How does attachment imagery for paranoia work? Cognitive fusion and beliefs about self and others mediate the impact on paranoia and anxiety

Monica Sood* , Katherine Carnelley and
Katherine Newman-Taylor

School of Psychology, University of Southampton, UK

Objectives. Paranoia describes unfounded and distressing interpersonal threat beliefs. Secure attachment imagery has been shown to attenuate paranoia and anxiety in non-clinical and clinical groups, but little is known about the differential effects of anxious and avoidant imagery or mechanisms of change. In this study, we tested the impact of secure, anxious, and avoidant attachment imagery on paranoia, anxiety, and help-seeking intentions. We also examined hypothesized mechanisms of change, specifically whether cognitive fusion and negative self- and other-beliefs mediate these relationships.

Design. This study utilized an experimental, cross-sectional design.

Methods. A large ($N = 303$), international general population sample with high levels of non-clinical paranoia completed a series of measures before and after engaging in secure, anxious, or avoidant imagery.

Results. Relative to anxious and avoidant attachment imagery, secure attachment imagery reduced paranoia and anxiety and increased help-seeking intentions. Cognitive fusion and negative self- and other-beliefs mediated the impact of attachment imagery on paranoia and anxiety, but not help-seeking.

Conclusions. In line with attachment and cognitive theory, secure attachment imagery is effective in reducing paranoia and anxiety and works by reducing cognitive fusion and negative self- and other-beliefs. These novel findings suggest that the secure imagery task could be incorporated into cognitive and behavioural therapies to reduce distressing interpersonal threat beliefs and associated negative affect, and increase help-seeking intentions.

Practitioner points

- When working with people experiencing paranoia, secure attachment imagery may be effective in reducing state paranoia and anxiety and improving help-seeking intentions.
- Attachment imagery works by influencing beliefs about self and others, and the degree to which people are fused with their beliefs. In clinical practice, the rationale for the imagery task fits well with

*Correspondence should be addressed to Monica Sood, School of Psychology, University of Southampton, University Road, Southampton, UK SO17 1BJ (email: ms13g14@soton.ac.uk).

psychological models of paranoia and the secure imagery task can be introduced as a way to cope when struggling with distressing beliefs about self and others, and feeling overwhelmed by these fears.

Psychosis describes diagnoses (e.g., schizophrenia) and psychotic-type experiences (e.g., paranoia) that can be observed in clinical and non-clinical populations (Berry, Bucci, & Danquah, 2020). Cognitive behavioural therapy (CBT) is a recommended psychological treatment for schizophrenia; however, systematic reviews have found only small symptom reductions (Jauhar et al., 2014), modest improvement in clinical and recovery outcomes (Jones et al., 2018), and equivocal long-term benefits (Laws, Darlington, Kondel, McKenna, & Jauhar, 2018).

Targeting individual symptoms (e.g., paranoia) may improve outcomes. Paranoia describes unfounded interpersonal threat beliefs (Freeman et al., 2005). Clinical paranoia typically describes enduring persecutory delusions, whereas non-clinical paranoia typically describes transient suspicious thoughts. Researchers agree that clinical and non-clinical paranoia exist on a continuum, and both are associated with distress (Freeman et al., 2005). Researchers have proposed that clinical paranoia develops from mechanisms associated with non-clinical paranoia, such as worry (van Os, Hanssen, Bijl, & Ravelli, 2000). Isolating these mechanisms will inform targeted psychological interventions for paranoia.

Paranoia and anxiety are closely associated. Threat appraisals are likely to elicit anxiety, and anxiety can lead to unfounded and implausible ideas that increase the likelihood of threatening interpretations and safety behaviours, which then maintain paranoia (Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002).

Attachment theory proposes that the availability and responsiveness of early attachment figures shape individuals' *internal working models* (Bowlby, 1969) that influence perceptions of interactions and operate as templates for future relationships (Collins & Read, 1994). Working models underlie *attachment styles,* which influence interpersonal cognitions, affect, and behaviour and lie on two orthogonal dimensions: *anxiety* about abandonment and *avoidance* of intimacy (Brennan, Clark, & Shaver, 1998).

Attachment-anxious individuals fear abandonment, exaggerate distress to gain attention from inconsistent caregivers, and believe themselves incapable of autonomously managing distress (Mikulincer & Shaver, 2016). They typically become overdependent on others and persistently seek reassurance. Attachment-avoidant individuals suppress distress, are compulsively self-reliant in times of need due to undependable or rejecting caregivers, and are uncomfortable with proximity (Mikulincer & Shaver, 2016). They withdraw from relationships to avoid intimacy. Individuals low on anxiety and avoidance (secure attachment) feel safe and secure in relationships, trust that others will be available and responsive when needed, and are confident in their ability to manage distress (Mikulincer & Shaver, 2016).

Attachment anxiety and avoidance are associated with clinical and non-clinical paranoia (Murphy, Goodall, & Woodrow, 2020). Attachment imagery (Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996; Carnelley & Rowe, 2007) has been used to investigate whether it is possible to effect change in state paranoia. When people with high non-clinical paranoia are primed to feel secure and trusting of others, their paranoia and anxiety decrease, whereas when primed to feel suspicious and untrusting of others, paranoia and anxiety increase (Bullock, Newman-Taylor, & Stopa, 2016; Newman-Taylor, Kemp, Potter, & Au-Yeung, 2017; Sood & Newman-Taylor, 2020). Similarly, case studies of people with schizophrenia demonstrate that security priming decreases paranoia and negative affect (Pitfield, Maguire, & Newman-Taylor, 2020). Attachment styles may

therefore inform our understanding of the development and maintenance of paranoia, and attachment priming may augment psychological therapies.

Attachment style also has implications for help-seeking. Secure individuals typically seek help because they have learned that others will respond when needed and that they are worthy of love (Simpson, Rholes, & Nelligan, 1992). Avoidant individuals do not typically seek help because they view others as unavailable and unresponsive (Dewitte, Houwer, Buysse, & Koster, 2008; Vogel & Wei, 2005). Findings for attachment-anxious individuals are inconsistent. Some evidence suggests that they are more likely to seek help than their attachment-avoidant counterparts due to their intense desire for security and protection (Dewitte et al., 2008; Vogel & Wei, 2005). Other evidence suggests that they perceive others as unsupportive and thus do not seek help (Rholes, Simpson, Campbell, & Grich, 2001). Attachment-anxious individuals' fear of rejection may make them hesitant to seek help directly and instead use indirect methods, such as exaggerating sad facial expressions (Mikulincer & Shaver, 2016). Conflicting beliefs regarding the need for protection and fear of rejection may explain these contradictory findings.

People with paranoia tend not to seek help when distressed (Bird, Waite, Rowsell, Fergusson, & Freeman, 2017; Harper & Timmons, 2019), use more avoidant coping strategies, and have negative attitudes towards expressing emotions (Melo & Bentall, 2010). Poor help-seeking partly accounts for longer duration of untreated psychosis (Birchwood et al., 2013), which is associated with poorer clinical outcomes and reduced remission (Crumlish et al., 2009).

Help-seeking in psychosis is typically examined by measuring service engagement (a person's availability for appointments, collaborative responsibility for managing difficulties, help-seeking, and treatment adherence [Tait, Birchwood, & Trower, 2002]). Secure individuals with psychosis are more engaged than avoidant individuals (Tait, Birchwood, & Trower, 2004), but findings for attachment-anxious individuals are inconsistent. Dozier (1990) found that attachment-anxious individuals sought more help than attachment-avoidant individuals. MacBeth, Gumley, Schwannauer, and Fisher (2011) found no differences in engagement between anxious and avoidant individuals, but secure individuals were more engaged than avoidant individuals. Other studies have failed to replicate these effects (Kvrgic et al., 2011; Macinnes, Macpherson, Austin, & Schwannauer, 2016). Overall, the research suggests that attachment styles influence the likelihood of help-seeking in those with psychosis.

No studies have examined the implications of attachment for help-seeking in paranoia. This is important so that services can adapt engagement efforts to increase the likelihood that individuals will accept and collaborate with treatment. Based on the evidence in psychosis samples, people with paranoia would be less likely to seek help if avoidantly attached, more likely to seek help if securely attached, and possibly more likely to seek help if anxiously attached.

Given that CBT for psychosis yields modest outcomes, and with the move to symptom-specific interventions, isolating the psychological mechanisms involved in the development and maintenance of paranoia would inform targeted paranoia interventions. Candidate mechanisms include negative self- and other-beliefs and cognitive fusion.

Evidence suggests that negative self-beliefs mediate the relationship between anxious and avoidant attachment and paranoia in non-clinical (Pickering, Simpson, & Bentall, 2008) and clinical (Wickham, Sitko, & Bentall, 2014) groups. However, this research relies on measured (rather than manipulated) variables which precludes causal inferences.

Methods involving the manipulation of attachment (e.g., priming) would demonstrate that attachment styles *cause* changes in paranoia. Although attachment anxiety is reliably associated with negative self-beliefs and attachment avoidance with negative other-beliefs (Bartholomew & Horowitz, 1991), studies have not examined the mediatory role of negative other-beliefs in the attachment–paranoia relationship.

Cognitive fusion describes the ability to distance oneself from one's thoughts, letting these transient internal events come and go, rather than becoming entangled in them (Gillanders et al., 2014). People with paranoia struggle to defuse from negative thoughts, which exacerbates distress (Newman-Taylor et al., 2020). Similarly, attachment-anxious individuals experience difficulty stepping back from negative cognitions, which increases negative affect (Fraley & Shaver, 1997). This suggests that cognitive fusion may mediate the relationship between attachment and paranoia. One study has examined this; Sood and Newman-Taylor (2020) found that cognitive fusion mediated the impact of attachment imagery (threat/insecure vs. secure) on paranoia and anxiety in individuals with high non-clinical paranoia. Relative to the threat/insecure group, the secure group was less fused with their thoughts and, therefore, less paranoid and anxious. This study requires replication.

In summary, people with psychosis, and/or paranoia specifically, experience heightened distress and paranoia due to negative self-beliefs and an inability to defuse from unhelpful cognitions. These problems are overrepresented in insecure individuals, suggesting that attachment could cause these problems. If we can confirm that attachment problems lead to paranoia and identify the mechanisms which exacerbate and mitigate paranoia, we can target these in psychological interventions.

Current study

We sought to examine whether priming secure, anxious, and avoidant attachment imagery influence paranoia and identify underlying cognitive mechanisms. We did this by randomly allocating participants to secure, anxious, or avoidant imagery. Given the associations between anxiety and paranoia, and help-seeking and paranoia, we included anxiety and help-seeking intentions as secondary outcomes.

Hypotheses:

1. Relative to anxious and avoidant attachment imagery, secure attachment imagery will reduce negative self- and other-beliefs, cognitive fusion, paranoia, and anxiety, and increase positive self- and other-beliefs and help-seeking intentions from pre-imagery (Time 1) to post-imagery (Time 2).
2. At Time 2, relative to the anxious and avoidant imagery groups, the secure imagery group will have fewer negative self- and other-beliefs, less cognitive fusion, paranoia, and anxiety, and more positive self- and other-beliefs and help-seeking intentions.
3. At Time 2, relative to the anxious imagery group, the avoidant group will be less likely to seek help.
4. Negative self- and other-beliefs and cognitive fusion will mediate the relationship between imagery (avoidant vs. secure; anxious vs. secure) and (a) paranoia, (b) anxiety, and (c) help-seeking. Specifically, relative to anxious and avoidant imagery, secure imagery will (a) decrease paranoia, (b) decrease anxiety, and (c) increase help-seeking intentions via decreased negative self- and other-beliefs and cognitive fusion.

Method

The study was pre-registered (https://osf.io/86u5j/?view_only=425aedb98068479d8a 82e381c3d5fe48).

Participants

We recruited a general population sample of adults with high non-clinical paranoia. Participants scoring at or above 53 (1*SD* above the original sample mean) on the Paranoia Scale (Fenigstein & Vanable, 1992) were eligible; we used this cut-off following key research (e.g., Bullock et al., 2016) to allow cross-study comparisons. A total of 902 participants completed the screening, 390 were eligible, and 321 completed the study. Participants with more than 5% missing data were excluded ($n = 9$); mean replacement was used when less than 5% of data were missing (Tabachnick & Fidell, 2013). Three participants completed the study twice, two reported distractions, and four did not finish in the requested time-frame. The final sample comprised 303 participants (182 males, 2 non-binary, and 2 did not report), aged 18–65 years ($M = 26.24$, $SD = 8.30$). Most identified as White (80.2%).

The sample size was justified by an *a priori* G*Power analysis and path model guidelines. For ANOVA, to obtain .95 power and detect a medium effect of .25 at $p = 0.05$ with three groups, 252 participants are required. For mediation, Kline (2005) recommends 20 participants per parameter (we have 27).

Self-report measures

The Paranoia Scale (PS) measures trait subclinical paranoia (Fenigstein & Vanable, 1992). Twenty items ($\alpha = .70$) were rated on a 5-point scale from 1 (*not at all applicable to me*) to 5 (*extremely applicable to me*)[1].

The Experiences in Close Relationships Short-Form (ECR-12) comprises two subscales (6 items each) assessing attachment anxiety ($\alpha = .81$) and avoidance ($\alpha = .79$) in close relationships (Lafontaine et al., 2016)[2]. Participants rated items on a 7-point scale from 1 (*disagree strongly*) to 7 (*agree strongly*).

The State and Trait Anxiety Inventory (STAI) measures trait and state anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The trait subscale comprises 20 items ($\alpha = .90$); participants rated the frequency of items on a 4-point scale from 1 (*almost never*) to 4 (*almost always*). We used a 6-item version of the state subscale (Marteau & Bekker, 1992): Time 1 ($\alpha = .80$) and Time 2 ($\alpha = .89$). Participants rated the frequency of state items on a slider from 1 (*not at all*) to 4 (*very much*).

The trait (Gillanders et al., 2014) and state (Bolderston et al., 2019) Cognitive Fusion Questionnaires (CFQs) each comprise seven items and measure the extent to which people are fused with their thoughts. Participants rated trait items ($\alpha = .91$) on a 7-point scale from 1 (*never true*) to 7 (*always true*), and state items (Time 1: $\alpha = .93$, Time 2: $\alpha = .94$) on a slider from 1 (*completely untrue*) to 7 (*completely true*).

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[1] *Cronbach's alphas reported in this section are for the current sample.*
[2] *Attachment anxiety and avoidance were also measured using the Psychosis Attachment Measure (Berry et al., 2006, 2008) to assess concurrent validity of this measure with the ECR, which will be reported separately.*

The Adapted Paranoia Checklist (APC) is a 5-item measure of state paranoia (Schlier, Moritz, & Lincoln, 2016): Time 1 (α = .75), Time 2 (α = .82). Participants rated items on a slider from 0 (*not at all*) to 10 (*very much*).

The Brief Core Schema Scales (BCSS) are four 6-item subscales assessing positive and negative self- and other-beliefs (Fowler et al., 2006). Instructions were adapted to reduce burden; participants rated items on a scale from 0 (*no, I do not hold this belief*) to 4 (*yes, I believe it totally*). Internal consistencies: trait negative-self (α = .89), positive-self (α = .87), negative-other (α = .90), positive-other (α = .90); state negative-self (Time 1: α = .86, Time 2: α = .91), positive-self (Time 1: α = .87, Time 2: α = .89), negative-other (Time 1: α = .90, Time 2: α = .93), and positive-other (Time 1: α = .89, Time 2: α = .93).

We developed a 3-item State Help-Seeking Measure (HSM-S), to measure current help-seeking intentions. Participants rated how likely they were to contact, talk to, or ask for help from someone if feeling upset right now, using a slider from 1 (*not at all*) to 5 (*extremely*): Time 1 (α = .89), Time 2 (α = .93).

Experimental manipulations

Attachment imagery

Imagery scripts (Bullock et al., 2016) were adapted to manipulate secure, anxious, and avoidant attachment (see Appendix S1). Participants were asked to recall a time when they were with another person and felt safe, secure, and trusting (secure), worried and uncomfortable that the other person did not like them and wanted to pull away (anxious), or nervous and uncomfortable when the other person tried to get too close (avoidant). Participants were prompted to recreate the situation as vividly as possible, focussing on all their senses.

Manipulation checks

Participants rated vividness of the image on a 10-point scale from 1 (*not at all*) to 10 (*very much*) and provided a percentage of time that the image was held in mind. They reported *felt security* (Luke, Sedikides, & Carnelley, 2012), and rated the first 6 items (α = .97) on a 6-point scale from 1 (*not at all*) to 6 (*very much*).

Fillers

An optical illusion and map reading task were used to hide the study objectives.

Procedure

General population participants accessed the study on social media and most (N = 296) completed the study through Prolific, a platform on which people participate for money. Students received credit for participation. Upon providing informed consent, participants reported demographics and trait measures of paranoia, attachment, cognitive fusion, anxiety, and positive and negative self- and other-beliefs.

Eligible participants were invited to complete Part 2 via email 4–7 days later. Participants were asked to switch off phones and verify that they were alone without distractions, otherwise they were told to exit the study. Those who proceeded to Part 2 provided their email address or Prolific ID and completed a filler item. They then

completed state measures of cognitive fusion, self- and other-beliefs, paranoia, anxiety, and help-seeking, after which the research platform automatically randomly assigned participants to listen to a 3-minute audio recording which primed secure, anxious, or avoidant attachment imagery. Subsequently, participants repeated the state measures, this time holding the attachment image in mind. Finally, participants completed the imagery manipulation checks, second filler, mood-repair, and were debriefed.

Results

Pre-manipulation between-group differences

Table 1 shows descriptive statistics. Differences between the secure, anxious, and avoidant groups were tested using one-way Analyses of Variance (ANOVA) and chi-square for gender. There were no differences in age, gender, trait attachment style, fusion, beliefs about self and others, paranoia, and anxiety, indicating that the groups were comparable on all demographic and trait measures (see Appendix S1).

ANOVA

We conducted mixed-model ANOVAs, with one between-subjects factor (3 levels, attachment imagery: secure, anxious, and avoidant) and one within-subjects factor (2 levels, pre- vs. post-imagery: Time 1 vs. Time 2), to test whether secure imagery (relative to anxious and avoidant imagery) reduces state paranoia, anxiety, negative self- and other-beliefs, and cognitive fusion, and increases help-seeking intentions and positive self- and other-beliefs. Simple effects tests with multiple comparisons and paired *t*-tests were conducted to explore between- and within-group differences. A Bonferroni-corrected *p*-value (α = .006 [0.05/8]) was used for ANOVA and post-hoc tests. There were no univariate outliers ($z > \pm 3.29$). All variables were normally distributed except for state negative self-beliefs, which was positively skewed at Time 1 (0.86) and 2 (1.01); square-root transformations were performed (new skewness statistics: -0.26 [Time 1] and -0.08 [Time 2]), and mixed-model ANOVAs and simple effects tests were conducted on the transformed variables.

Main effects are reported in Table 2. There were significant condition by time interactions for all DVs (Figure 1). Simple effects revealed that the three imagery conditions did not differ on any of the state measures at Time 1, though differed in paranoia, anxiety, help-seeking, cognitive fusion, negative other-beliefs, and positive self- and other-beliefs at Time 2 (Table 2). At Time 2, relative to the secure condition, the anxious and avoidant conditions reported higher levels of paranoia, anxiety, cognitive fusion, negative other-beliefs, and fewer positive self- and other-beliefs (Table 1); between-group differences on negative self-beliefs at Time 2 did not reach significance. Relative to the secure condition, the avoidant condition was less likely to seek help at Time 2; however, there was no difference in help-seeking between the secure and anxious conditions, and the anxious and avoidant conditions, at Time 2.

Paranoia, anxiety, and cognitive fusion decreased from pre- to post-imagery in the secure condition and increased over time in the anxious and avoidant conditions[3]. Negative self- and other-beliefs decreased over time in the secure condition. There was a trend towards negative self-beliefs increasing in the anxious and avoidant conditions

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[3] *Post-hoc paired t-test statistics are reported in the supplementary material.*

Table 1. Descriptive statistics for demographic, trait, and state measures in the secure, anxious, and avoidant imagery conditions

	Secure imagery (n = 106) M (SD)	Anxious imagery (n = 98) M (SD)	Avoidant imagery (n = 99) M (SD)
Age	26.25 (8.35)	26.18 (7.70)	26.16 (8.00)
Trait paranoia (PS)	64.94 (8.20)	64.17 (8.47)	64.44 (7.86)
Trait anxiety (STAI)	54.25 (9.36)	51.58 (10.14)	54.31 (9.55)
Trait cognitive fusion (CFQ)	33.32 (8.35)	32.12 (8.30)	33.47 (8.86)
Negative self-beliefs (BCSS)	7.70 (5.40)	8.06 (6.63)	7.04 (6.01)
Positive self-beliefs (BCSS)	10.19 (5.46)	10.90 (5.35)	10.02 (5.70)
Negative other-beliefs (BCSS)	9.42 (5.18)	9.92 (5.79)	8.90 (5.05)
Positive other-beliefs (BCSS)	9.11 (3.96)	9.21 (4.87)	9.29 (4.90)
Attachment anxiety (ECR)	4.85 (1.22)	4.60 (1.09)	4.66 (1.17)
Attachment avoidance (ECR)	4.16 (1.29)	4.19 (1.19)	4.23 (1.27)

	Secure imagery (n = 106) Time 1 M (SD)	Secure imagery (n = 106) Time 2 M (SD)	Anxious imagery (n = 98) Time 1 M (SD)	Anxious imagery (n = 98) Time 2 M (SD)	Avoidant imagery (n = 99) Time 1 M (SD)	Avoidant imagery (n = 99) Time 2 M (SD)
Paranoia (APC)	24.04 (8.29)	19.58 (10.28)	22.23 (9.70)	24.17 (10.82)	23.14 (10.31)	26.14 (11.15)
Anxiety (STAI)	14.26 (3.64)	11.98 (4.13)	13.80 (3.64)	15.59 (4.55)	14.46 (3.81)	16.62 (4.72)
Help-seeking (HSM-S)	2.40 (1.16)	2.89 (1.22)	2.47 (1.20)	2.37 (1.28)	2.55 (1.20)	2.26 (1.23)
Cognitive Fusion (CFQ)	28.78 (10.35)	23.12 (10.49)	26.20 (10.19)	31.30 (9.67)	28.72 (12.15)	33.40 (10.33)
Negative self-beliefs (BCSS)	7.25 (5.31)	5.49 (5.16)	6.12 (5.53)	7.42 (6.37)	6.63 (5.51)	7.38 (6.43)
T-Negative self-beliefs (BCSS)	2.44 (1.14)	2.01 (1.21)	2.13 (1.26)	2.38 (1.33)	2.26 (1.23)	2.37 (1.33)
Positive self-beliefs (BCSS)	10.01 (5.19)	11.54 (5.44)	10.69 (5.03)	9.01 (5.35)	10.14 (5.50)	8.65 (5.74)
Negative other-beliefs (BCSS)	8.75 (5.38)	6.75 (5.37)	8.48 (5.30)	9.46 (5.82)	9.15 (5.18)	9.76 (5.66)
Positive other-beliefs (BCSS)	8.88 (4.14)	9.92 (4.92)	8.76 (4.34)	7.32 (5.00)	8.85 (4.48)	7.25 (4.79)

Note. Time 1 = pre-imagery; Time 2 = post-imagery. PS = Paranoia Scale; STAI = State-Trait Anxiety Inventory; HSM-S = State Help-Seeking Measure; CFQ = Cognitive Fusion Questionnaire; BCSS = Brief Core Schema Scales; ECR = Experiences in Close Relationships Inventory; APC = Adapted Paranoia Checklist. Original and transformed (T-) scores are reported for negative self-beliefs.

Table 2. Analyses of variance and simple effects statistics

Measure	F	p	Effect Size
Paranoia			
Condition (2, 300)	2.31	.101	-
Time (1, 300)	0.14	.705	-
Condition × Time	31.66	<.001	0.17
Simple effects T1	0.93	.369	-
Simple effects T2	10.14	<.001	0.06
Anxiety			
Condition	11.49	<.001	0.07
Time	6.99	.009	-
Condition × Time	47.10	<.001	0.24
Simple effects T1	0.85	.429	-
Simple effects T2	30.68	<.001	0.17
Help-seeking			
Condition	1.41	.246	-
Time	0.49	.486	-
Condition × Time	26.82	<.001	0.15
Simple effects T1	0.41	.666	-
Simple effects T2	7.55	.001	0.05
Cognitive fusion			
Condition	7.50	.001	0.05
Time	6.54	.01	-
Condition × Time	44.17	<.001	0.23
Simple effects T1	1.81	.165	-
Simple effects T2	29.41	<.001	0.16
Negative self-beliefs			
Condition	0.16	.854	-
Time	0.40	.526	-
Condition × Time	22.88	<.001	0.13
Simple effects T1	1.71	.183	-
Simple effects T2	2.78	.064	-
Positive self-beliefs			
Condition	1.95	.144	-
Time	8.03	.005	0.03
Condition × Time	29.43	<.001	0.16
Simple effects T1	0.48	.619	-
Simple effects T2	8.44	<.001	0.05
Negative other-beliefs			
Condition	3.00	.051	-
Time	0.48	.491	-
Condition × Time	22.44	<.001	0.13
Simple effects T1	0.40	.668	-
Simple effects T2	9.04	<.001	0.06
Positive other-beliefs			
Condition	3.48	.032	-
Time	10.75	.001	0.04
Condition × Time	18.40	<.001	0.11
Simple effects T1	0.02	.987	-
Simple effects T2	9.99	<.001	0.06

Note. T1 = Time 1 (pre-imagery); T2 = Time 2 (post-imagery). Partial eta squared (η_p^2) is reported for main effects and interactions and eta squared (η^2) is reported for simple effects tests.
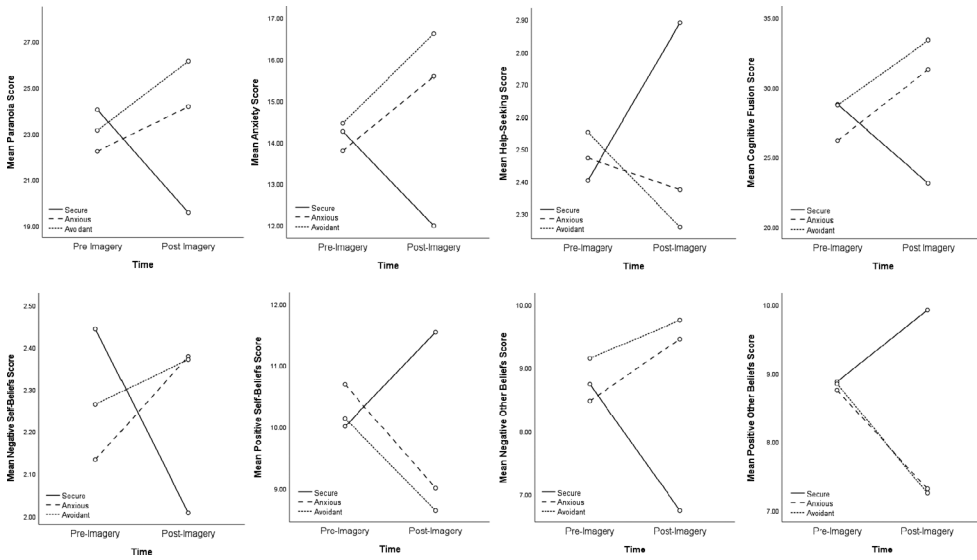
Figure 1. Change in state variables pre- and post-imagery in the secure, anxious, and avoidant attachment imagery conditions.

(though these were not statistically significant). Negative other-beliefs increased in the anxious imagery condition and there was a trend toward these increasing in the avoidant imagery condition (though not significant).

Mediation

We conducted parallel mediation using PROCESS version 3.0 (Hayes, 2018) to test whether cognitive fusion and negative self- and other-beliefs mediate the association between attachment imagery and paranoia, anxiety, and help-seeking. Post-imagery minus pre-imagery scores were computed for the DVs and mediators[4].

Attachment imagery was dummy coded into two conditions: anxious relative to secure imagery (D_1) and avoidant relative to secure imagery (D_2) (Hayes & Preacher, 2014). We report the *relative specific* indirect effects[5] and infer these using percentile bootstrap confidence intervals (CI) with 5000 bootstrapped samples. Mediation is inferred when the CIs do not straddle zero (Hayes, 2018). To reduce the risk of Type 1 error, we used a *p*-value of 0.01 (0.05/4) and based inferences about the indirect effects on 99% CIs (Hayes & Preacher, 2014). We report the partially standardized indirect effects (ab_{ps}; Hayes, 2018) and infer the magnitudes of these following Kenny's (2018) designation of small (.01), medium (.09), and large (.25)[6].

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[4] *Correlations between all variables are reported in the supplementary material.*

[5] *Relative specific indirect effects quantify the effect of anxious relative to secure imagery (D_1), and avoidant relative to secure imagery (D_2), on the outcome through each specific mediator.*

[6] *Exploratory analyses testing whether trait attachment anxiety and avoidance moderated the effect of attachment imagery on state paranoia, anxiety, and help-seeking are reported in the supplementary material.*

Paranoia

There were no direct effects of D_1 or D_2 on state paranoia (Figure 2). Holding imagery condition constant, higher levels of paranoia were observed among those who had higher cognitive fusion and more negative self- and other-beliefs.

There were relative indirect effects for D_1 and D_2 on paranoia through cognitive fusion and negative self- and other-beliefs (Table 3). The partially standardized relative indirect effect of D_1 on paranoia was large for cognitive fusion ($a_{11}b_{1ps} = 0.40$, $SE = 0.07$, 99% CI = [0.23, 0.59]), and medium for negative self- ($a_{12}b_{2ps} = 0.16$, $SE = 0.05$, 99% CI = [0.04, 0.32]) and other-beliefs ($a_{13}b_{3ps} = 0.17$, $SE = 0.06$, 99% CI = [0.03, 0.32]). The partially standardized relative indirect effect of D_2 on paranoia was large for cognitive fusion ($a_{21}b_{1ps} = 0.39$, $SE = 0.07$, 99% CI = [0.23, 0.56]) and medium for negative self- ($a_{22}b_{2ps} = 0.13$, $SE = 0.05$, 99% CI = [0.03, 0.26]) and other-beliefs ($a_{32}b_{3ps} = 0.14$, $SE = 0.06$, 99% CI = [0.02, 0.31])[7].

Anxiety

There was no direct effect of D_1, but there was a direct effect of D_2 on state anxiety (Figure 3). Holding imagery condition constant, higher levels of anxiety were observed among those who had higher cognitive fusion and more negative self- and other-beliefs.
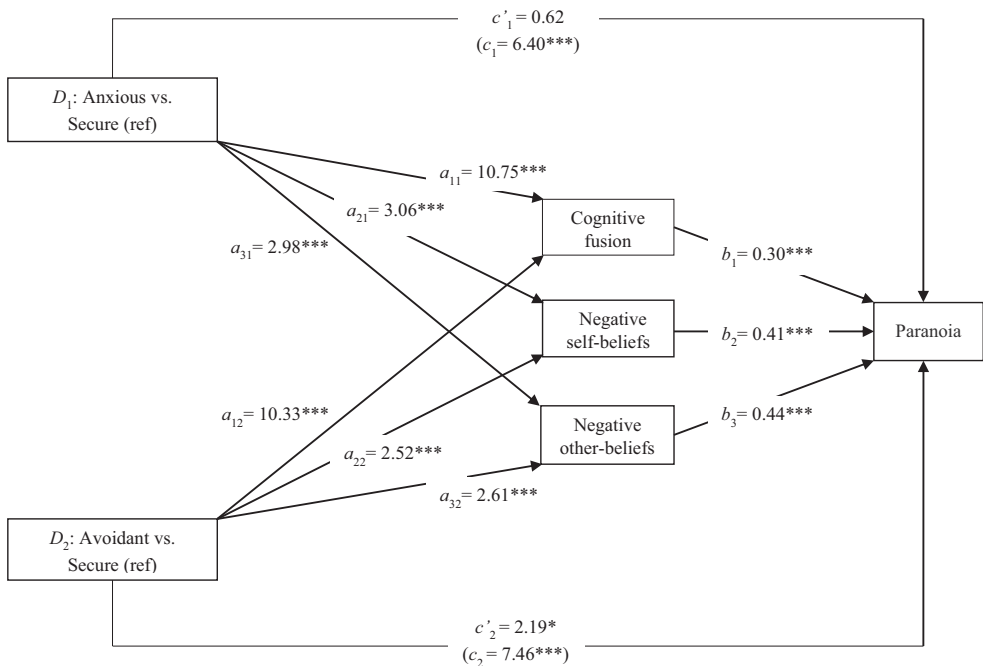

Figure 2. Mediation model of the effect of attachment imagery on state paranoia through cognitive fusion and negative self- and other-beliefs. ref = reference category; c' = relative direct effect, c = relative total effect. Estimated path coefficients are unstandardized.* $p < .05$. *** $p < .001$.

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[7] *See supplementary material for statistical interpretations of partially standardized indirect effects.*

Table 3. Relative indirect effects of attachment imagery on paranoia, anxiety, and help-seeking through cognitive fusion and negative self- and other-beliefs

	Path coefficient	Standard error	Lower 99% CI	Upper 99% CI
Paranoia				
Indirect effects of D_1				
Cognitive fusion	3.21	0.65	1.72	5.03
Negative self-beliefs	1.25	0.42	0.30	2.47
Negative other-beliefs	1.32	0.46	0.26	2.64
Indirect effects of D_2				
Cognitive fusion	3.08	0.62	1.65	4.78
Negative self-beliefs	1.03	0.36	0.23	2.10
Negative other-beliefs	1.16	0.47	0.19	2.61
Anxiety				
Indirect effects of D_1				
Cognitive fusion	1.69	0.31	0.96	2.56
Negative self-beliefs	0.72	0.23	0.23	1.35
Negative other-beliefs	0.64	0.22	0.09	1.24
Indirect effects of D_2				
Cognitive fusion	1.63	0.30	0.90	2.44
Negative self-beliefs	0.59	0.19	0.19	1.15
Negative other-beliefs	0.56	0.21	0.07	1.17
Help-seeking				
Indirect effects of D_1				
Cognitive fusion	−0.11	0.06	−0.27	0.03
Negative self-beliefs	−0.10	0.05	−0.25	0.04
Negative other-beliefs	−0.08	0.06	−0.25	0.04
Indirect effects of D_2				
Cognitive fusion	−0.10	0.05	−0.26	0.03
Negative self-beliefs	−0.08	0.05	−0.22	0.03
Negative other-beliefs	−0.07	0.05	−0.22	0.04

Note. D_1 = anxious relative to secure attachment imagery. D_2 = avoidant relative to secure attachment imagery. Estimated path coefficients are unstandardized.

There were relative indirect effects for D_1 and D_2 on anxiety through cognitive fusion and negative self- and other-beliefs (Table 3). The partially standardized relative indirect effect of D_1 on anxiety was large for cognitive fusion ($a_{11}b_{1ps}$ = 0.41, SE = 0.07, 99% CI = [0.24, 0.59]), and medium for negative self- ($a_{12}b_{2ps}$ = 0.17, SE = 0.05, 99% CI = [0.06, 0.33]) and other-beliefs ($a_{13}b_{3ps}$ = 0.15, SE = 0.05, 99% CI = [0.02, 0.29]). The partially standardized relative indirect effect of D_2 on anxiety was large for cognitive fusion ($a_{21}b_{1ps}$ = 0.39, SE = 0.07, 99% CI = [0.23, 0.56]) and medium for negative self- ($a_{22}b_{2ps}$ = 0.14, SE = 0.05, 99% CI = [0.06, 0.33]) and other-beliefs ($a_{32}b_{3ps}$ = 0.13, SE = 0.05, 99% CI = [0.02, 0.27]).

Help-seeking

There was a relative direct effect of D_2, but not D_1, on help-seeking (Figure 4). Holding imagery condition constant, lower levels of help-seeking were observed among those with higher cognitive fusion and more negative self- and other-beliefs – these results approached significance (significant at the 0.05 level) and are reported given the novelty
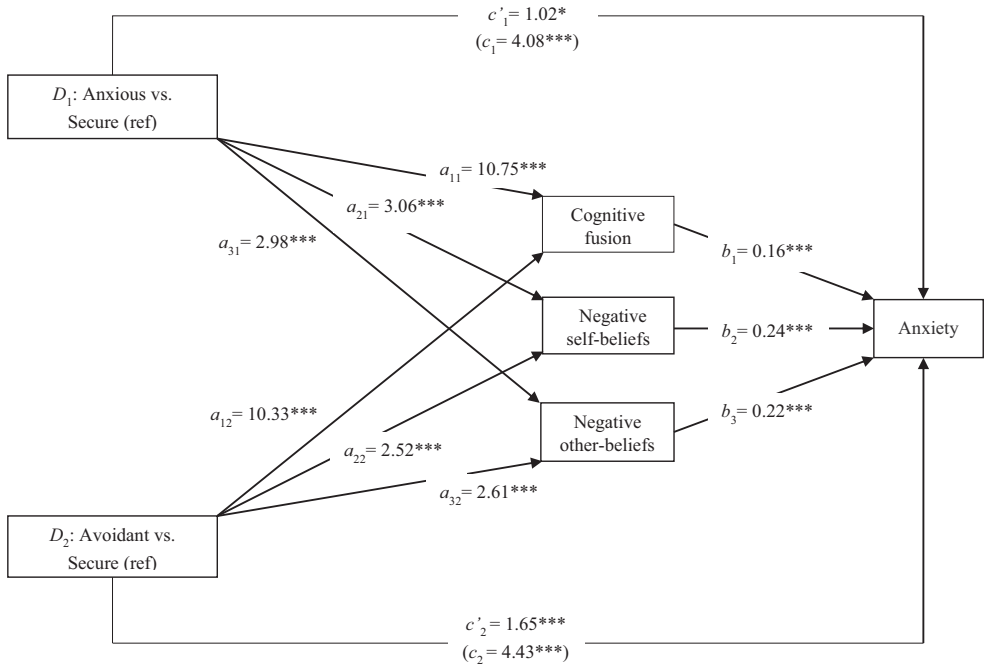
Figure 3. Mediation model of the effect of attachment imagery on state anxiety through cognitive fusion and negative self- and other-beliefs. ref = reference category; c' = relative direct effect, c = relative total effect. Estimated path coefficients are unstandardized. * $p < .05$. *** $p < .001$.

of the findings. There were no relative indirect effects of D_1 and D_2 on help-seeking through cognitive fusion or negative self- and other-beliefs (Table 3).

Discussion

This study shows that secure, anxious, and avoidant attachment imagery predict changes in paranoia, anxiety, and help-seeking, and the impact of imagery on paranoia and anxiety is mediated by cognitive fusion and negative self- and other-beliefs. When participants recalled a time when they felt safe, secure, and trusting of another person, their paranoia, anxiety, cognitive fusion, and negative self- and other-beliefs decreased, whereas help-seeking intentions and positive self- and other-beliefs increased. By contrast, when participants recalled a time when they felt worried that the other person did not like them and wanted to pull away (anxious imagery), or nervous and uncomfortable when the other person tried to get too close (avoidant imagery), their paranoia, anxiety, cognitive fusion, and negative self- and other-beliefs typically increased, and help-seeking and positive self- and other-beliefs decreased.

The change in state paranoia from pre- to post-imagery was largely accounted for by the effect of secure imagery, which decreased paranoia with a moderate effect. State anxiety and cognitive fusion decreased from pre- to post-imagery in the secure imagery group and increased in the anxious and avoidant groups with moderate effects. These results align with research demonstrating that secure imagery reduces paranoia in individuals with non-clinical paranoia (Newman-Taylor et al., 2017) and a diagnosis of schizophrenia
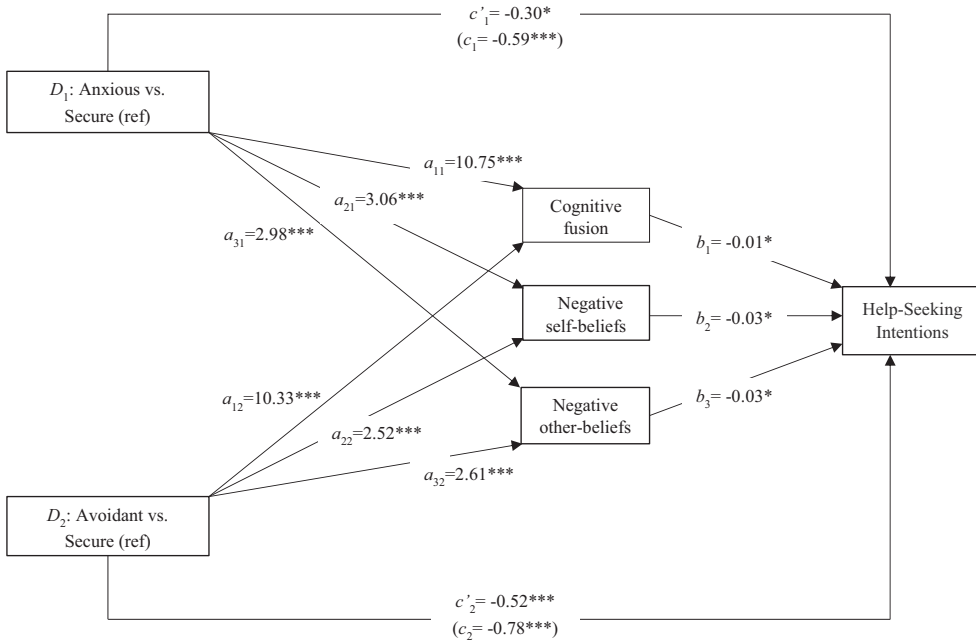
Figure 4. Mediation model of the effect of attachment imagery on state help-seeking intentions through cognitive fusion and negative self- and other-beliefs. ref = reference category; c' = relative direct effect, c = relative total effect. Estimated path coefficients are unstandardized. * $p < .05$. *** $p < 001$.

(Pitfield et al., 2020). The results are consistent with research showing that, relative to insecure/threat imagery, secure attachment imagery reduces state paranoia and anxiety via reduced cognitive fusion (Sood & Newman-Taylor, 2020). The results extend previous research by distinguishing anxious and avoidant imagery and demonstrating that both increase paranoia and anxiety via reduced cognitive fusion and negative self- and other-beliefs.

This is the first study to examine the effects of attachment imagery on help-seeking intentions, which decreased in the avoidant group and increased in the secure group. The change in help-seeking from pre- to post-imagery was largely accounted for by secure imagery. These results align with evidence demonstrating that securely attached individuals with psychosis are more engaged with services (Tait et al., 2004). We are the first to demonstrate these relationships in analog paranoia and show that secure working models can be activated using secure attachment imagery, which increases help-seeking intentions.

Help-seeking intentions did not change over time in the anxious imagery group. This may be because the anxious prime activated individuals' attachment systems resulting in both fear of rejection and desire for support.

Figure 1 shows that help-seeking intentions diverge for participants in the secure and avoidant imagery conditions, with the anxious condition falling between these. The trend for post-imagery differences between the secure and anxious groups did not reach significance and is consistent with research showing no significant differences in help-seeking between secure and anxious individuals (Dozier, 1990; MacBeth et al., 2011). This pattern of findings (attachment-anxious people exhibiting help-seeking behaviours

between those typical of secure and avoidant groups) could explain the contradictory results in the literature – with consistent differences between secure and avoidant individuals, and variable differences between secure and anxious, and anxious and avoidant individuals.

Similarly, although some evidence suggests that, in psychosis, attachment-anxious individuals seek more help than attachment-avoidant individuals (Dozier, 1990), this is inconsistent. Our results align with MacBeth et al.'s (2011) findings, which showed no differences in service engagement among anxious and avoidant individuals and that secure individuals were more engaged than avoidant individuals.

Compared with the insecure imagery groups, the secure group experienced fewer negative self- and other-beliefs, and more positive self- and other-beliefs. This suggests that secure imagery successfully facilitated endorsement of positive working models of self and others, and insecure imagery facilitated endorsement of negative working models of self and others. These results are consistent with Carnelley and Rowe (2007) and demonstrated here for the first time in a high non-clinical paranoia sample.

The changes in negative self- and other-beliefs from pre- to post- imagery were largely accounted for by secure imagery which decreased negative self- and other-beliefs with moderate effects. The increase in negative self-beliefs over time did not reach significance in the anxious and avoidant imagery conditions; this is surprising given that negative self-beliefs (e.g., 'I am unworthy') are a defining feature of attachment anxiety. Negative other-beliefs increased over time in the anxious imagery condition but showed only a trend towards significance in the avoidant condition. This is surprising given that negative other-beliefs (e.g., 'others are rejecting') are a defining feature of attachment avoidance. People with paranoia are more likely to have negative self- and other-beliefs (Fowler et al., 2006), which might explain the small or lack of significant change in negative beliefs following insecure imagery.

Post-imagery, relative to the anxious and avoidant conditions, the secure imagery condition reported fewer negative self- and other-beliefs, less cognitive fusion, paranoia, and anxiety, and more positive self- and other- beliefs and help-seeking intentions. This demonstrates that secure attachment imagery successfully produced the hypothesized effects with medium to large effect sizes.

Since the imagery groups did not differ on demographic and trait variables, we are confident that the effects are due to the imagery tasks and cannot be explained by characteristics of individuals in each group. Previous studies have largely relied on correlations between trait attachment style and paranoia (e.g., Pickering et al., 2008). The imagery manipulation in the present study adds to the literature by enabling us to infer causation between secure, anxious, and avoidant attachment imagery and paranoia. We have shown that activating mental representations of secure, anxious, or avoidant attachment figures influences fluctuations in paranoia.

As hypothesized, cognitive fusion and negative self- and other-beliefs mediated the association between attachment imagery (anxious/avoidant vs. secure) and paranoia and anxiety, but not help-seeking. Relative to the secure group, the anxious and avoidant imagery groups were more fused with their negative cognitions, held more negative self- and other-beliefs and, therefore, felt more paranoid and anxious. These results align with evidence showing that negative self-beliefs mediate the attachment–paranoia association (e.g., Wickham et al., 2014) and that cognitive fusion mediates the impact of attachment imagery on paranoia and anxiety (Sood & Newman-Taylor, 2020).

We have demonstrated that, as predicted by cognitive theory, both cognitive content (negative self- and other-beliefs) and process (cognitive fusion) are key mechanisms in the

maintenance of paranoia and linked distress. Importantly, the mediation effects were larger for cognitive fusion than negative self- and other-beliefs, suggesting that cognitive fusion explained more variance.

Unexpectedly, cognitive fusion and negative self- and other-beliefs did not mediate the relationship between imagery and help-seeking. It is possible that help-seeking intentions are predicted by other factors (e.g., the availability of *help-offering* others). Another possibility is related to the fact that secure and anxious individuals differ in their support-seeking motives and behaviours. Secure individuals seek support when necessary (e.g., when self-soothing is insufficient), whereas attachment-anxious individuals seek reassurance excessively. Measures that differentiate between these help-seeking motives and behaviours (e.g., direct and indirect help-seeking) might elucidate different results for secure- and anxious-primed individuals.

A key concern regarding the replicability of social priming experiments (Cesario, 2014) is that researchers are often unable to control all confounding variables (e.g., mood and environment). However, the effects of attachment security priming on numerous outcomes hold even when mood is accounted for or when compared to a positive affect prime, and security priming consistently improves positive affect and attenuates negative affect with medium to large effect sizes, across various priming methods, designs, and outcomes (Rowe, Gold, & Carnelley, 2020). Criticisms regarding social priming generally therefore do not apply to attachment priming research.

Limitations

This study was cross-sectional, and the mediators and DVs were measured which precludes causal inferences between these variables. There is reason to assume causality since evidence suggests that cognitive fusion exacerbates distress (Bach & Hayes, 2002; Bardeen & Fergus, 2016), and negative self-beliefs precede the onset of state paranoia (Thewissen, Bentall, Lecomte, van Os, & Myin-Germeys, 2008). Since we manipulated and randomized participants to attachment imagery condition, we can be confident that changes in the proposed mediators and DVs are attributable to the imagery tasks. A longitudinal design with repeated primes is needed to determine if these effects can be sustained and whether changes in fusion and negative beliefs precede changes in paranoia. Replication with clinical populations is also needed. Given the high rates of early adversity in people with psychosis (Varese et al., 2012), it may be necessary to include a hypothetical attachment figure for participants who have difficulty identifying a secure figure from their network.

Implications

The present study shows that attachment imagery effects change in paranoia, anxiety, and help-seeking intentions, and operates by influencing working models of self and others and the degree to which people are fused with negative cognitions. Secure attachment imagery can be used to manage state paranoia and anxiety, either as a standalone intervention or incorporated into CBT to target key interpersonal threat beliefs, and facilitate optimal emotional expression (cf. Blackburn et al., 2001). The role of cognitive fusion suggests that therapists should pay attention to facilitating people's ability to defuse from compelling paranoid thoughts when using this imagery. As a brief, 'low-intensity' intervention for people with early signs of psychosis, repeated secure attachment imagery

might promote continued service engagement. Examination of the feasibility and impact of sustained use of secure attachment imagery in a clinical sample is now required.

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Author contributions

Monica Sood: Funding acquisition, Conceptualization, Methodology, Data curation, Investigation, Formal analysis, Visualization, and Writing – original draft preparation, review, and editing. **Katherine Newman Taylor** and **Katherine Carnelley**: Funding acquisition, Conceptualization, Methodology, Supervision, and Writing – review and editing.

Conflict of interest

None.

Data availability statement

Data for this research are available on the Open Science Framework Data Repository: https://osf.io/5pa6k/. Full Citation: Sood, M., Carnelley, K., & Newman-Taylor, K. (2021, January 6). Do Cognitive Factors Mediate the Association Between Attachment Imagery and Paranoia and Anxiety? Retrieved from osf.io/5pa6k.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Appendix S1: The supplementary file includes imagery scripts (pp. 1-3), relevant statistics (pp. 4-9), exploratory moderation analyses (pp. 10-17), and statistical interpretations of partially standardized indirect effects (pp. 18-19).