

Psychopathological mediators between insecure attachment and psychotic features in a non-clinical sample: the role of depression and interpersonal sensitivity

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Summary. Introduction. Attachment styles represent a personality pattern critical to psychological health, with insecure attachment being a central factor in developing psychopathological characteristics of psychosis. However, its downstream psychopathological pathways remain unclear. This study aimed to investigate the putative psychopathological mediators in the relationship between insecure attachment and psychotic features in a non-clinical sample of university students. **Methods.** We recruited two non-clinical samples for a total of 978 subjects, 324 males and 654 females, and administered the Relationship Questionnaire (RQ) to assess attachment styles and the Symptom Check-List 90 (SCL-90) to assess psychopathological symptoms. Moreover, the Paranoia and Psychoticism subscales of SCL-90 were combined and used as a measure of Psychosis (PSY). A mediation analysis model was carried out to establish the relationship among variables. **Results.** Mediation analysis showed a total effect from RQ-Preoccupied and RQ-Fearful to PSY, respectively, 0.31 and 0.28. Direct effects from the SCL-90-R factor candidate mediator to PSY ranged from 0.51 for somatization to 0.72 for depression and 0.72 for interpersonal sensitivity. Indirect effects ranged from 0.08 for RQ-Preoccupied via hostility to 0.21 for RQ-Preoccupied via depression. **Discussion.** Our results show that the effect of insecure attachment on psychosis features is differentially mediated by some psychopathological dimensions, being depression and interpersonal sensitivity the most relevant ones. PSY feature, therefore, is predicted by other specific symptoms in the psychological context of insecure primary relationships. **Conclusions.** From a preventive and clinical point of view, our results could be relevant in informing the early-stage psychological treatment of pre-psychotic states and, in general, people experiencing sub-threshold psychotic symptoms.

Key words. Depression, insecure attachment, interpersonal sensitivity, non-clinical sample, psychotic features.

Mediatori psicopatologici tra attaccamento insicuro e caratteristiche psicotiche in un campione non clinico: il ruolo della depressione e della sensibilità interpersonale.

Riassunto. Introduzione. Gli stili di attaccamento rappresentano un aspetto della personalità che determina la salute psicologica. A questo proposito, una particolare rilevanza riveste lo stile di attaccamento insicuro nello sviluppo dei tratti psicopatologici e nell'eziologia della psicosi. Lo scopo di questo studio è stato quello di indagare il ruolo di mediazione dei sintomi psicopatologici nella relazione tra stili di attaccamento e caratteristiche psicotiche in un campione non clinico di studenti universitari. **Metodi.** Abbiamo reclutato due campioni non clinici per un totale di 978 soggetti, 324 maschi e 654 femmine, e abbiamo somministrato loro il Questionario sulle Relazioni (RQ), per valutare gli stili di attaccamento e la Symptom Check-List 90 (SCL-90) per valutare i sintomi psicopatologici. Inoltre, le sottoscale di Paranoia e Psicoticismo di SCL-90 sono state combinate e utilizzate come misura delle caratteristiche della psicosi (PSY). Quindi, è stato eseguito un modello di analisi di mediazione per stabilire la relazione tra le variabili. **Risultati.** L'analisi di mediazione ha mostrato un effetto totale da RQ-Preoccupato e RQ-Fearful su PSY, rispettivamente 0,31 e 0,28. Gli effetti diretti dal mediatore stabilito del fattore SCL-90-R a PSY variavano da 0,51 per la somatizzazione a 0,72 per la depressione e 0,72 per la sensibilità interpersonale. Gli effetti indiretti variavano da 0,08 per RQ-preoccupato tramite ostilità a 0,21 per RQ-preoccupato tramite depressione. **Discussione.** I nostri risultati mostrano che l'effetto dell'attaccamento insicuro sugli aspetti psicotici è mediato in modo differente da varie dimensioni psicopatologiche, di cui la depressione e la sensibilità interpersonale sono risultate le più rilevanti. Il fattore PSY, quindi, può essere predetto da altri sintomi specifici in un contesto psicologico di relazioni primarie insicure. **Conclusioni.** Da un punto di vista preventivo e clinico, il nostro risultato potrebbe essere rilevante per informare il trattamento psicologico in fase iniziale degli stati pre-psicotici e, in generale, delle persone che manifestano sintomi psicotici sotto soglia.

Parole chiave. Attaccamento insicuro, campione non clinico, caratteristiche psicotiche, depressione, sensibilità interpersonale.

Introduction

The relationship between insecure attachment and sub-clinical psychotic symptoms has received considerable interest in recent years; however, the exact psychopathological pathways linking attachment and psychosis need further elucidation.

Insecure attachment is an affective and behavioral pattern characterized by Anxious and Avoidant mental states related to interpersonal interaction¹, often derived from a history of rejecting, traumatizing, or neglectful parenting styles. Insecure attachment is characterized by two main dimensions, attachment anxiety and avoidance². Individuals with high levels of attachment anxiety need approval from others, are likely to experience separation anxiety, and engage in an interpersonal style generally marked by fixing attention to distressing stimuli. Individuals with high levels of avoidant attachment tend to feel uncomfortable with closeness to others, value their autonomy, and divert attention from distressing stimuli and attachment-related thoughts and feelings². A dimensional model of attachment describes four styles derived from the combination of anxiety and avoidance: 1) Secure attachment, characterized by low anxiety and avoidance; 2) Preoccupied attachment, characterized by high anxiety and low avoidance; 3) Dismissing anxiety, characterized by high avoidance and low anxiety; 4) Fearful attachment, characterized by high anxiety and avoidance^{3,4}.

Insecure attachment is highly prevalent among patients with schizophrenia and other Schizophrenia-Spectrum Disorders (SSD), as well as in premorbid stages of SSD, including schizotypy⁵, psychotic-like experiences, at-risk mental states, Ultra-high risk^{2,6,7}.

Early evidence suggested that the dismissing-avoidant attachment style was mainly associated with Severe Mental Illness and SSD^{8,9}. However, subsequent investigations highlighted that fearful and preoccupied attachment were strongly associated with clinical¹⁰ and sub-clinical¹¹ psychotic features. A recent systematic review revealed that both attachment anxiety and avoidance are associated with paranoia in clinical and non-clinical samples¹². Another recent meta-analysis has shown that the most relevant Attachment Style for psychosis and psychosis proneness is fearful attachment, followed by dismissing/avoidant style⁶. Consistently with studies highlighting the association of fearful and preoccupied attachment style with psychosis, a recent work that addressed attachment anxiety and avoidance separately found a mediation role for attachment anxiety rather than avoidance between childhood trauma and the presence of a psychotic disorder¹⁰.

This apparent inconsistency could be probably

because early investigations addressed adult attachment in psychotic patients using the Adult Attachment Interview (AAI), which collapses into one "avoidant" style with different characteristics that, according to other models of attachment, belong to dismissing and fearful attachment style.

Moving from the highly replicated evidence of an indirect association between childhood trauma and subsequent psychotic symptoms and SSD, a large body of research has addressed insecure attachment as a mediator between the two¹³⁻¹⁵.

This perspective is critical in the context of the proneness-persistence-impairment model perspective. According to this model, exposure to stressful life events in vulnerable individuals promotes the evolution of premorbid stages of SSD, characterized by the presence of sub-clinical psychotic symptoms, to full-blown psychotic disorders associated with functional impairment. In this framework, insecure attachment would represent an essential gateway towards psychotic illness for subjects undergoing repeated interpersonal stressful events and could represent an important therapeutic target for psychological interventions.

Although the role of insecure attachment as a mediator between early life adversity and psychotic symptoms has been widely replicated, less is known about the intermediate mechanisms - assuming that insecure attachment would not directly affect psychotic symptoms *per se*.

Different neurobiological putative pathways could underpin the mediational effect of insecure attachment⁷, including Hypothalamic-Pituitary-Adrenal (HPA) axis hyperactivity, oxytocinergic¹⁶ and dopaminergic systems dysfunctions, as well as influence on neuroinflammation and oxidative stress responses.

These neurobiological alterations may manifest themselves at a psychopathological level with different symptomatologic correlates that could, in turn, mediate the effect of insecure attachment on subsequent psychotic symptoms. For example, HPA-axis hyperactivity could be associated with depressive symptomatology, often related to premorbid stages of psychotic disorders.

Elucidating the psychopathological pathways from insecure attachment to psychosis features could provide better predictive power and inform early psychological intervention in the prodromal stages of SSD.

Given this background, the current study hypothesis is that insecure attachment promotes the development of different dimensions of psychopathology that, in turn, affect subclinical psychotic symptoms differently. Therefore, this study aimed to investigate the mediation role of psychopathological symptoms in the relationship between attachment styles and

psychotic features in a non-clinical sample of university students.

Methods

SAMPLE

For the current study, we performed a cross-sectional study of two samples from Italy and Albania, with a final sample size of 978 subjects, 324 males and 654 females.

The first sample is a convenience sample of 551 university students (161 males and 390 females) recruited at the University of L'Aquila between 2014 and 2015 in the context of a more extensive cohort study. Five hundred and eighty students were recruited at the beginning of the university classes of all university faculties, and they were asked to fill in a paper and pencil questionnaire on-site after providing informed consent. No incentives were provided to the participants. Of these, 18 did not consent to participate, and 11 were excluded due to missing data >25%.

The second cohort is a convenience sample of 427 university students (163 male, 264 female) recruited at the Catholic University of "Our Lady of Good Council" in Tirana (Albania), also in this case, in the context of a more extensive cohort study, between 2016 and 2018. Four hundred fifty-seven students were approached during the lessons and invited to participate in the study. Of these, 24 did not consent to participate, and six were excluded due to missing data. Questionnaires were paper-and-pencil and were completed at the end of lessons.

Eligible subjects provided informed consent after receiving a complete description of the study and had an opportunity to ask questions before completing the self-report questionnaires. No incentives were offered to participate. The local Ethics Committees approved all recruitment and assessment procedures.

MEASURES

All instruments used were in Italian, as the university setting in Albania is an Italian-speaking university and all students are fluent in Italian. The description of self-report assessment is extensively reported in another study from our group¹⁷.

Attachment styles

Attachment style was measured using the Italian version of the Relationship Questionnaire (RQ)³. The RQ comprises four short paragraphs describing a prototypical attachment style (secure, preoccupied, fearful, and dismissing). Participants are first asked to choose one of the four attachment styles that better describes them (categorical scoring), providing

a single-item variable with four possible values. Afterward, participants are asked to rate their degree of correspondence to each prototype on a 7-point scale, providing four continuous variables, one for each attachment style (dimensional scoring).

For our analysis, we used the four-dimensional scores only.

Psychosis features and psychopathological symptoms

Psychosis features and psychopathological symptoms were assessed by the Italian version of Symptom Check List-90-R (SCL-90-R), one of the most widely used self-report psychometric tests in the area of psychopathological symptom assessment¹⁸. SCL-90-R has 90 items, with a 4-point Likert scale for the evaluation of nine psychological symptoms (somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism) and three global indexes (global severity index, positive symptom distress index, and positive symptom total).

Consistently with previous studies^{19,20} Paranoia and Psychoticism subscales, which include items on thought interference, perceptual anomalies, and suspiciousness, were combined and used as a measure of Psychosis (PSY). The remaining seven factors were tested as mediators.

Statistical strategy

All statistical analyses were performed using Stata[®] 16. Before statistical analysis, SCL-90-R factor scores were tested for non-normality and squared-transformed to account for non-normal distribution. All SCL-90-R and RQ scores were standardized to simplify the calculation of standardized bootstrap coefficients (see below).

Exploratory regression models

Before testing a mediation model, we first tested the assumption of a relevant direct effect from the three insecure attachment styles and the seven SCL-90-R factors on PSY using multiple linear regression to exclude irrelevant variables from subsequent mediation analysis. Because RQ dimensional scores and SCL-90-R factors are known to display a large amount of covariance, we chose to test them in two multiple regression models to adjust each factor's effect for the others. Factors that had a regression coefficient with $p > 0.05$ were excluded from the subsequent mediation analysis.

Mediation analysis

Mediation analysis was performed using bootstrapped Structural Equation Modelling (SEM) with

a bootstrapping procedure with 5000 replications. Firstly, a SEM model was fitted with all the candidate mediators simultaneously. This approach was the most appropriate, given the high correlation between the candidate mediators. Secondly, bias-corrected or percentile confidence intervals be used instead. These confidence intervals are nonsymmetric, reflecting the skewness of the sampling distribution of the product coefficients. The indirect effect is considered statistically significant if the confidence interval does not contain zero. Finally, the percentage of total effect mediated (%TEM) for each attachment style on PSY was estimated as follows.

$$\%TEM = \frac{\text{Indirect Effect}}{\text{Total Effect}} * 100$$

Results

Linear regression analyses are reported in Table 1. The SCL-90-R somatization coefficient was not statistically significant and was thus excluded from further analyses. The six remaining factors had all significant coefficients ranging from $b=0.07$ [0.01, 0.13] for anxiety to $b=0.29$ [0.24, 0.35] for interpersonal sensitivity. RQ-Dismissing displayed a marginal, statistically non-significant association with PSY and was thus excluded from subsequent analysis ($b=0.02$, 95% CI [-0.01, 0.04]). RQ-Preoccupied and RQ-Fearful attachment styles were significantly associated with PSY, respectively $b=0.17$, 95%CI [0.14, 0.20] and $b=0.14$, 95% CI [0.11, 0.17].

Mediation path models are reported in Figure 1, and path coefficients are reported in Table 2.

Mediation analysis showed a total effect from RQ-Preoccupied and RQ-Fearful to PSY, respectively 0.31

[0.25, 0.37] and 0.28 [0.23, 0.34]. All SCL-90-R factors explored as mediators exerted a partial mediation effect, i.e., the indirect effects were all significant, while the residual unmediated effect was never completely abolished. Direct effects from the SCL-90-R factor candidate mediator to PSY ranged from 0.51 for somatization to 0.72 [0.68, 0.77] for depression and 0.72 [0.67, 0.76] for interpersonal sensitivity. Indirect effects ranged from 0.08 [0.04, 0.12] for RQ-Preoccupied via hostility to 0.21 [0.16, 0.25] for RQ-Preoccupied via depression.

%TEM ranged from 29.68% for RQ-Preoccupied via Somatization to nearly 70% for interpersonal sensitivity and depression. In particular, interpersonal sensitivity mediated 64.51% and 68.96% of the effects of RQ-Preoccupied and RQ-Fearful, while depression mediated 67.74% and 65.51% of the effects of RQ-Preoccupied and RQ-Fearful.

Overall, indirect effects and %TEM via the six SCL-90-R factors for RQ-Preoccupied and RQ-Fearful were similar in each model except when testing "hostility" as a mediator. In this model, %TEM was 26.45% for RQ-Preoccupied and 44.82% for RQ-Fearful. A graphical representation of the % of total effect mediated is reported in figure 2.

Discussion

This paper aimed to test the hypothesis of an indirect effect of insecure attachment on psychosis features in a neurotypical sample of university students and to detail which psychopathological dimensions exert the most considerable mediating effect between them. Our results show that the effect of insecure attachment on psychosis features is differentially mediated by different psychopathological dimensions, being depression and interpersonal sensitivity the most relevant ones. More in detail, both depression and interpersonal sensitivity mediated about 20% of the effect of insecure attachment on psychosis features each. To the best of our knowledge, this is the first study addressing the psychopathological mediators of insecure attachment on psychosis features. Two earlier studies focused on self-esteem and external locus of control as mediators between insecure attachment and psychotic symptoms^{21,22}. Our finding of depression as a mediator is in line with this evidence, given the tight connection between low self-esteem and depression. Moreover, depression can manifest in several forms, not only through depressive mood but also with reactive behavioral forms, predicting psychotic risk. In these cases, depression symptoms could be related to traumatic life experiences generating behavioral addictions and hypersexuality²³.

Therefore, clinicians should pay attention to subjects who show a clear depressive mood and pe-

Table 1. Multiple regression coefficients of SCL-90-R on PSY composite score.

Somatization	0.01 [-0.04, 0.06]
Obsessive-compulsive	0.13*** [0.08, 0.19]
Interpersonal sensitivity	0.29*** [0.23, 0.35]
Depression	0.25*** [0.18, 0.32]
Anxiety	0.07* [0.00, 0.13]
Hostility	0.13*** [0.09, 0.18]
Phobic anxiety	0.12*** [0.08, 0.16]
RQ-Preoccupied	0.17*** [0.14, 0.20]
RQ-Fearful	0.14*** [0.11, 0.17]
RQ-Dismissing	0.02 [-0.01, 0.04]

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

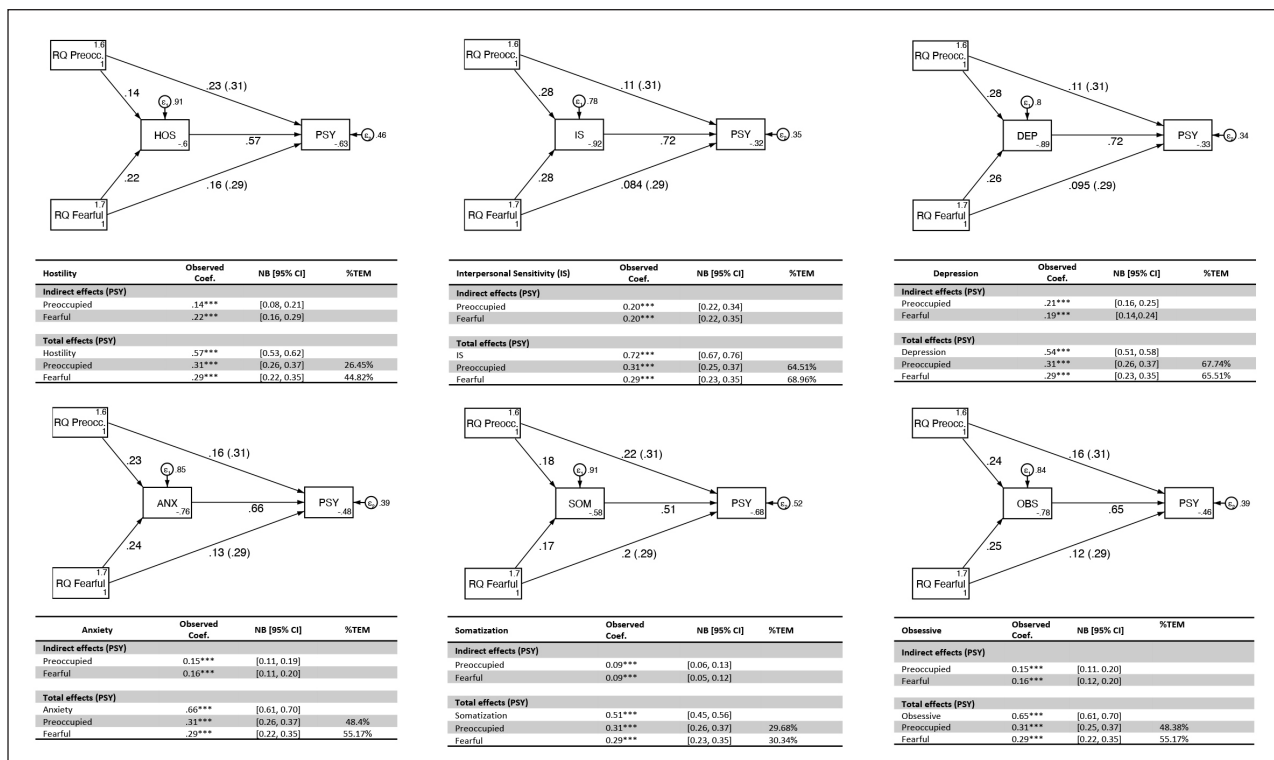


Figure 1. Path models with direct, indirect and total effects.

Table 2. Indirect effect with bias-corrected confidence intervals.

	Observed Coef. [BC 95% CI]	%TEM
RQ Preoccupied -> PSY		
Direct effects	0.08 [0.06, 0.12]	
Indirect effects via:		
Obsessive-compulsive	0.03 [0.02, 0.05]	10.8%
Interpersonal sensitivity	0.08 [0.05, 0.10]	24.2%
Depression	0.07 [0.05, 0.10]	22.9%
Hostility	0.02 [0.01, 0.03]	7.0%
Phobic anxiety	0.02 [0.01, 0.03]	7.6%
Total indirect effect	0.22 [0.17, 0.28]	72.5%
Total effect	0.31 [0.25, 0.37]	
RQ Fearful -> PSY		
Direct effects	0.05 [0.01, 0.07]	
Indirect effects via:		
Obsessive-compulsive	0.04 [0.02, 0.05]	12.6%
Interpersonal sensitivity	0.07 [0.05, 0.10]	26.6%
Depression	0.07 [0.04, 0.09]	23.4%
Hostility	0.03 [0.02, 0.05]	12.2%
Phobic anxiety	0.03 [0.01, 0.04]	9.4%
Total indirect effect	0.24 [0.18, 0.30]	84.3%
Total effects	0.28 [0.23, 0.34]	

Direct effect is equivalent to the mediated residual effect; total effect is equivalent to the unmediated effect.

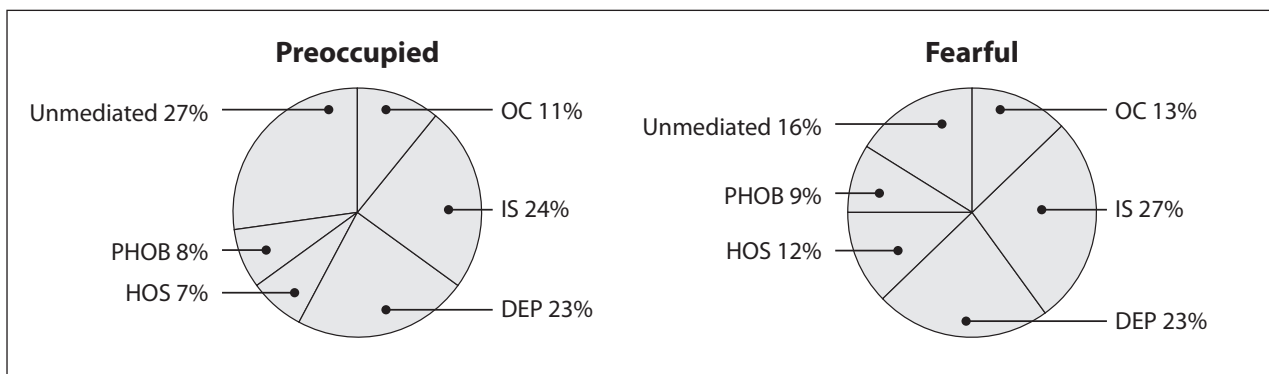


Figure 2. Percentage of total effect of psychotic features mediated by fearful and preoccupied attachment styles.
Legend: OC= obsessive-compulsive; IS= interpersonal sensitivity; DEP= depression; HOS= hostility; PHOB= phobic anxiety.

ople with dysfunctional behaviors that could hide latent depression symptoms and predict psychosis onset.

Interpersonal sensitivity is an excessive awareness of others' behaviors and mental states when interpreted as a potential or actual source of rejection or criticism associated with feelings of inner-self fragility²⁴. In network analysis studies, interpersonal sensitivity is one of the main components of paranoia²⁵. Interpersonal sensitivity has been linked to at-risk mental states (ARMS) for psychosis²⁶ being a mediator between childhood victimization and paranoia²⁷, to paranoid ideation^{28,29} and persistent attenuated psychotic symptoms in adolescence³⁰. Furthermore, interpersonal sensitivity has been extensively linked to insecure attachment^{31,32}. For example, Boyce and Parker proposed that individuals who failed to achieve secure attachment in childhood prevent or cope with separation anxiety by being overly sensitive to any threat to their interpersonal bonds²⁴. Given the strong evidence supporting reciprocal links between interpersonal sensitivity, psychotic clinical features, and insecure attachment, our model proposes a coherent mechanism by which IS could mediate the effect of insecure attachment on psychosis. Such a mechanism will need further replication with longitudinal data, as the direction of the path could be considered somewhat arbitrary given the cross-sectional nature of the data.

Interpersonal sensitivity and depression show a tight association. In the present work, we did not attempt to build a unifying model involving a directional association between depression and interpersonal sensitivity in the relation between insecure attachment and paranoia, again due to the cross-sectional nature of the data. However, further studies

could attempt to test different models of depression-interpersonal sensitivity interactions in the pathway between attachment and paranoia.

This study presents some limitations. Firstly, it is based on cross-sectional data, which limits the validity of the proposed models. In particular, it may be argued that the directions of the effects modeled here are somewhat arbitrary. However, strong evidence in the literature supports the likelihood of our models. Secondly, this study is based on a self-report measure that may introduce a measurement bias. Although this limitation is always valid for self-report assessment tools, the SCL-90-R and the RQ are considered psychometrically sound instruments.

This study has some strengths, most notably its solid statistical techniques and large sample size.

Conclusions

Our results proposed a detailed model of the association between insecure attachment and psychosis features by exploring the role of different psychopathological mediators. Our results could be relevant in informing the early-stage psychological treatment of pre-psychotic states and, generally, people experiencing sub-threshold psychotic symptoms. Further studies must address the mutual interactions between the different psychopathological dimensions between insecure attachment and downstream psychotic features.

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