum period is acknowledged to be a vulnerable period for new mothers to develop mental health difficulties (Murray et al., 2003) and research has consistently demonstrated that parental mental health difficulties may compromise effective parenting. For instance, a systematic review by Davidsen et al. (2015) concluded that mothers with schizophrenia differed in their maternal behaviour compared to controls, for example in reduced contact with their child and increased tension. They noted that most studies regarding the effects of mothers with psychosis take place within the first 12 months after the birth of their child. Ammerman et al. (2013) suggest that parenting stress is especially likely during the first year for parents as they adjust to the unfamiliar demands of raising an infant and increased stress has been shown to decrease parenting self-efficacy and perceived competence (Leahy-Warren and McCarthy, 2011).

Schizotypal experiences in a non-clinical population may also be experienced as stressful and as parenting stress is linked to poorer parent-child relationships and outcomes for the child (Neece, Green, & Baker, 2012), the current study is a worthy investigation The conceptualisation of psychosis on a continuum means that analogue samples can provide a convenient preliminary test of models which may subsequently be tested in a clinical population, for example women with postpartum psychosis (PPP) or individuals with established psychosis who become parents, but these populations are notoriously difficult to recruit. Therefore, a non-clinical sample was utilised for the current study.

The specific aim of the current study is to explore associations between earlier trauma, attachment, parenting and schizotypy in first time parents with a child under 12 months. The specific hypotheses to be tested are grouped into three sets: (Set H1) there will be a positive association between schizotypy and attachment anxiety, attachment avoidance and childhood trauma, (Set H2) there will be a positive association between parenting stress and attachment anxiety, attachment avoidance and trauma, but a negative association between parenting competence, attachment anxiety/avoidance and trauma, (Set H3) there will be a positive association between parenting stress and schizotypy and a negative association between parenting competence and schizotypy. Finally, exploratory analyses will test whether parenting variables mediate any associations between schizotypy and earlier relational experiences (trauma and attachment).

Method

Design

The current study is an online survey utilising a cross-sectional design which recruited participants between 15 February 2016 and 15 May 2016.

Ethics

Ethical approval for the study was obtained from Lancaster University Research Ethics Committee. All participants completed a consent form before gaining access to the study.

Measures

Demographics questionnaire

Participants were asked to report their: age, gender, age and gender of their child, nationality and any prior mental health conditions.

Schizotypal Personality Questionnaire – Brief Revised (SPQ-BR) (Cohen et al., 2010): The SPQ-BR is a 32-item scale used to assess schizotypal traits organised into seven trait subscales: 1) odd beliefs or magical thinking, 2) unusual perceptual experiences, 3) excessive social anxiety, 4) odd or eccentric behaviour, 5) odd speech, 6) no close friends and constricted affect, and 7) ideas of reference and suspiciousness. Participants are asked to indicate their level of agreement with each item on a five-point scale from 0: strongly disagree to 4: strongly agree. Internal reliability is previously reported to be 'robust' with a mean alpha coefficient of .91 (Callaway et al., 2014). In the present study Cronbach's Alpha was .94.

Adverse Childhood Experiences Questionnaire (ACE) (Felitti et al., 1998)

This 10-item screening questionnaire was initially developed within the Felitti et al. (1998) study to ascertain presence of trauma before the age of 18 years. The World Health

7

Organisation have recently developed a lengthier version intended to measure ACE's in all countries and explore associations with subsequent risk behaviours. Participants can score between 0 and 10 depending on how many traumas they indicate they have experienced.

Experiences of Close Relationships Scale-Short Form (ECR-S) (Wei et al., 2007)

The ECR-S is a 12-item scale used to measure adult attachment, with six items measuring attachment anxiety and six items measuring attachment avoidance. Participants are asked to indicate their level of agreement with each item on a seven-point scale from 1: strongly disagree to 7: strongly agree. Wei et al. (2007) reported reliability as good with coefficient alpha levels of .78 for the anxiety subscale and .84 for the avoidance subscale. In the current alphas were .70 for the anxiety subscale and .79 for the avoidance subscale.

Parental Stress Scale (Berry and Jones, 1995)

This scale was developed as an alternative to the 101-item Parenting Stress Index. The items represent both positive and negative themes of parenthood. Parents indicate their level of agreement with 18 items on a five-point scale from 1: strongly disagree to 5: strongly agree. Initial reliability was reported as good with a coefficient alpha level of .83 and reliability in the current study was .80.

Parenting Sense of Competence Scale (PSOC) (Gibaud-Wallston and Wandersman, 1978, in Johnston and Mash, 1989)

The PSOC is a 16-item scale that measures parents' sense of confidence and satisfaction with their parenting. Parents are asked to indicate their level of agreement with each item on a six-point scale from 1: strongly agree to 6: strongly disagree. Internal consistency has been reported as good in previous studies ranging from .75-.88 (Gilmore and Cuskelly, 2008) with reliability in the present study as .86.

Procedure

Recruitment for this study took place online and through displaying posters advertising the study in children's centres, which directed participants to the online study. Several websites aimed at new parents were emailed requesting a link to the survey was placed within their website or social media posts. Websites contacted include netmums, bounty, babycentre, mother & baby, mumsnet, gurgle and new parent. Where possible an advert for the study was placed in the forum page of each website. Social media platforms, for example Twitter, were also used via accounts held by the Doctorate in Clinical Psychology and the Division of Health Research. For recruitment purposes, the study was titled 'What affects the experience of parenting?' The advert included a link to the study which first presented the participant information sheet followed by a consent form. Once consent was indicated, participants accessed the study and were presented with the measures. At the end of the study participants were offered the option to be entered into a prize draw to win a £50 voucher.

Participants

Inclusion/exclusion criteria

Participants were considered eligible for inclusion in the study if they were a first-time primary caregiver of a child under the age of 12 months. The term 'primary care-giver' was used to encompass all those who may provide the main care for a new born infant, including fathers. Participants self-defined themselves as a primary care-giver to take part in the study.

A total of 182 participants accessed the online study, though of these 134 provided useable data.

Data Analysis

A mean effect size was calculated using previous research in this area which indicated that we would find effect sizes in the region of .3 (e.g. Berant et al., 2001; Berry et al., 2007; Calvo and Bianco, 2015; Kohlhoff and Barnett, 2013; Rholes et al., 2006; Wickham et al., 2015). This effect size would mean that a sample of 82 would give us 80% power to detect significant effects using the conventional alpha level of 0.05 (Field, 2014).

Statistical analyses

Correlational analysis was used to test the bivariate associations between the key variables (schizotypy, attachment, parenting stress, parenting sense of competence and trauma). Independent t-tests examined for differences on categorical demographic data. Demographic data found to exert effects on outcome variables were controlled for in the mediation analyses and compared with the same analyses without control of these covariates. Mediation analysis used the PROCESS macro (Hayes, 2016) for SPSS which follows the Preacher and Hayes (2004) approach by calculating regression coefficients between each variable in the model along with mediation effects. Parenting stress and competence were tested as mediators of the relationship between attachment and schizotypy (see Figure 1). Confidence intervals and standard errors used to assess significance were bias corrected and bootstrapped using 5000 samples. All analyses were carried out using IBM SPSS v22.

Missing data

Eleven participants had some data missing: Seven participants did not complete any of the final measure in the battery which was the ACE questionnaire and two of these participants also did not complete any of the SPQ-BR. Four participants missed more than 10% of the questions in the SPQ-BR (between 12.5% and 65.6%) so total scores were not calculated. Additionally, four participants missed one question each in different measures: two missed one question each in the PSOC (6% of the measure), one missed one question in

the ECR-S (8%) and one missed one question in the SPQ-BR (3%). However, Little

MCAR's test confirmed this data was missing completely at random (χ^2 (7, N = 134) = 3.274,

p = .859), so the missing data points were imputed and the measures for these four

participants were retained in the analyses.

Results

Sample characteristics

Demographic data for all participants and descriptive statistics for all measures are presented in Table 1.

Several significant differences were found in the scores on the measure of schizotypy (SPQ-BR) for gender of participant ($t(126) = 2.89$, $p = .01$), employment status ($t(126) = -3.43$, $p = .001$), previous diagnosis of a mental health condition ($t(126) = 4.53$, $p = .001$) and prior contact with mental health services ($t(126) = 2.26$, $p = .03$). Men scored higher than women and unemployed participants scored higher than employed participants. Those participants who reported a previous diagnosis of a mental health condition scored higher than those who did not and similarly, participants with previous mental health service contact scored higher than those who have not had contact. These demographic variables were controlled for in the mediation analyses, in which the SPQ-BR was the outcome variable.

Correlation analyses

Table 2 displays the correlation coefficients between the main variables. As hypothesised (Set H1), there was a positive association between schizotypy and attachment anxiety, attachment avoidance and childhood trauma. Secondly, there was a positive association between parenting stress and attachment anxiety/attachment avoidance and a negative association between parenting competence, attachment anxiety/avoidance, but the correlation between trauma and the parenting variables were not significant (Set H2). Thirdly, as hypothesised (Set H3), there was a positive association between parenting stress and schizotypy and a negative association between parenting competence and schizotypy.

12

Mediation analyses

Exploratory analyses of the relationships between attachment, parenting and schizotypy was conducted to determine if there were any mediation effects. Trauma was not included in the mediation analyses as no significant association was found with the parenting variables in the correlational analyses. Mediation model one used attachment anxiety as the predictor variable and model 2 used attachment avoidance as the predictor variable. Figures 2 and 3 show diagrammatic representations of these relationships. Regression analyses as part of the parallel, multiple mediation model indicated that relationships between all variables were significant (see Table 3) except between parenting competence and schizotypy. However, a mediation model with parenting competence as a single mediator indicated that there was a negative association between parenting competence and schizotypy (b = -.45, $t(125)$ = -2.70, 95% CI [-.78, -.12]) with a specific indirect effect of b = .30, 95% CI [.11, .59]. Hayes (2013) suggests different effects may be noted in parallel, multiple mediations as a specific indirect effect is calculated while "controlling for all other mediators in the model" (p. 129). Parenting stress and competence share a significant proportion of variance (R^2 = .63) so it may be assumed the competence variable is ineffective in the parallel mediation model because stress is a stronger variable.

The results reported here, in Table 3, Table 4 and in Figures 2 and 3 are from the parallel mediation model. This analysis indicates a positive indirect effect of attachment anxiety on schizotypy through parenting stress (b = .36, 95% CI [.07, .80]) with both predictors accounting for 28% of the variance in schizotypy (R^2 = .28). The effect size (*ab: b* = .11) was medium (Cohen, 1988) and the confidence interval was entirely above zero (95% CI [.02, .23], see Figure 2 and Tables 3 and 4). A similar effect was found for attachment avoidance (see Figure 3 and Tables 3 and 4). There was a positive indirect effect of attachment avoidance on schizotypy through parenting stress (b = .37, 95% CI [.04, .92]) with

both predictors accounting for 27% of the variance in schizotypy ($R^2 = .27$). Again, the effect size (*ab: b* = .10) was medium (Cohen, 1988) and the confidence interval was entirely above zero (95% CI [.01, .23]). These results suggest that participants scoring higher on either attachment anxiety or avoidance also scored higher on parenting stress and schizotypy.

These mediation models were re-tested controlling for the relevant demographic variables found to exert effects on schizotypy, namely gender of participant, employment status, previous diagnosis of a mental health condition and prior contact with mental health services. Figures 4 and 5 depict diagrammatic representations of these models. The results found largely replicate those reported in figures 2 and 3, though it was noted that the variance accounted for in schizotypy increased from a total of .28 (attachment anxiety, parenting stress and competence) to .44 when the covariates were added to the model. The same was noted for the attachment avoidance model (R^2 =.27 to .46 respectively). As there were so few male participants (*n* = 8), gender of participant was removed from the covariates and the model was re-tested. Results differed minimally from those already reported, though the variance accounted for in schizotypy in model 1 (attachment anxiety) reduced to .40 and in model 2 (attachment avoidance) it reduced to .43.

Discussion

This study examined the relationships between trauma, attachment, parenting and schizotypy, with exploratory mediation analyses investigating whether parenting stress and competence mediated the association between attachment and schizotypy. There were significant indirect effects of attachment anxiety and attachment avoidance on schizotypy through parenting stress, though parenting competence did not have a significant effect as a mediator in the parallel model. Results did not differ significantly when demographic variables were controlled for in the analyses. Trauma was significantly associated with attachment anxiety, attachment avoidance and schizotypy, but was not significantly associated with parenting variables.

We predicted and found significant positive associations between schizotypy and attachment anxiety, attachment avoidance and childhood trauma, which supports previous studies in this area (e.g. Korver-Nieberg et al., 2014; Velikonja et al., 2015). In the current study, trauma was also associated with attachment as would be expected from existing research (Murphy et al., 2014; Riggs, 2010). The consequences of early trauma histories and attachment difficulties, such as difficulties in interpersonal relationships, problems regulating affect and negative beliefs about the self and others have been implicated in psychological models of the development of psychosis (Korver-Nieberg et al., 2015). The findings here suggest that early experiences might also play a role in the development of schizotypal symptoms.

We also hypothesised that there would be associations between parenting variables and attachment anxiety, attachment avoidance and trauma. As hypothesised, and in support of previous research, attachment was significantly associated with both parenting variables (Rholes et al., 2006; Vieira et al., 2012). In the case of attachment anxiety, an overactivation of the attachment system may lead to unrealistic expectations of the parent-child relationship

15

and elevation of stress levels when the child is perceived as demanding care (Moreira et al., 2015). Conversely, attachment avoidance may generate parental stress due to the difficulties experienced having a dependent child, which is at odds to the desire for self-sufficiency and independence (Mikulincer and Shaver, 2007). Parental competence has also been linked to insecure attachment in previous research (Gelkopf and Jabataro, 2013), though the pathways from insecure attachment to lower parental competence are less clear with mediating factors such as depression having a more significant role than in the relationship between insecure attachment and parenting stress (Calvo and Bianco, 2015).

Contrary to predictions, trauma was not associated with either of the parenting measures despite recent evidence suggesting a possible link between early trauma and parenting stress (Steele et al., 2016). Both the present study and the Steele et al. (2016) study used the ACE questionnaire to assess trauma, but the two studies reported different degrees of trauma. In the current study, only 17% ($n = 22$) participants reported four or more ACE's whereas in the Steele at al. study 25% of community participants and 79% of clinical participants reported four or more ACE's. The relatively low levels of trauma in our study and the consequent lack of variance in our data may therefore have prevented us from identifying significant associations between trauma and parenting. The measure of trauma was not included in subsequent mediation analyses due to the non-significant association with the parenting variables.

As predicted parenting stress and competence were associated with schizotypy with a positive association between schizotypy and parenting stress and a negative association between schizotypy and parenting competence. The relationship between parenting stress and schizotypy could be bi-directional as parenting stress may be a trigger for schizotypy, or schizotypal symptoms may increase parental stress. Previous studies have shown evidence of increased stress responsivity with schizotypy (Abbott et al., 2012; Smith and Lenzenweger,

2013), focusing on the measurement of physiological markers of stress or psychosocial stressors in daily life. However, the current study specifically assessed the concept of parental stress which therefore adds to the existing literature on stress and schizotypy (e.g. Soliman et al., 2011). Several previous studies have investigated parenting outcomes in psychosis (e.g. Dolman et al., 2013; Plant et al., 2002), however, this research tends to regard the parenting abilities of mothers who already have psychosis whereas the mediation model in the current study suggests that parenting emotional experiences may also predict levels of sub-clinical psychotic phenomena. The current study used a non-clinical population rather than a clinical sample, but due to the link between schizotypy and psychosis our findings suggest that the model should be tested in a clinical sample.

This is the first study to use a mediation model to explore associations between attachment, parenting and schizotypy in a non-clinical sample. Parenting stress was found to be a more significant mediator than parenting competence, and the latter did not reach significance in the parallel mediation model. Parental stress and competence shared a notable amount of variance ($R^2 = .63$) suggesting they measure similar constructs. It is possible that stress was a stronger predictor of schizotypy than competence. Previous research has found stress is related to both schizotypy and psychosis (Phillips et al., 2007; Smith and Lenzenweger, 2013), but no such relationship has been found between measures of self-perceived parenting competence and schizotypy/psychosis.

Strengths and Limitations

The results of the current study were from a relatively large, adequately powered sample which adds to the existing literature regarding attachment, parenting and schizotypy. Using online methods of data collection enabled the recruitment of a more geographically diverse sample than would have been possible through traditional recruitment methods. The

decision to focus on first time parents with a child under 12 months old also enabled a

homogenous sample to be recruited for analysis.

Despite these strengths, the current study had a number of limitations which should be

considered when evaluating the implications of the results. Firstly, the data was obtained from

a cross-sectional sample which limits the degree to which causal inferences can be made.

Secondly, participation in the current study was via response to an online advert, which

increases the risk that some potential participants were not able to access the study.

Thirdly, only eight males responded to the online advert and gender comparisons were

therefore limited by this small sample. Fourthly, the findings for trauma are limited by the

relatively low levels of adverse events in the sample. Fifthly, the current study used self-

report measures which research suggests are susceptible to reporting biases and common

method variance (Morsbach and Prinz, 2006). Additionally, the measure of parenting stress

was a rather general measure to capture parenting distress. However, given that we were

aiming to recruit a general population sample, the inclusion of a more clinically-focused

specific measure may have resulted in limited variance within the data set.

Finally, it is also possible that other confounding variables which were not measured

may account for the significance of the results in the current study. One particularly important

confounder in this group would be Postpartum Depression (PPD) given the high levels of

PPD reported in first time mothers (O'Hara and McCabe, 2013). Depression may have

skewed the results obtained in the current study as research has shown it can lead to negative

reporting bias (e.g. Moussavi et al., 2007). Participants experiencing depression may have

endorsed more negative items on the measures included in the current study, or over-reported

difficulties, for example with parenting stress. Similarly, anxiety was not measured in the

current study which is also suggested to be a common factor in the experience of new parents

(Vismara et al., 2016). This may also have affected the association between the measured variables.

Arguably, the study may have attracted new parents with a history of mental health problems suggesting that our sample were not representative of all new parents. However, the finding that 30 percent of the sample reported prior contact with mental health services is consistent with data from the UK that suggests one in four people each year experience mental health problems (Health and Social Care Information Centre, 2009).

Clinical implications

This study adds to the understanding of what may exacerbate mental health difficulties in the first 12 months postpartum as parental attachment insecurity and stress together predict elevated experiences of schizotypal symptoms. It is possible that mothers experiencing these difficulties may not encounter services. However, it is important to identify mothers experiencing parenting stress postpartum, particularly those with difficult relationships from their family of origin or other important attachment relationships such as romantic partners, as this may help prevent exacerbation of schizotypal symptoms. Midwives and health visitors have a significant role in this identification process and should refer mothers on for specialist help if indicated, while being sensitive to the possible fear new mothers may have of their child being removed should they indicate lack of coping. Normalising stressful feelings for new mothers should perhaps become routine during postpartum health visits, with the distribution of information and guidance on seeking support which can be accessed externally to the midwife/health visitor. Additionally, it is important to normalise schizotypal experiences in the face of stress so that new parents do not develop negative appraisals about their experiences. Research suggests that catastrophic meta-cognitive appraisals of anomalous sub-clinical psychotic-like experiences and consequent increases in stress can exacerbate

psychotic experiences (Morrison and Wells, 2007), so acknowledging the difficult nature of the postpartum period, including the potential for schizotypal experiences, in a transparent way through literature and contact with health professionals may normalise experiences for new parents.

Future Research

Future research should firstly test this model in a clinical population with parents experiencing psychosis. Additionally, investigation of associations between attachment, parenting and psychotic phenomena with the clinical subgroup of women experiencing PPP may advance understanding of the aetiology of this condition. It would also be beneficial to explore if the results found in this cross-sectional study occur across different periods of parenting with children of different age groups. This may enable firmer establishment of the causal pathways which were suggested in this cross-sectional study. Further research should also include other potential mediators or moderators which may affect the relationship between these three variables, for example anxiety and depression. As highlighted above gender analyses in this study were limited by the small number of males in the sample. Future should therefore proactively attempt to target more men so that more meaningful comparisons can be made between men's and women's experience of parenting. Finally, a measure of child outcomes in future studies of this nature may explore potential intergenerational transmission of insecure attachment style from the combined effects of parental attachment insecurity and parenting stress elevating schizotypal symptoms. The first year of a child's life is a critical period in terms of developing attachments (Wan and Green, 2009), so disruptions in this period due to parental stress and/or mental health difficulties are highly significant and possibly pervasive for the child's lifetime making this area worthy of further investigation.

Summary and conclusions

This is the first study to investigate associations between attachment, parenting stress and schizotypy. The results indicated that the relationship between insecure attachment and elevated schizotypal symptoms was partially mediated by parenting stress in a non-clinical sample of first time parents with a child under 12 months. This suggests that both insecure attachment and parenting stress may be predictors of schizotypy in this postpartum period. The findings add to the existing literature by suggesting parenting stress may be an important factor in the experience of psychotic phenomena as previous research has focused on stress related to daily hassles or physiological stress responses. Finally, these findings suggest a need to test these hypotheses in a clinical sample of women experiencing PPP or new mothers with established psychosis.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Conflict of interest

There are no conflicts of interest.

Acknowledgements

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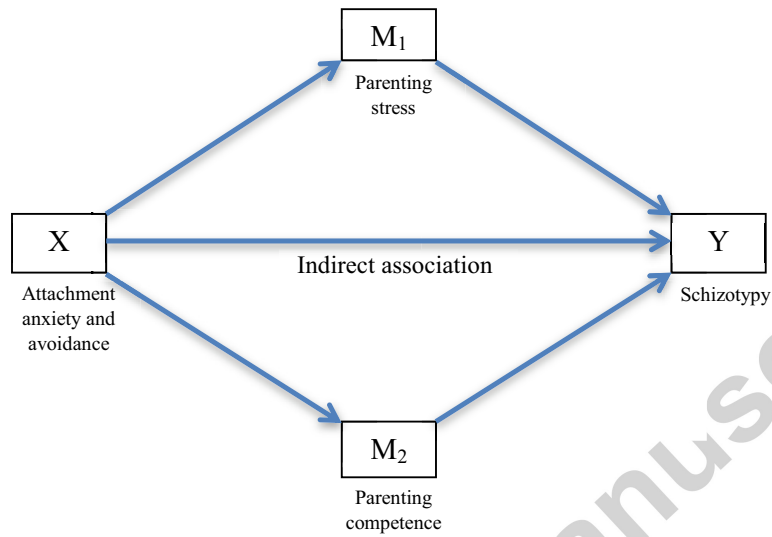Figure 1. Illustrative diagram of the hypothesized mediation model showing attachment as the predictor variable, schizotypy as the outcome variable and parenting stress and competence as mediating variables.

Figure 2. Mediation model 1 testing if parenting stress and parenting competence mediate the relationship between attachment anxiety and schizotypy. *$p<.05$,**$p< .01$, ***$p< .001$, ns= non-significant

Figure 3. Mediation model 2 testing if parenting stress and parenting competence mediate the relationship between attachment avoidance and schizotypy. *p<.05,**p< .01, ***p< .001, ns= non-significant

M_1

Parenting stress

$a_1=.43$ ***

$b_1=.1.12$***

Direct association
$c = .1.25$***

X

Attachment anxiety

Indirect association
$c^1 = .88$***

Y

Schizotypy
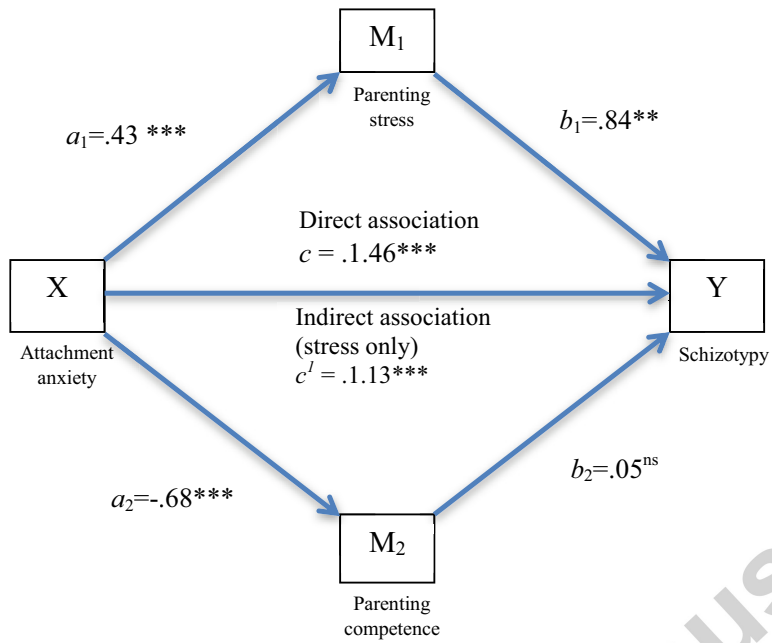
$a_2=-.68$***

$b_2=.18^{ns}$

M_2

Parenting competence

Figure 4. Mediation model 1 testing if parenting stress and parenting competence mediate the relationship between attachment anxiety and schizotypy, controlling for gender of participant, employment status, previous diagnosis of a mental health condition and prior contact with mental health services. $*p<.05, **p< .01, ***p< .001$, ns= non-significant

M_1

Parenting stress

$a_1=.49$ ***

$b_1=.1.04***$

Direct association
$c = .1.51***$

X

Y

Indirect association
$c^1 = 1.11***$

Attachment avoidance

Schizotypy

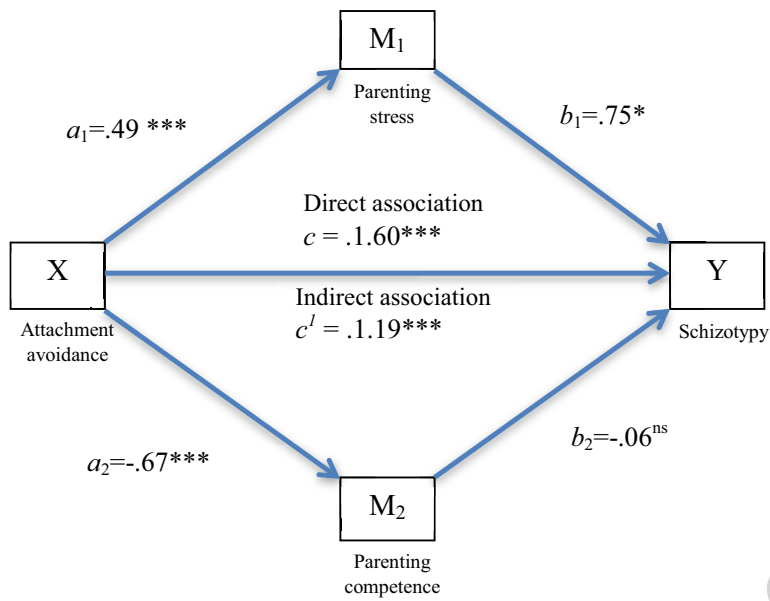$a_2=--.67***$

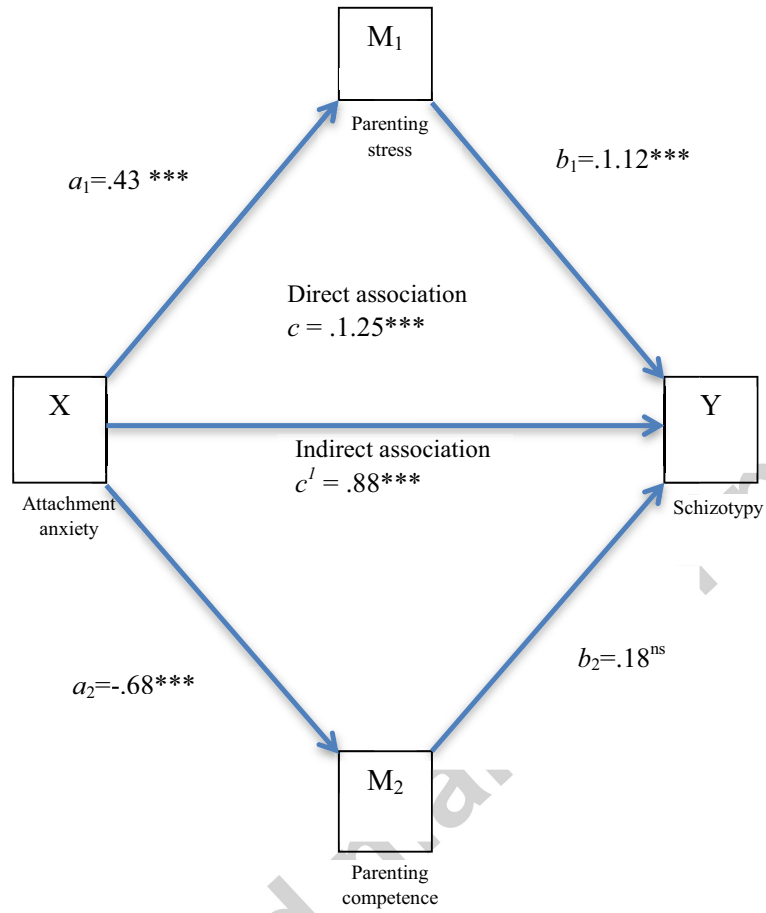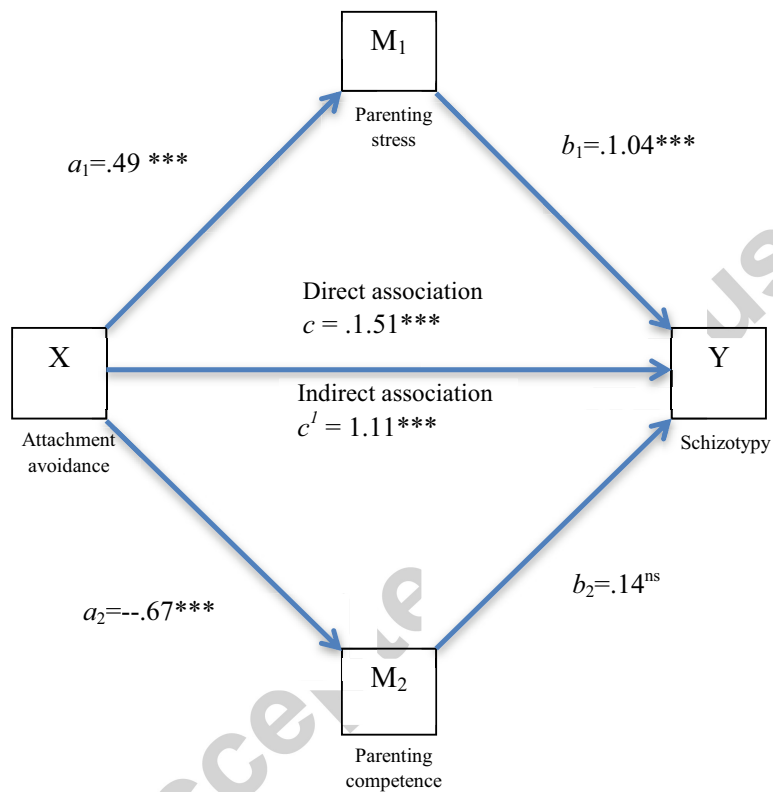$b_2=.14^{ns}$

M_2

Parenting competence

Figure 5. Mediation model 2 testing if parenting stress and parenting competence mediate the relationship between attachment avoidance and schizotypy, controlling for gender of participant, employment status, previous diagnosis of a mental health condition and prior contact with mental health services. *p<.05,**p< .01, ***p< .001, ns= non-significant

Table 1. Demographic data and descriptive statistics

N = 134			
Gender: Female, n (%)		126	(94)
Age of participant in years, mean		31	
Age of child in months, mean		7	
Gender of child: Female, n (%)		65	(48.5)
Country of residence, n (%)	UK	113	(84)
	Other	21	(16)
Ethnicity, n (%)	Caucasian	116	(86.5)
	Other	18	(13.5)
Marital status, n (%)	Married or cohabiting	130	(97)
	Other	4	(3)
Highest level of education, n (%)	GCSE/NVQ/A-Level	23	(17.2)
	Undergraduate degree/above	111	(82.8)
Employment status, n (%)	Employed/maternity leave	119	(89)
	Unemployed	15	(11)
Previous diagnosis of a MH condition: Yes, n (%)		29	(22)
Prior contact with MH services: Yes, n (%)		40	(30)
PSOC, mean (SD)		67.13	(10.82)
N = 134			

Parental Stress Scale, mean (SD) *N* = 133	38.74	(8.28)
Attachment anxiety (ECR-S), mean (SD) *N* = 133	20.04	(6.64)
Attachment avoidance (ECR-S), mean (SD) *N* = 133	13.15	(5.88)
SPQ-BR, mean (SD) *N* = 128	44.38	(21.44)
ACE, mean (SD) *N* = 127	1.68	(1.81)
Participants reporting 4 or more ACE's, *n* (%)	22	17

Abbreviations: MH, mental health; SD, Standard Deviation; PCOS, Parenting Sense of Competence

Scale; ECR-S, Experiences of Close Relationships – Short Form; SPQ-BR, Schizotypal Personality

Questionnaire – Brief Revised; ACE, Adverse Childhood Experiences Questionnaire.

ATTACHMENT, PARENTING AND SCHIZOTYPY

Table 2. Correlation matrix for the variables in the study (Pearson's *r*)

	Measure	1	2	3	4	5	6
1	PCOS	-					
2	Parental Stress Scale	-.80**	-				
3	Attachment Anxiety (ECR-S)	-.40**	.34**	-			
4	Attachment avoidance (ECR-S)	-.35**	.31**	.29**	-		
5	SPQ-BR	-.37**	.42**	.50**	.43**	-	
6	ACE	-.09	.09	.20*	.23**	.41**	-

Abbreviations: PCOS, Parenting Sense of Competence Scale; ECR-S, Experiences of Close Relationships – Short Form; SPQ-BR, Schizotypal

Personality Questionnaire – Brief Revised; ACE, Adverse Childhood Experiences Questionnaire.

**p = .01, *p = .05

ATTACHMENT, PARENTING AND SCHIZOTYPY

Table 3. Results of regression analyses

Model 1	IV	DV	b	df	SE	t	p	LLCI	ULCI
	Attachment anxiety	Schizotypy	1.13	124	.27	4.18	<.001	.60	1.67
	Attachment anxiety	Parenting stress	.43	126	.10	4.12	<.001	.22	.64
	Attachment anxiety	Parenting competence	-.68	126	.14	-4.98	<.001	-.95	-.41
	Parenting stress	Schizotypy	.84	124	.33	2.54	.05	.18	1.49
	Parenting competence	Schizotypy	.05	124	.25	.19	*ns*	-.45	.55
Total effect X on Y:	Attachment anxiety	Schizotypy	1.46	126	.26	5.63	*<.001*	.95	1.97

ATTACHMENT, PARENTING AND SCHIZOTYPY

[2] Model 1 uses attachment anxiety as the predictor variable. This table shows the regression analyses between all the variables used in this model. These are all significant except for the parenting competence and schizotypy outcome which indicates parenting competence does not predict schizotypy in the presence of attachment anxiety.

Model 2	IV	DV	b	df	SE	t	p	LLCI	ULCI
	Attachment avoidance	Schizotypy	19	124	.31	3.89	<.001	.58	1.79
	Attachment avoidance	Parenting stress	.49	126	.12	4.12	<.001	.26	.73
	Attachment avoidance	Parenting competence	-.67	126	.16	-4.26	<.001	-.99	-.36
	Parenting stress	Schizotypy	.75	124	.33	2.23	.05	.08	1.41
	Parenting competence	Schizotypy	-.06	124	.25	-.23	*ns*	-.56	.44
Total effect X on Y:	Attachment avoidance	Schizotypy	1.60	126	.30	5.36	<.001	1.01	2.18

41

[3] Model 2 uses attachment avoidance as the predictor variable. This table shows the regression analyses between all the variables used in this model. These are all significant except for the parenting competence and schizotypy outcome which indicates parenting competence does not predict schizotypy in the presence of attachment avoidance.

Table 4. Results of mediation analyses

Model	IV	Mediator	DV	*b*	R^2	*SE*	LLCI	ULCI	*ab*	*SE*	LLCI ULCI
								Bootstrap 5000 samples			
Model 1	Attachment anxiety	Parenting stress	Schizotypy	.36	.28	.18	.07	.80	.11	.05	.02 - .23
Model 2	Attachment avoidance	Parenting stress	Schizotypy	.37	.27	.21	.04	.92	.10	.05	.01 - .23

ATTACHMENT, PARENTING AND SCHIZOTYPY

Highlights

- Insecure attachment is associated with schizotypy postpartum.

- Insecure attachment is associated with more stressful parenting.

- Parenting stress mediates the association between attachment and schizotypy.