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# Pathways from insecure attachment to paranoia: the mediating role of emotion regulation

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## Abstract

**Background:** Paranoia is common across the clinical and non-clinical spectrum. Cognitive behavioural therapy for psychosis currently yields modest results, warranting research into symptom-specific maintenance factors to improve outcomes. There is strong evidence of a relationship between insecure attachment and increased paranoia, but little is known about the mediating mechanisms. Emotion dysregulation is associated with both insecure attachment and paranoia, and a candidate causal mechanism. **Aims:** This study aimed to determine if emotion dysregulation mediates the association between attachment and paranoia.

**Method:** Sixty-two individuals with elevated paranoia were recruited from NHS services and community settings across the South of England. Mediation analyses were conducted on trait attachment, emotion regulation and paranoia variables, which were collected at one time point.

**Results:** As predicted, emotion dysregulation mediated the relationship between attachment avoidance and paranoia, and between attachment anxiety and paranoia. Emotion suppression did not mediate the relationship between attachment avoidance and paranoia, possibly due to power. Attachment avoidance correlated with deactivating emotion regulation strategies (e.g. lack of emotional awareness) and attachment anxiety correlated with hyperactivating emotion regulation strategies (e.g. impulse control difficulties). Both deactivating and hyperactivating strategies correlated with paranoia.

**Conclusion:** Emotion dysregulation is not routinely targeted in cognitive behavioural therapy for psychosis. This study suggests that incorporating emotion regulation strategies in therapy may improve clinical outcomes. Experimental studies are now required to support a causal argument, and pilot intervention studies should investigate if emotion regulation skills development (aligned with attachment style) is effective in reducing non-clinical and clinical paranoia.

**Keywords:** affect regulation; attachment; emotion regulation; mediation; paranoia; psychosis

## Introduction

Paranoia is defined as beliefs of persecution, conspiracy, and threat in the absence of supporting evidence (Freeman, 2007). Paranoia exists in both non-clinical and clinical populations, ranging on a continuum from mild suspiciousness to intense distressing delusions (Freeman *et al.*, 2005; Johns and van Os, 2001). In clinical populations, paranoia is a key symptom of psychosis and is typically associated with schizophrenia-type diagnoses (Cooke, 2014). Clinical paranoia is associated with a range of negative outcomes such as poor treatment response, isolation, emotional distress, and poor quality of life (Freeman, 2016). Given the impact, it is imperative that we understand the factors that lead to its development and maintenance of paranoia, and ensure that these are targeted in psychological interventions.

Cognitive behavioural therapy (CBT) focuses on cognitive and behavioural change strategies (Morrison and Barratt, 2010) and is currently recommended for individuals experiencing or at risk of psychosis, including symptoms such as paranoia (National Institute for Health and Care Excellence, 2014). Evidence of the effectiveness of CBT for psychosis is inconsistent across meta-analyses. Van der Gaag *et al.*, (2014) found that CBT resulted in modest improvements in hallucinations, although results were less consistent for delusions, and Bighelli *et al.*, (2018) found low to medium improvements across positive symptoms. By contrast, Laws *et al.*, (2018) examined the impact of CBT on functioning in people with psychosis, finding no improvement in quality of life and only a small reduction in distress, which became non-significant when adjusted for possible publication bias. While there is evidence for the effectiveness of CBT, the modest and inconsistent findings suggest we may need to explore additional factors involved in the maintenance of psychosis which are not currently targeted in therapy. One area likely to be therapeutically beneficial is the role of attachment (Berry *et al.*, 2020; Gumley *et al.*, 2014).

### **Attachment**

Attachment theory assumes that early relationships with primary caregivers influence beliefs about self, others, and the world, as well as emotion regulation, into adulthood (Bowlby, 1969/1982). Attachment style is typically conceptualised along two dimensions: attachment anxiety and attachment avoidance (Brennan *et al.*, 1998). Individuals scoring low on both dimensions are said to have a secure attachment, and tend to hold reasonably positive self and other beliefs and use effective emotion regulation strategies, as a result of responsive caregiving (Mikulincer and Shaver, 2016). Individuals scoring highly on either attachment anxiety or avoidance are said to have an insecure attachment (Brennan *et al.*, 1998). Attachment anxiety typically follows inconsistent caregiving, and is associated with negative representations of the self, and a strong desire for connection coupled with a fear of rejection (Mikulincer and Shaver, 2016). Individuals with high levels of attachment anxiety tend to rely on hyperactivating emotion regulation strategies, such as catastrophising emotion, in an attempt to gain a response from attachment figures (Mikulincer and Shaver, 2016). Attachment avoidance typically follows rejecting caregiving and is associated with negative representations of others and a compulsive self-reliance (Mikulincer and Shaver, 2016). Individuals with high levels of attachment avoidance tend to adopt deactivating emotion regulation strategies, such as emotional suppression, to avoid further rejection from attachment figures (Mikulincer and Shaver, 2016). Both hyperactivating and deactivating strategies function to reduce the emotional pain associated with the unavailability of attachment figures (Mikulincer and Shaver, 2007).

Insecure attachment is associated with increased clinical paranoia, with a recent systematic review finding significant associations in 11 out of the 12 identified studies (Lavin *et al.*, 2020). Insecure attachment is also associated with non-clinical paranoia (Berry *et al.*, 2006; Pickering *et al.*, 2008). Furthermore, a recent meta-analysis found strong associations between both attachment anxiety and avoidance, and paranoia, with no difference between clinical and non-clinical samples (Murphy *et al.*, 2020). Experimental studies have also found that priming insecure attachment increases level of paranoia (Hutton *et al.*, 2017; Sood and Newman-Taylor, 2020).

While there is strong evidence of a relationship between attachment style and paranoia, little is known about the mediating mechanisms underlying this relationship. Read and Gumley (2008) propose that attachment predicts psychosis via a range of mediating mechanisms, including emotion regulation.

### **Emotion regulation**

Hyperactivating (e.g. catastrophising) and deactivating emotion regulation strategies (e.g. suppression) are typically used by those with insecure attachments (Mikulincer and

Shaver, 2007; Owens *et al.*, 2013), and are associated with increased psychosis symptomology, including suspiciousness (Dozier and Lee, 1995). This is supported by longitudinal research; for example, suppression predicted increases in paranoia in individuals with psychosis in experience sampling studies (Kimhy *et al.*, 2020; Nittel *et al.*, 2018), and self-blaming predicted non-clinical paranoia one month later (Westermann *et al.*, 2013). In addition, an experimental study found that increases in paranoia after a social exclusion task were accounted for by lower levels of functional (e.g. acceptance) and higher levels of dysfunctional emotion regulation strategies (e.g. catastrophising and blaming others), in individuals at high risk of psychosis (Lincoln *et al.*, 2018). Correlational research shows that dysfunctional emotion regulation (e.g. impulse control difficulties and catastrophising) is associated with paranoia when controlling for a range of variables (Westermann and Lincoln, 2011; Westermann *et al.*, 2013). Importantly, preliminary intervention studies have found that emotion regulation skills training may be an effective way to reduce paranoia in psychosis (Silva *et al.*, 2020).

Limited research has examined emotion regulation as a mediator in the attachment–paranoia relationship in psychosis (Ascone *et al.*, 2020; Castilho *et al.*, 2017; Jones, 2015) and in non-clinical psychotic-type experience (Udachina and Bentall, 2014). There is some evidence that hyperactivating emotion regulation strategies (rumination, self-blame, catastrophising) mediate the relationship between attachment anxiety and clinical paranoia (Ascone *et al.*, 2020), and that internal dysfunctional affect regulation (e.g. dwelling on thoughts and feelings) mediates the relationship between fearful attachment (negative view of self and other) and clinical hallucinations, but not other positive symptoms (Jones, 2015). There is also some evidence that experiential avoidance mediates the relationship between attachment anxiety and non-clinical paranoia (Castilho *et al.*, 2017; Udachina and Bentall, 2014).

Unexpectedly, Jones (2015) found that internal-functional affect regulation (e.g. concentrating on positive activity) mediated the relationship between dismissing (avoidant) attachment and positive symptoms (but not hallucinations). While this strategy is generally considered functional, avoidantly attached individuals tend to suppress affect and not seek out others for support; these results may therefore reflect an unhelpful over-use of internal strategies. Experiential avoidance may mediate the relationship between attachment avoidance and non-clinical paranoia (Udachina and Bentall, 2014), although blaming others did not mediate the relationship between attachment avoidance and clinical paranoia (Ascone *et al.*, 2020).

Many of these studies did not control for confounders (Ascone *et al.*, 2020; Castilho *et al.*, 2017; Jones, 2015; Udachina and Bentall, 2014), used weak data analysis (Castilho *et al.*, 2017), and/or employed *post-hoc* analyses (Ascone *et al.*, 2020), which limit confidence in the results.

The research to date indicates that the recommended psychological interventions for paranoia have just moderate effects, warranting research into other factors that contribute to the maintenance of paranoia. Research suggests that insecure attachment is associated with both emotional dysregulation and paranoia, and that emotion dysregulation is associated with paranoia. We have preliminary evidence that emotion regulation may be involved in the relationship between attachment and psychosis. Robust research examining whether trait emotion regulation mediates the relationship between trait attachment and paranoia would help to isolate key processes which may be amenable to change in therapy. Previous research has also recommended exploring emotional suppression as a mediator in the attachment avoidance and paranoia relationship, as this is assumed to be a key strategy associated with this attachment style (Ascone *et al.*, 2020).

Additionally, it would be beneficial to explore correlations between attachment style and emotion regulation strategies to inform potential hypotheses about tailoring emotion regulation skills training by attachment style for clinical populations.

### **Current study**

The current study aims to test the following hypotheses:

**H1:** Emotion dysregulation [as measured by the Difficulties in Emotion Regulation Scale (DERS); Gratz and Roemer, 2004] will mediate the relationship between attachment anxiety [as measured by the Psychosis Attachment Measure (PAM); Berry *et al.*, 2006], and paranoia [as measured by the Revised Green *et al.*, Paranoid Thoughts Scale (R-GPTS); Freeman *et al.*, 2019]

**H2:** Emotion dysregulation (as measured by the DERS), will mediate the relationship between attachment avoidance (as measured by the PAM) and paranoia (as measured by the R-GPTS)

**H3:** Emotional suppression [as measured by the Emotion Regulation Questionnaire (ERQ); Gross and John, 2003], will mediate the relationship between attachment avoidance (as measured by the PAM) and paranoia (as measured by the R-GPTS)

Exploratory analyses will also be conducted to examine associations between attachment style and emotion regulation strategies, to explore the following research questions:

**RQ1:** Is attachment anxiety (as measured by the PAM) associated with hyperactivating emotion regulation [difficulties engaging in goal-directed behaviour, impulse control difficulties, and limited access to effective emotion regulation strategies (as measured by the DERS)]?

**RQ2:** Is attachment avoidance (as measured by the PAM), associated with deactivating emotion regulation strategies [non-acceptance of emotions, lack of emotional awareness, and lack of emotional clarity (as measured by the DERS)] and suppression (as measured by the ERQ)?

## **Method**

### **Design**

We used a cross-sectional design, collecting data at one time point in line with previous research in this area (e.g. Ascone *et al.*, 2020). Cross-sectional analysis is justified by the theoretical rationale for the temporal ordering of the variables (Fairchild and McDaniel, 2017), as outlined above (i.e. enduring trait attachment predicts current emotion regulation and paranoia, and emotion regulation predicts paranoia). The predictor variable (attachment) is assumed to develop in childhood and remain broadly consistent over time, with the PAM found to be stable in individuals with psychosis (Berry *et al.*, 2008).

### **Participants**

We recruited individuals with elevated levels of paranoia across a broad spectrum of symptom severity and diagnostic status. Participants were recruited from NHS outpatient settings as well as community settings (e.g. voluntary charities and online support groups for people with psychosis). Recruiting participants from both NHS and community settings is in line with the continuum model of psychosis (Johns and van Os, 2001), and with previous research exploring mediating mechanisms between attachment style and psychosis, and allows for comparison across studies (e.g. Ascone *et al.*, 2020; Pilton *et al.*, 2016; Scott *et al.*, 2020; Wickham *et al.*, 2015).

Inclusion criteria were that participants were over 18 years of age, were fluent in English language (as questionnaires are written and standardised in English), had capacity to give informed consent, and experienced paranoia at the time of the study. Experience of paranoia was assessed using the R-GPTS (Freeman *et al.*, 2019), screening for individuals scoring in at least the elevated range on either subscale (Reference >9; Persecution >4).

### Procedure

The study protocol was pre-registered in July 2020 on OSF Registries ([osf.io/5emjf](https://osf.io/5emjf)). Early Intervention for Psychosis services (EIP) and Community Mental Health Teams (CMHT) in the South of England were contacted and provided with the study information. Clinicians were asked to review their caseloads to identify and approach potentially eligible participants for initial consent. The first author then contacted potential participants to discuss the study. The study adhered to NHS guidelines for COVID-19 secure contact (via telephone or face-to-face). An online version of the study was advertised to relevant support networks (e.g. National Paranoia Network, Mind Charities, Intervoice) for community participants who accessed the study remotely.

After reading an information sheet and providing informed consent, all participants completed the questionnaires in the following order: R-GPTS, PAM, DERS, ERQ, and were then debriefed. Participants recruited from the community were offered the opportunity to be entered into a draw to win one of three £50 Amazon vouchers. Participants recruited from the NHS received a reimbursement of £10 (either cash or voucher) for their time and any incurred travel expenses.

### Measures

#### *Demographic questionnaire*

This self-report measure gathered information on age, gender, ethnicity, time since onset of paranoia, and any formal mental health diagnoses received.

#### *Paranoia*

The R-GPTS (Freeman *et al.*, 2019) is a self-report measure of paranoia. The scale consists of 16 items; eight items measure ideas of social reference and ten items measure persecutory ideation. Each item is rated on a 5-point Likert scale from 1 (not at all) to 4 (totally), and scores can be summed to yield two subscales or a total score. Higher scores reflect higher levels of paranoia. The scale has excellent reliability ( $\alpha > .90$ ; Freeman *et al.*, 2019). Internal consistency for the current sample was also excellent ( $\alpha = .91$ ).

#### *Attachment*

The PAM (Berry *et al.*, 2006) is a 16-item self-report questionnaire assessing trait attachment anxiety and attachment avoidance. Each item is rated on a 4-point Likert scale from 0 (not at all) to 3 (very much). Each dimension yields a total score, with higher scores reflecting greater attachment anxiety and attachment avoidance. In a population of individuals with psychosis, internal consistency was good for anxiety ( $\alpha = .82$ ) and acceptable for avoidance ( $\alpha = .76$ ; Berry *et al.*, 2008). Internal consistency for the current sample was good for both attachment anxiety ( $\alpha = .81$ ) and attachment avoidance ( $\alpha = .83$ ).

#### *Emotion regulation*

The DERS (Gratz and Roemer, 2004) is a 36-item self-report questionnaire assessing trait emotion regulation strategies. The measure yields a global score and six subscale scores: difficulties engaging in goal directed behaviour when upset, impulse control difficulties, limited access to effective emotion regulation strategies, non-acceptance of emotional responses, lack of emotional awareness, and lack of emotional clarity. We grouped the first three strategies as 'hyperactivating', as these function to increase emotional arousal, and the latter three strategies as 'deactivating', as these function to decrease emotional arousal (cf. Mikulincer *et al.*, 2003). Individuals score items on a 5-point Likert scale from 1 (almost never) to 5 (almost always), with higher scores reflecting greater difficulties with emotion regulation. Internal consistency

of the DERS is excellent ( $\alpha = .93$ ), with individual subscales all rated as good or above ( $\alpha > .80$ ; Gratz and Roemer, 2004). In the current sample, internal consistency of the total scale was excellent ( $\alpha = .96$ ). All individual subscales rated as good or above ( $\alpha > .83$ ), with the exception of emotional awareness which was acceptable ( $\alpha = .71$ ).

The ERQ (Gross and John, 2003) is a self-report trait measure of cognitive reappraisal and expressive suppression. We used the 4-item expressive suppression subscale. Individuals score items on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The expressive suppression scale has acceptable internal consistency ( $\alpha = .73$ ; Gross and John, 2003). In the current sample internal consistency was also acceptable ( $\alpha = .77$ ).

### **Statistical analyses**

Microsoft Excel was used to collate data and SPSS 26 for Windows was used for data analysis. There were four occurrences of missing data by four different participants. As there was only one item rating missing for each participant, these were assigned based on the average of scores in the relevant subscale (Tabachnick and Fidell, 2013).

Mediation analyses were conducted using PROCESS (Model 4; Hayes, 2018). Differences in categorical demographic data (gender, recruitment pathway, self-reported diagnosis) on the dependent variable (R-GPTS) were explored using independent *t*-tests/one-way ANOVAs. Following protocols in previous research in the area (Hugill *et al.*, 2017), demographic variables with significant differences in levels of paranoia were controlled for in separate mediation analyses, and compared with the models which did not control for covariates. Exploratory research questions were examined using correlational analyses.

## **Results**

### **Sample characteristics**

Seventy-one participants completed the study. A total of 62 participants scored on or above the elevated cut-off on the R-GPTS and were therefore included in the analyses. Of the total, 42 were recruited from community settings, and 20 were recruited from clinical settings. Demographic data for the included participants are presented in Table 1, which also shows that our sample reported levels of paranoia comparable to, or more severe than, previous studies recruiting clinical samples.

We found significant differences in level of paranoia (R-GPTS) by gender ( $t_{60} = 2.05, p = .04$ ) and recruitment pathway ( $t_{60} = 3.69, p < .001$ ). Females scored higher than men, and participants recruited from the community scored higher than those recruited from the NHS. We therefore conducted mediation analyses which controlled for gender and recruitment pathway, and compared this with the initial mediation analyses. No significant differences were found in level of paranoia by self-reported diagnosis status ( $F_{2,59} = 3.07, p = .05$ ). Age and years of suspicious thinking did not correlate with level of paranoia (R-GPTS).

### **Mediation analyses**

Mediation analyses were conducted to determine if emotion dysregulation mediated the relationship between attachment style and paranoia. Sample size was initially estimated using Kline's (2015) model of 20 participants per parameter, yielding a required sample of 60 participants. Additionally, power for the indirect effect of each model was determined *post-hoc* using Monte Carlo simulations (10,000 replications and 20,000 draws), as recommended by Schoemann *et al.*, (2017). The R application ([https://schoemanna.shinyapps.io/mc\\_power\\_med/](https://schoemanna.shinyapps.io/mc_power_med/); Schoemann *et al.*, 2017) revealed that a sample size of 62 was sufficient to achieve the conventional desired power level of .80 (Schoemann *et al.*, 2017) in mediation models 1 and 2. A sample size of 62 yielded .85 power for model 1 and .95 power for model 2. However, model

**Table 1.** Demographic data and descriptive statistics ( $n = 62$ )

Variable	Descriptive statistic	Comparison figure
Gender: $n$ (%)		
Female	35 (56.5)	
Male	27 (43.5)	
Age of participant in years: mean ( $SD$ ), range	37.02 (12.71), 18–62	
Ethnicity: $n$ (%)		
White British	50 (80.65)	
Asian	4 (6.45)	
White American	2 (3.23)	
White and Black mixed background	2 (3.23)	
White other background	2 (3.23)	
Any other mixed background	2 (3.23)	
Suspicious thinking in years: mean ( $SD$ ), range	15.77 (13.66), 1–50	
Self-reported mental health diagnosis: $n$ (%)		
Yes	43 (69.35)	
No	15 (24.19)	
Not sure	4 (6.45)	
Self-reported diagnosis type: $n$ (%)		
Depression	14 (20.97)	
Anxiety	13 (17.74)	
Schizophrenia	10 (16.13)	
Emotionally unstable personality disorder	8 (12.90)	
Psychosis	5 (8.06)	
Post-traumatic stress disorder	5 (8.06)	
Bipolar	3 (4.84)	
Delusional disorder	1 (1.61)	
Attachment disorder	1 (1.61)	
Attachment anxiety – PAM: mean ( $SD$ )	14.53 (5.61)	10.9 (6.5) <sup>a</sup>
Attachment avoidance – PAM: mean ( $SD$ )	14.37 (5.59)	15.2 (5.2) <sup>a</sup>
Paranoia – Persecution R-GPTS: mean ( $SD$ )	20.66 (9.87)	13.7 (13.0) <sup>b</sup>
Paranoia – Social Reference R-GPTS: mean ( $SD$ )	18.11 (7.67)	15.8 (7.42) <sup>b</sup>
Paranoia – Total R-GPTS: mean ( $SD$ )	38.76 (15.80)	—
Emotion dysregulation: DERS, mean ( $SD$ )	110.74 (30.74)	101.7 (26.8) <sup>c</sup>
Emotion suppression: ERQ, mean ( $SD$ )	4.12 (1.48)	4.09 (1.42) <sup>d</sup>

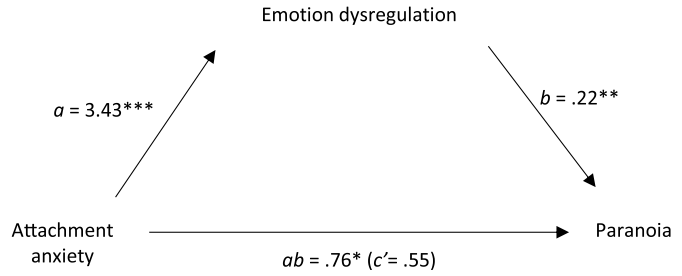
<sup>a</sup>44 adults with voices recruited from community settings, most had contact with mental health services (Robson and Mason, 2015). <sup>b</sup>1804 adults with psychotic disorder recruited from clinical settings (Freeman *et al.*, 2019). Score ranges for R-GPTS Persecution: average (0–4), elevated (5–10), moderately severe (11–17), severe (18–27), very severe (28+). Cut-offs for Persecution: 11 = clinical persecutory ideation, 18 = persecutory delusion. Score ranges for R-GPTS Social Reference: average (0–9), elevated (10–15), moderately severe (16–20), severe (21–24), very severe (25+). <sup>c</sup>592 adults with mental health difficulties recruited from clinical settings (Fowler *et al.*, 2016). <sup>d</sup>44 adults with schizophrenia recruited from clinical and community settings (Kimhy *et al.*, 2012).

3 was significantly under-powered, with a sample size of 62 yielding .14 power. To achieve .80 power in model 3, a sample size of 825 is required.

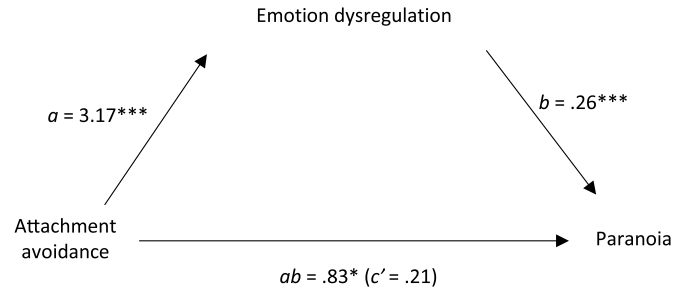
Mediation is considered significant if the 95% confidence interval does not cross the zero value (Hayes, 2018). The percentile bootstrap CI is the recommended method for inferring indirect effects as it balances validity and power considerations (Hayes, 2018).

For model 1, as expected, the total effect of attachment anxiety on paranoia was positive and significant;  $c = 1.31$ ,  $SE = .32$ , 95% CI [.66, 1.95]. When accounting for the mediator (emotional dysregulation) there was no longer a significant relationship between attachment anxiety and paranoia,  $c' = .55$ ,  $SE = .39$ , 95% CI [–.22, 1.32]. There was a significant positive relationship between attachment anxiety and emotion dysregulation,  $a = 3.43$ ,  $SE = .55$ , 95% CI [2.32, 4.53], and between emotion dysregulation and paranoia,  $b = .22$ ,  $SE = .07$ , 95% CI [.08, .36]. In line with the hypothesis, the indirect effect was significant, suggesting that emotional dysregulation mediates the relationship between attachment anxiety and paranoia  $ab = .76$ ,  $\beta = .27$ , bootstrapped  $SE = .29$ , bootstrapped 95% CI [.22, 1.37]; see Fig. 1. Those scoring higher on attachment anxiety had increased emotional dysregulation, which predicted greater

**Figure 1.** Mediation model testing if emotion dysregulation mediates the relationship between attachment anxiety and paranoia. Path coefficients are unstandardised regression coefficients. The value in parentheses is the direct effect ( $c'$ ) of attachment anxiety on paranoia. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .



**Figure 2.** Mediation model testing if emotion dysregulation mediates the relationships between attachment avoidance and paranoia. Path coefficients are unstandardised regression coefficients. The value in parentheses is the direct effect ( $c'$ ) of attachment avoidance on paranoia. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .



paranoia. Overall, attachment anxiety and emotional dysregulation explained 33% of variance in levels of paranoia.

For model 2, as expected, the total effect of attachment avoidance on paranoia was positive and significant,  $c = 1.04$ ,  $SE = .34$ , 95% CI [.36, 1.72]. When accounting for the mediator (emotional dysregulation) there was no longer a significant relationship between attachment avoidance and paranoia,  $c' = .21$ ,  $SE = .37$ , 95% CI [-.54, .96]. There was a significant positive relationship between attachment avoidance and emotion dysregulation,  $a = 3.17$ ,  $SE = .58$ , 95% CI [2.01, 4.33], and between emotion dysregulation and paranoia,  $b = .26$ ,  $SE = .07$ , 95% CI [.13, .40]. In line with the hypothesis, the indirect effect was significant, suggesting that emotional dysregulation mediates the relationship between attachment anxiety and paranoia,  $ab = .83$ ,  $\beta = .29$ , bootstrapped  $SE = .26$ , bootstrapped 95% CI [.35, 1.39]; see Fig. 2. Those scoring higher on attachment avoidance had increased emotional dysregulation, which predicted more paranoia. Overall, attachment avoidance and emotional dysregulation explained 31% of variance in levels of paranoia.

For model 3, the total effect of attachment avoidance on paranoia was positive and significant,  $c = 1.04$ ,  $SE = .34$ , 95% CI [.36, 1.72]. When accounting for the mediator (emotional suppression) there was no longer a significant relationship between attachment avoidance and paranoia,  $c' = .80$ ,  $SE = .47$ , 95% CI [-.14, 1.74]. There was a significant positive relationship between attachment avoidance and emotional suppression,  $a = .18$ ,  $SE = .02$ , 95% CI [.13, .23]. There was no significant relationship between emotional suppression and paranoia,  $b = 1.30$ ,  $SE = 1.77$ , 95% CI [-2.24, 4.84]. Contrary to prediction, the indirect effect was not significant, suggesting that emotional suppression does not mediate the relationship between attachment avoidance and paranoia,  $ab = .24$ ,  $\beta = .08$ , bootstrapped  $SE = .34$ , bootstrapped 95% CI [-.41, .96]; see Fig. 3. Overall, attachment avoidance and emotional suppression explained 14% of variance in levels of paranoia.

Significant mediation models were re-tested controlling for the demographic variables found to exert effects on levels of paranoia (gender and recruitment pathway). Results differed minimally from those already reported. Indirect effects on paranoia remained significant for attachment anxiety  $ab = .66$ ,  $\beta = .23$ , bootstrapped  $SE = .24$ , bootstrapped 95% CI [.22, 1.15] and attachment avoidance  $ab = .62$ ,  $\beta = .22$ , bootstrapped  $SE = .23$ , bootstrapped 95% CI [.19, 1.13].

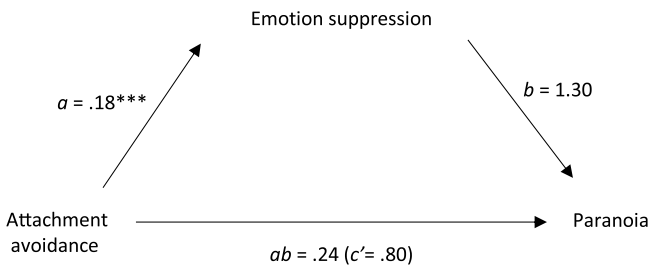


**Table 2.** Correlation matrix for attachment anxiety and emotion regulation (Pearson's  $r$ )

Variable	1	2	3	4	5
1. Attachment anxiety	—	.43***	.55***	.54***	.46***
2. Difficulties engaging with goals	—	—	.44***	.62***	.42***
3. Impulse	—	—	—	.72***	.46***
4. Lack of strategies	—	—	—	—	.48***
5. Paranoia	—	—	—	—	—

\*\*\* $p < .001$ .**Table 3.** Correlation matrix for attachment avoidance and emotion regulation (Pearson's  $r$ )

Variable	1	2	3	4	5	6
1. Attachment avoidance	—	.54***	.39**	.47***	.69***	.37**
2. Non-acceptance	—	—	.34**	.66***	.39**	.57***
3. Lack of awareness	—	—	—	.54***	.43***	.27*
4. Lack of clarity	—	—	—	—	.32*	.38**
5. Suppression	—	—	—	—	—	.32*
6. Paranoia	—	—	—	—	—	—

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .**Figure 3.** Mediation model testing if emotion suppression mediates the relationships between attachment avoidance and paranoia. Path coefficients are unstandardised regression coefficients. The value in parentheses is the direct effect ( $c'$ ) of attachment avoidance on paranoia. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

The variance accounted for in paranoia increased to 38% in both models, when covariates were added.

### Exploratory analyses

Table 2 gives the correlation coefficients between attachment anxiety, hyperactivating emotion regulation measures, and paranoia. In line with RQ1, there was a positive association between attachment anxiety and these strategies (difficulties engaging in goal-directed behaviours when upset, impulse control difficulties, and lack of access to emotion regulation strategies). These strategies also correlated with level of paranoia.

Table 3 gives the correlation coefficients between attachment avoidance, deactivating emotion regulation measures, and paranoia. In line with RQ2, there was a positive association between attachment avoidance and these strategies (emotional non-acceptance, lack of emotional awareness, lack of emotional clarity, and emotional suppression). These strategies also correlated with level of paranoia.

## Discussion

The positive associations between variables, and results of the mediation analyses, support theoretical assumptions about the role of emotion regulation in the relationship between attachment style and paranoia. Our results suggest that emotion dysregulation mediates the relationship between attachment anxiety and paranoia, and between attachment avoidance and paranoia in those with elevated levels of paranoia.

Level of paranoia in the current sample was comparable to clinical groups – in the moderately-severe to severe ranges, and above the clinical cut-off for persecutory delusions, on average (see Table 1). Our results support theories which suggest that emotion dysregulation contributes to the maintenance of paranoia (Freeman and Garety, 2014; Freeman *et al.*, 2002), and builds on these by showing that attachment style affects emotion dysregulation and therefore severity of paranoia (cf. Mikulincer and Shaver, 2012). These results are in line with previous research showing that attachment impacts emotion regulation (e.g. Owens *et al.*, 2013) and paranoia (Murphy *et al.*, 2020), and emotion regulation impacts paranoia (e.g. Lincoln *et al.*, 2018). In addition, it contributes to the growing evidence that emotion regulation mediates this attachment and paranoia relationship (Ascone *et al.*, 2020; Castilho *et al.*, 2017; Jones, 2015; Udachina and Bentall, 2014) and addressed some of the limitations of this past research by using strong data analysis, controlling for confounders, and employing *a priori* analyses.

Our findings suggest that emotion regulation may be a valuable target in CBT for psychosis characterised by paranoia. Emotion regulation is not currently targeted in recommended CBT interventions (Morrison and Barratt, 2010), and attention to emotion regulation may improve the currently modest outcomes for CBT for psychosis (Laws *et al.*, 2018). Indeed, preliminary research has shown that emotion regulation skills training is an effective intervention for reducing paranoia (Silva *et al.*, 2020). This adds to the growing evidence that CBT interventions targeting specific maintenance factors associated with particular symptoms, such as paranoia, are likely to improve clinical outcomes for people with psychosis (e.g. Freeman *et al.*, 2015).

Despite being correlated with both variables, emotion suppression did not mediate the relationship between attachment avoidance and paranoia. Previous research indicates that individuals with an avoidant attachment often use emotion suppression (Mikulincer and Shaver, 2019), and that emotion suppression increases paranoia (Nittel *et al.*, 2018). This mediation model was significantly under-powered (Schoemann *et al.*, 2017), which increases the likelihood of a Type II error. The lack of power in this model was partly due to the small relationship between the mediator (suppression) and dependent variable (paranoia), which conflicts with previous research finding a strong relationship between these variables (e.g. Nittel *et al.*, 2018). It may also be that the diagnostic heterogeneity of the sample reduced the emotional suppression–paranoia relationship. Additionally, the suppression measure (ERQ) used in the current study consists of several negatively worded questions, which can cause participant confusion (Johnson *et al.*, 2004; Patten, 1998).

Attachment avoidance correlated with deactivating emotion regulation strategies and attachment anxiety correlated with hyperactivating emotion regulation strategies. This is in line with previous research (Mikulincer and Shaver, 2007; Owens *et al.*, 2013). These dysfunctional emotion regulation strategies correlated with paranoia, which again corroborates previous findings which suggest that dysfunctional emotion regulation increases level of paranoia (e.g. Westermann and Lincoln, 2011; Westermann *et al.*, 2013). It may be that specific strategies are involved in mediating the relationship between the different attachment styles and paranoia – that hyperactivating emotion regulation mediates the relationship between attachment anxiety and paranoia, and deactivating emotion regulation mediates the relationship between attachment avoidance and paranoia. This now needs to be examined.

### Limitations

The results should be considered within the study's limitations. The study was cross-sectional, which limits the degree to which causal inferences can be made, although there is a strong theoretical basis for the temporal ordering of the variables (Fairchild and McDaniel, 2017). While relevant measured variables were controlled for (i.e. gender and recruitment pathway), there are likely to have been other potential confounding variables which were not measured, for example prescribed medication which can be used as an emotion regulation strategy. Such variables may have had an influence on observed effects.

While our sample had a reasonable balance of gender and wide age range, participants were majority White British (80.65%), limiting the generalisability of the results. Furthermore, the sample was self-selecting and participants may not therefore be representative of the target population.

Mediation model 3 was significantly under-powered and used a questionnaire with negatively worded questions which may have caused confusion.

### Future research and clinical implications

Future research should first examine the role of emotion regulation in the attachment–paranoia relationship using longitudinal or experimental designs, to determine causality. These studies should use *a priori* analyses to explore if hyperactivating emotion regulation strategies mediate the attachment anxiety–paranoia relationship, and if deactivating emotion regulation strategies mediate the attachment avoidance–paranoia relationship, as these have been explored *post-hoc* in the current study.

Following longitudinal/experimental studies, intervention studies are needed to explore the impact of emotion regulation skills training for individuals with paranoia, and specifically, whether those high in attachment anxiety benefit from emotion regulation skills training to reduce hyperactivating strategies (i.e. develop strategies to reduce emotional arousal and impulsivity), and whether those high in attachment avoidance benefit from emotion regulation skills training to reduce deactivating strategies (i.e. gain awareness and acceptance of emotions).

In terms of clinical implications, routine assessment of individuals' trait attachment style and emotion regulation strategies would help guide formulation and treatment planning in cognitive behavioural therapy for psychosis (cf. Berry *et al.*, 2008; Gumley *et al.*, 2014; Korver-Nieberg *et al.*, 2014; Ludwig *et al.*, 2019). People with attachment anxiety are likely to benefit from skills to reduce emotional arousal, whereas those with attachment avoidance are likely to benefit from skills to articulate and express emotional arousal.

### Conclusions

Our study found that emotion regulation mediates the relationship between insecure attachment (anxiety/avoidance) and paranoia in a sample with clinical levels of paranoia. Our results show that hyperactivating emotion regulation is associated with attachment anxiety and paranoia, and deactivating emotion regulation is associated with attachment avoidance and paranoia. Research should now investigate causality and if attachment-based emotion regulation interventions are effective in reducing elevated levels of paranoia.

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**Data availability statement.** The data that support the findings of this study are available from the corresponding author (O.P.), upon reasonable request.

**Author contributions.** **Olivia Partridge:** Conceptualization (equal), Data curation (lead), Formal analysis (lead), Investigation (equal), Methodology (equal), Project administration (equal), Resources (equal), Software (equal), Validation (equal), Visualization (equal), Writing – original draft (lead), Writing – review & editing (equal). **Tess Maguire:** Conceptualization (equal), Investigation (equal), Methodology (equal), Project administration (equal), Resources (equal), Software (equal), Supervision (equal), Validation (equal), Visualization (equal), Writing – review & editing (equal). **Katherine NewmanTaylor:** Conceptualization (equal), Investigation (equal), Methodology (equal), Project administration (equal), Resources (equal), Software (equal), Supervision (lead), Validation (equal), Visualization (equal), Writing – review & editing (lead).

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