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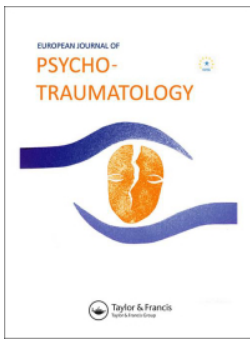
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## Dissociation and insecure attachment as mediators of the relation between childhood emotional abuse and nonclinical paranoid traits

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### ABSTRACT

**Background:** Research suggests dissociation and insecure attachment serve as explanatory mechanisms in the pathway from childhood trauma to paranoia. However, past work has not examined these mechanisms concurrently in nonclinical populations.

**Objective:** The current study sought to examine dissociation and insecure attachment as parallel mediators of the association between childhood emotional abuse and paranoid traits. Furthermore, a serial mediation model with insecure attachment preceding dissociation in the explanatory pathway was explored.

**Methods:** Eighty-nine nonclinically ascertained young adults were assessed for childhood emotional abuse, dissociation, attachment styles, and paranoid traits. Parallel and serial mediation models were tested.

**Results:** The association of childhood emotional abuse with both interview-based and self-reported paranoid traits was significantly mediated by dissociation and preoccupied attachment. Fearful attachment was a significant mediator in the model for self-reported paranoid traits. No evidence for a serial mediation effect was found.

**Conclusions:** The present findings extend support for dissociation and attachment insecurity as mechanisms underlying the link between childhood emotional maltreatment and paranoid traits. Longitudinal research is needed to inform whether insecure attachment contributes to dissociation along the pathways to paranoid traits.

### Disociación y apego inseguro como mediadores de la relación entre abuso emocional infantil y rasgos paranoides en población no clínica

**Antecedentes:** La investigación sugiere que la disociación y el apego inseguro sirven como mecanismos explicativos en el camino del trauma infantil a la paranoia. Sin embargo, trabajos anteriores no han examinado estos mecanismos concurrentemente en poblaciones no clínicas.

**Objetivo:** El estudio actual buscó examinar la disociación y el apego inseguro como mediadores paralelos de la asociación entre el abuso emocional infantil y los rasgos paranoides. Además, se exploró un modelo de mediación en serie con apego inseguro como precedente de la disociación en la vía explicativa.

**Métodos:** Ochenta y nueve adultos jóvenes no evaluados clínicamente fueron medidos en cuanto a abuso emocional infantil, disociación, estilos de apego y rasgos paranoides. Se probaron modelos de mediación en paralelo y en serie.

**Resultados:** La asociación del abuso emocional infantil con rasgos paranoides tanto basados en entrevistas como auto-reporte fue mediada significativamente por la disociación y el apego preocupado. El apego temeroso fue un mediador significativo en el modelo de rasgos paranoides auto-reportados. No se encontró evidencia de mediación en serie.

**Conclusiones:** Los presentes hallazgos apoyan a la disociación y la inseguridad del apego como mecanismos subyacentes a la asociación entre el maltrato emocional infantil y los rasgos paranoides. Una investigación longitudinal sería necesaria para explorar si el apego inseguro contribuye a la disociación en la vía del desarrollo de los rasgos paranoides.

### 解离和不安依恋作为童年期情感虐待与非临床偏执特质之间关系的中介因子

**背景:** 研究表明, 解离和不安依恋是从童年期创伤到偏执症的解释机制。但是, 以往的工作并未在非临床人群中同时考查这些机制。

**目的:** 本研究试图将解离和不安依恋作为童年期情感虐待与偏执特质之间联系的平行中介因子。此外, 探索了在解释路径中不安依恋在解离之前的链式中介模型。

### ARTICLE HISTORY

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### KEYWORDS

Paranoia; dissociation; attachment style; childhood trauma; schizotypy

### PALABRAS CLAVE

Paranoia; Disociación; Estilo de apego; trauma infantil; Esquizotipia

### 关键词

偏执; 解离; 依恋风格; 童年期创伤; 精神分裂症

### HIGHLIGHTS

- Dissociation and insecure attachment mediate the effect of childhood emotional abuse on paranoid traits.
- Research on etiological trajectories in nonclinical cohorts may offer valuable insights into the traumagenic model of paranoia.

**方法:**评估了89名非临床明确的青壮年的童年期情感虐待, 解离, 依恋风格和偏执特质。考查了平行和链式中介模型。

**结果:**童年期情感虐待与基于访谈和自我报告的偏执特质的相关由解离和先占型依恋显著中介。恐惧型依恋是自我报告偏执特质模型的显著中介。未发现链式中介效应的证据。

**结论:**本研究结果支持解离和依恋不安全感作为童年期情感虐待与偏执特质之间联系的机制基础。需要进行纵向研究, 以了解不安全依恋是否会导致解离与偏执特质一起。

Traumatic stress in childhood provides a risk factor for both the occurrence and persistence of psychotic experiences in adolescence and adulthood (Van Os, Kenis, & Rutten, 2010; Van Os & Reininghaus, 2016). Extensive research has found increased developmental risk for psychosis when childhood adversity is reported, even when controlling for family history of mental illness or substance abuse (Read, Van Os, Morrison, & Ross, 2005; Varese et al., 2012). In addition, findings indicate a dose-response relationship that holds across the psychosis spectrum from subclinical schizotypy (Velikonja, Fisher, Mason, & Johnson, 2015) to schizophrenia (Matheson, Shepherd, Pinchbeck, Laurens, & Carr, 2013). For example, a prospective study revealed exponential increases of psychotic symptoms aligned with mild, moderate, and severe childhood abuse (Janssen et al., 2004). Altogether, the findings highlight the necessity for careful and severity-based trauma assessment in psychosis risk research.

Trauma can predispose people to risk for a wide variety of psychopathology and not every person experiencing abuse or neglect in childhood develops psychotic psychopathology. Various researchers have suggested different psychobiological mechanisms that help explain when and how childhood adversity increases the risk of reality distortion (Bentall et al., 2014; Debbané et al., 2016; Read et al., 2005). In particular, two explanatory pathways shed light on the risk for psychotic phenomena following childhood adversity exposure: Attachment insecurity and dissociation (Berry, Bucci, & Varese, 2019).

### 1.1. Pathway 1: attachment insecurity

Attachment insecurity is an umbrella term that reflects disruptions in the ways individuals relate to significant others and is generally conceptualized in terms of individual differences in attachment anxiety and avoidance (Mikulincer & Shaver, 2019). Along the dimensions of self and others, four attachment styles have been identified in adulthood (Bartholomew & Horowitz, 1991): secure (positive self/positive other), dismissing (positive self/negative other), preoccupied (negative self/positive other), and fearful (negative self/negative other). Dismissing attachment is characterized by deactivating affect-regulation strategies to avoid interpersonal engagement including reduced emotional reactivity and expressiveness (Mikulincer & Shaver, 2008). Preoccupied attachment is characterized by hyperactivating affect-regulation strategies including hypervigilance to

interpersonal threat and hypersensitivity towards rejection (Lorenzini & Fonagy, 2013; Mikulincer & Shaver, 2008, 2019). Fearful attachment is characterized by a combination of both hyperactivating (approach) and deactivating (avoid) strategies. Due to the inconsistent attachment strategies employed, fearful attachment has been suggested as a proxy adult measure of disorganized attachment in childhood (e.g. Simpson & Rholes, 2002). Fearful attachment is the most prevalent style in clinical psychosis (Carr, Hardy, & Fornells-Ambrojo, 2018) and has been proposed as a precursor to psychotic phenomena among individuals exposed to maltreatment (Sheinbaum, Kwapil, & Barrantes-Vidal, 2014).

Research has identified specific associations between insecure attachment styles and schizophrenia-spectrum traits. Preoccupied attachment was associated with positive schizotypy, characterized by unusual perceptual experiences, odd beliefs, and negative affect. Dismissing attachment was associated with negative schizotypy, which includes affective flattening, avolition, and asociality. Fearful attachment was associated with both positive and negative schizotypy (Sheinbaum, Bedoya, Ros-Morente, Kwapil, & Barrantes-Vidal, 2013) and mediated the link of physical/emotional childhood trauma with positive and negative schizotypy, paranoid beliefs, and psychotic-like experiences (Sheinbaum et al., 2014). Overall, there is robust evidence for associations between insecure (anxious) attachment and paranoia even when controlling for potential confounders such as self-esteem or illness severity (Lavin, Bucci, Varese, & Berry, 2020; Murphy, Goodall, & Woodrow, 2020).

Studies focused on specific adversity subtypes in non-clinical samples have also supported attachment insecurity as an explanatory mechanism, particularly in relation to emotional abuse. In an interview study, angry-dismissive and/or preoccupied/enmeshed attachment were mediators of associations of two forms of poor childhood care, namely parental antipathy (which overlaps with emotional abuse) and role reversal, with subclinical psychosis-spectrum phenomenology, including paranoid traits (Sheinbaum et al., 2015). Another study focusing on the link between emotional abuse and schizotypy found significant mediation via attachment anxiety and avoidance (Goodall, Rush, Grünwald, Darling, & Tiliopoulos, 2015). However, an important limitation of this study is that it tested schizotypy as a unidimensional construct despite evidence indicating that positive and negative schizotypy are two interrelated, but distinct dimensions (Barrantes-Vidal et al., 2013; Kwapil &

Barrantes-Vidal, 2015) differentially associated with insecure attachment patterns (Sheinbaum et al., 2013).

### 1.2. Pathway 2: dissociation

There is growing emphasis on the role of dissociative experiences in the aetiology of psychosis (Moskowitz, Dorahy, & Schäfer, 2019). Dissociation is a multifaceted phenomenon broadly defined as a disruption of 'normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behavior' (American Psychiatric Association, 2013, p. 291). Dissociative experiences appear in nonclinical populations (Kate, Hopwood, & Jamieson, 2020) and a wide range of psychiatric disorders (Lyssenko et al., 2018). Symptoms include absorption (i.e. daydreaming), amnesia, and feeling detached from *the self*, (i.e. depersonalization, often accompanied by disembodiment, decreased sense of agency, and emotional numbing) and *one's surroundings* (i.e. derealization, in which people, objects, or the external environment can appear unreal) (Carlson & Putnam, 1993; Holmes et al., 2005). At the most severe end of the spectrum, dissociative patients can report identity confusion (e.g. presence of distinct dissociative self-states), likely related to chronic childhood abuse (Nijenhuis, Van Der Hart, & Steele, 2010).

In light of the commonality of reality disturbances and feelings of detachment shared by the symptom patterns of psychosis and dissociation, it is not surprising that dissociation is – while distinguishable – strongly associated with schizophrenia-spectrum disorders (for a review, see Renard et al., 2017). The available data also suggest that dissociation in schizophrenia-spectrum disorders is more strongly related to childhood trauma compared to adult trauma (Rafiq, Campodonico, & Varese, 2018; Renard et al., 2017). In particular, clinical research found robust associations between childhood emotional abuse and dissociation in both psychotic (Braehler et al., 2013; Schäfer et al., 2006) and general psychiatric populations (Mueller-Pfeiffer et al., 2013).

So far, most psychosis research has focused on dissociation in the context of auditory verbal hallucinations. There is growing evidence that dissociative experiences are a relevant mechanism in hearing voices (Pilton, Varese, Berry, & Bucci, 2015) and mediate the link between childhood trauma and hallucination proneness in clinical (Perona-Garcelán et al., 2012) and nonclinical populations (Cole, Newman-Taylor, & Kennedy, 2016). By contrast, its impact on paranoid traits has been less well-established. The two latter mediation studies showed inconsistent results in which significant mediation via dissociation was only found for subclinical delusional ideation (Cole et al., 2016; Perona-Garcelán et al., 2012).

In sum, there is substantial evidence for an association between childhood trauma, dissociation, and

auditory verbal hallucinations. Nonetheless, the scarcity of research on other psychotic symptoms such as paranoid traits precludes fully answering the extent to which psychosis is indeed 'traumatic in origin and dissociative in kind' (Moskowitz, Read, Farrelly, Rudegear, & Williams, 2009, p. 521).

### 1.3. The two-pathway model

In alignment with the differential mediation patterns found for attachment insecurity and dissociation, Bentall and colleagues (Bentall et al., 2014) offered an explanatory model in which specific psychotic experiences correspond with specific psychological underpinnings and childhood exposures. The authors postulated two distinct pathways. First, early relationship disruptions, such as childhood neglect, foster insecure attachment styles leading to paranoia. Secondly, severe forms of trauma, e.g. childhood sexual abuse, foster dissociative symptoms that increase the risk for auditory hallucinations.

To provide empirical evidence for this model, Pearce et al. (2017) tested dissociation and fearful attachment as parallel mediators between childhood trauma and paranoia and hearing voices, respectively. Dissociation and fearful attachment were significantly correlated with moderate association strength in their sample. In keeping with former findings (Pilton et al., 2015; Sheinbaum et al., 2014), they found that dissociation mediated the association of childhood trauma with hearing voices and that fearful attachment mediated the association of childhood trauma with paranoia. To the authors' surprise, dissociation also mediated the link between childhood trauma and paranoia, while accounting for the variance explained by fearful attachment. This finding suggests that the role of dissociation as a mechanism is not restricted to hallucinatory symptoms, but might also be relevant in the aetiology of paranoia (Pearce et al., 2017). One limitation of this study is the sole use of online self-report measures. Furthermore, the assessment of childhood trauma was based on only nine items of the Brief Betrayal Trauma Survey, which does not allow to distinguish between specific childhood trauma types. This is relevant because increased attention to specificity has been considered an important step towards elucidating underlying mechanisms (e.g. Bentall & Fernyhough, 2008).

The conceptualization of attachment insecurity and dissociation as distinct mediators that do not causally influence each other may not adequately reflect the reality of the complex aetiological patterns. For example, it has been proposed that trauma, attachment disorganization, and dissociation are 'inextricably intertwined, like three threads woven into a single strand' (Liotti, 2004, p. 14) and that disorganized attachment might precede dissociation in the development of psychotic experiences (Berry & Bucci, 2016). To our knowledge, previous

studies have not examined attachment insecurity as a mediator between childhood trauma and dissociative experiences within the traumagenic model of paranoia. However, it is relevant to note that longitudinal research with at-risk low-income families showed that disorganized attachment, as coded from young adult-parent interactions (e.g. out-of-context conflict behaviour), mediated the relationship between childhood abuse and dissociation (Byun, Brumariu, & Lyons-Ruth, 2016). Furthermore, a recent study with psychiatric patients found that attachment anxiety, and not avoidance, fully mediated the effect of emotional abuse on dissociation (Kong, Kang, Oh, & Kim, 2018). On the basis of these findings, it is conceivable that early exposure to emotional abuse (i.e. threatening, insulting, or showing hostility towards the child) increases the risk for dissociative experiences through its internalization into a sensitized stress system and insecure attachment strategies.

#### 1.4. Study aims

The current study's aims were twofold: First, to examine whether dissociation and attachment insecurity act as parallel mediators between childhood maltreatment and self-reported and interview-assessed paranoid traits in a nonclinical cohort of young adults. In keeping with prior work (Goodall et al., 2015; Sheinbaum et al., 2015), this study focused specifically on emotional abuse. Emotional abuse is an often overlooked but highly prevalent and detrimental form of abuse (Spinazzola et al., 2014; Stoltenborgh, Bakermans-Kranenburg, Alink, & Van Ijzendoorn, 2012) and may be of particular relevance to psychosis vulnerability in samples in which sexual and physical abuse are less prevalent (Goodall et al., 2015). Furthermore, emotional abuse shows robust associations with dissociation (Braehler et al., 2013; Mueller-Pfeiffer et al., 2013; Rafiq et al., 2018; Schäfer et al., 2006) and insecure attachment (Oshri, Sutton, Clay-Warner, & Miller, 2015; Riggs, 2010). The second aim was to explore a serial mediation model testing whether insecure attachment precedes dissociative experiences in the pathway to paranoid traits. Three hypotheses were tested. It was predicted that insecure attachment styles would significantly mediate the association between emotional abuse and paranoid traits. Furthermore, dissociation was hypothesized to significantly mediate the association between emotional abuse and paranoid traits. Ultimately, insecure attachment styles were expected to precede dissociation in a serial mediation model of paranoid traits.

## 2. Methods

### 2.1. Participants

The participants ( $N = 89$ ) were drawn from a sample of undergraduate students from the Universitat

Autònoma de Barcelona recruited via the university participation system, who participated in an ongoing longitudinal research investigating vulnerability and protective factors for psychotic experiences. As described in Barrantes-Vidal et al. (2013), 589 unselected participants were recruited in the first phase (T1) of the study, of which 547 (mean ( $M$ ) age = 20.6,  $SD = 4.1$ ; 86% female) provided usable screening data. Three follow-up assessments were conducted (T2, T3, T4). The T2 reassessment took place 1.7 years ( $SD = 0.2$  years, range 1.4 to 2.2 years) after the baseline assessment. At T2, a selected subsample of 214 participants ( $M = 21.4$  years,  $SD = 2.4$ ; 78% female) completed an extensive laboratory, interview, and experimental protocol; 123 participants had standard scores above 1.0 and 91 participants below 1.0 on schizotypy dimensions. At T3, a further selected subsample of 104 participants ( $M = 23.1$ ,  $SD = 2.6$ ; 62.1% female) completed the reassessment. At T4, the current 89 participants ( $M = 24.8$  years,  $SD = 2.7$ ; 61.8% female) were assessed, of which 66 had elevated schizotypy scores and 23 had standard scores below 1.0. Participants with high schizotypy scores were oversampled to ensure enough variance given the nonclinical nature of the sample; yet, the overall sample contained a wide distribution of scores. The mean interval between T2 and T4 was 2.7 years ( $SD = 0.2$ , range 2.3 to 3.4 years) and between T1 and T4 4.4 years ( $SD = 0.3$  years, range 4.0 to 5.2 years). The current sample was predominantly Western European (94.4% Spanish). At T4, the majority was in a relationship (58.4%) or married (5.6%) and 36.0% of the sample was single.

### 2.2. Procedure

Participants completed self-report measures at T1 and later undertook an extensive interview and questionnaire battery at each subsequent data wave. Childhood trauma was assessed at T2, the other measures of attachment style, dissociation, and paranoid traits were assessed at T4. The interviews were conducted by trained psychologists and advanced graduate students in clinical psychology. The interviewers were unaware of participants' screening instruments' scores and ratings were frequently discussed throughout the data collection period via consensus meetings. All participants were over 18 years of age at the initiation of the study and provided informed consent to participate at every stage of the study. The study was approved by the Ethics Committee of the Universitat Autònoma de Barcelona (Spain).

### 2.3. Time 2 measures

#### 2.3.1. Childhood trauma

Interpersonal abuse and neglect experiences in childhood were assessed via the structured Interview for Traumatic Events in Childhood (ITEC; Lobbstaal,

Arntz, Harkema-Schouten, & Bernstein, 2009). Participants answered a set of standardized questions concerning five types of childhood maltreatment including sexual abuse, physical abuse, emotional abuse, emotional neglect, and physical neglect. Severity scores of the ITEC are calculated based on a formula that includes parameters such as the age of onset, proximity to the perpetrator, and duration (Lobbestael, Arntz, & Bernstein, 2010). In a mixed sample of nonclinical and clinical adults ( $N = 217$ ), the emotional abuse subscale showed high internal consistency and satisfactory convergent validity (Lobbestael et al., 2009).

## 2.4. Time 4 Measures

### 2.4.1. Attachment Style

The Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991) is a validated self-report measure to assess secure, dismissing, preoccupied, and fearful attachment styles. Participants rated (continuous) how much they agree with four statements reflecting each attachment style on a Likert scale from 1 ('totally disagree') to 7 ('totally agree'). They also indicated which attachment style describes them best (categorical). As recommended by the authors, only the continuous scores were used for analysis. The RQ has adequate test-retest reliability (Scharfe & Bartholomew, 1994) and has been frequently used in clinical and nonclinical populations (e.g. Pearce et al., 2017; Sheinbaum et al., 2014).

### 2.4.2. Dissociation

The Dissociative Experiences Scale (DES-II; Carlson & Putnam, 1993) is a validated self-report screening measure containing 28 items. Participants rate on a percentage scale from 0% (=never) to 100% (=always) how often they experience dissociative symptoms along the dimensions of amnesia, depersonalization/derealization, and absorption. The total dissociation scores were obtained by dividing the sum

of all items by 28. The questionnaire has excellent internal consistency (Carlson & Putnam, 1993).

### 2.4.3. Paranoid traits

Based on research supporting dimensional models of paranoia (e.g. Bell & O'Driscoll, 2018; Costello, 1994; Freeman, 2006; Van Os & Verdoux, 2003), paranoia was conceptualized and measured as a continuum in which nonclinical expressions (e.g. trait suspiciousness) are less severe but have continuity with clinical expressions (e.g. symptoms of paranoid personality disorder and paranoia). Two measures were used. The self-reported paranoid trait of suspiciousness was assessed with the 8-item Suspiciousness subscale of the Schizotypal Personality Questionnaire (SPQ), which has high internal consistency (Raine, 1991). Interview-based paranoid traits and symptoms were assessed with the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II; Gibbon, Spitzer, Williams, Benjamin, & First, 1997), which has demonstrated excellent inter-rater reliability for paranoid personality disorder traits in clinical and non-clinical populations (Lobbestael, Leurgans, & Arntz, 2011). The sum of the SCID-II paranoid trait ratings produced a continuous score for each participant.

## 2.5. Data analysis

The data were analysed with the IBM Statistical Package for Social Sciences (SPSS, Version 22, IBM, Armonk, NY). Descriptive and correlational analyses including all variables were conducted.

In order to test our hypotheses, a three-step approach was implemented using the PROCESS macro for SPSS (Hayes, 2013): First, the three insecure attachment styles (dismissing, preoccupied, and fearful attachment) were entered as parallel mediators of the effect of emotional abuse on paranoid traits. Second, the significant attachment styles obtained in the previous step were tested individually as parallel mediators with dissociation in separate models for self-reported and interview-based paranoid traits. These analyses comprised four parallel

**Table 1.** Descriptive statistics ( $N = 89$ ).

	<i>n</i> (%)	Mean	SD	Min.	Max.	Skewness	Kurtosis
Childhood trauma (ITEC)	77 (86.5)	8.94	10.63	0.00	68.79	3.15	13.66
Sexual abuse	6 (6.7)	0.25	1.19	0.00	9.52	6.28	44.39
Physical abuse	20 (22.5)	1.24	3.51	0.00	25.46	4.66	26.92
Emotional abuse	67 (75.3)	4.45	4.44	0.00	22.58	1.88	5.18
Emotional neglect	23 (25.8)	1.36	2.66	0.00	12.40	2.18	4.64
Physical neglect	30 (33.7)	1.63	2.81	0.00	16.32	2.34	7.64
Dissociation (DES-II)		6.17	4.87	0.00	23.57	1.03	0.97
Attachment style (RQ)							
Secure		4.64	1.55	1.00	7.00	-0.62	-0.36
Dismissive		3.22	1.51	1.00	7.00	0.53	-0.74
Preoccupied		2.44	1.43	1.00	7.00	0.88	0.09
Fearful		2.76	1.80	1.00	7.00	0.70	-0.78
Self-reported paranoid traits (SPQ)		1.25	1.53	0.00	7.00	1.69	3.03
Interview-based paranoid traits (SCID-II)		1.65	2.30	0.00	12.00	1.99	4.58

RQ = Relationship Questionnaire; ITEC = Interview for Traumatic Experiences in Childhood; DES-II = Dissociative Experiences Scale; SPQ = Schizotypal Personality Questionnaire; SCID-II = Structured Clinical Interview for DSM-IV Axis II; SD = Standard Deviation.

mediation analyses (PROCESS Model 4) testing dissociation and attachment styles as two explanatory pathways between emotional abuse and both measures of paranoid traits, respectively. In comparison to multiple single mediator analyses, parallel mediation as introduced by Hayes (2013) accounts for the variance explained by the other mediator and thus offers a more precise estimate of the specific indirect effects. The utility of exploring unique mechanistic pathways with the use of parallel mediation in psychosis research has been repeatedly demonstrated (Pearce et al., 2017; Sheinbaum et al., 2014).

Third, an alternative model using serial indirect effects (PROCESS Model 6) was explored. In contrast to parallel mediation, serial multiple mediator models presume an a priori causal relationship between the mediators. By entering insecure attachment styles as preceding mediators to dissociation, it was possible to examine whether insecure attachment explained the effect of emotional abuse on dissociation (Hayes & Rockwood, 2017) and dissociation explained the effect of attachment on paranoia. Statistical significance of the indirect effects was evaluated with the use of 95% bootstrapped bias-corrected confidence intervals (CI) with 10,000 draws.

### 3. Results

Independent t-tests showed there were no significant sex differences on any of the investigated variables, emotional abuse  $t(87) = 0.30, p = .78$ ; dissociation:  $t(87) = -0.91, p = .36$ ; self-reported paranoid traits:  $t(87) = 0.37, p = .71$ ; interview-based paranoid traits:  $t(87) = 1.51, p = .13$ ; secure attachment:  $t(87) = 1.16, p = 1.34$ ; dismissive attachment:  $t(87) = 1.07, p = .29$ ; preoccupied attachment:  $t(87) = 0.77, p = .44$ ; fearful attachment:  $t(87) = -0.72, p = .47$ . For the sake of completeness, all forms of childhood maltreatment were examined in the descriptive analysis (see Table 1). Out of all participants, 86.5% ( $n = 77$ ) indicated the experience of some form of childhood maltreatment. On average, participants reported experiencing dissociation 6.17% ( $SD = 4.87$ ) of the time, which is slightly above the cut-off (5.4) for the general population (Carlson & Putnam, 1993). Secure attachment had the highest mean average of all attachment styles, followed by dismissing, fearful, and preoccupied attachment. Self-reported paranoid traits were slightly

lower compared to prior research conducted in a similar cohort (Fonseca-Pedrero et al., 2014). Mean interview-based paranoid traits were comparable to previous nonclinical research (Chun, Barrantes-Vidal, Sheinbaum, & Kwapil, 2017).

#### 3.1. Correlational analysis

Correlation analysis (Table 2) indicated positive significant correlations of emotional abuse with preoccupied and fearful attachment, dissociation, and paranoid traits (self-reported and interview-based). Dissociation showed significant positive associations with both self-reported and interview-based paranoid traits. Dissociation also correlated negatively with secure attachment, and positively with preoccupied and fearful attachment, but not with the dismissing style. Fearful and preoccupied attachment showed positive correlations with paranoid traits while secure attachment was negatively associated with all other measures. Following Cohen (1992), correlations between dissociation and self-reported paranoid traits, emotional abuse and self-reported paranoid traits, preoccupied attachment and interview-based paranoid traits, as well as between both measures of paranoid traits, were of a large magnitude. The associations of fearful attachment with both paranoid trait measures, as well as between emotional abuse, dissociation, and interview-based paranoid traits, were of a medium magnitude. Most other correlations were of a small effect size.

#### 3.2. Mediation analyses

As recommended by Hayes (2013), parameter estimation and interpretation are based on the unstandardized (raw) coefficients. After entering all three insecure attachment styles as parallel mediators in the models for interview-assessed and self-reported paranoid traits, preoccupied and fearful attachment significantly mediated the effect of emotional abuse on both paranoid trait measures. The parameter estimates of the indirect effects in the model for self-reported paranoid traits were:  $b = 0.018$ ; 95% CI [0.002; 0.047] for preoccupied, and  $b = 0.020$ ; 95%

**Table 2.** Correlational matrix.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Emotional abuse								
2. Secure attachment	-.18							
3. Dismissive attachment	.08	-.27*						
4. Preoccupied attachment	.24*	-.29**	-.02					
5. Fearful attachment	.26*	-.47**	.33**	.09				
6. Dissociation	.31**	-.23*	.17	.21*	.24*			
7. Self-reported paranoid traits	.50**	-.26*	.24*	.33**	.39**	.53**		
8. Interview-based paranoid traits	.49**	-.30**	.15	.50**	.33**	.44**	.59**	

Correlations of medium effect size are marked bold. Correlations of large effect size are marked bold and are italicized.

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).



CI [0.001; 0.052]) for fearful attachment. The parameter estimates of the indirect effect in the model for interview-based paranoid traits were:  $b = 0.050$ ; 95% CI [0.011; 0.103]) for preoccupied and  $b = 0.025$ ; 95% CI [0.001; 0.073]) for fearful attachment. The dismissing style was not a significant mediator of the association of emotional abuse with self-reported (indirect effect:  $b = 0.004$ ; 95% CI [-0.006; 0.048]) or interview-based paranoid traits (indirect effect:  $b = 0.003$ ; 95% CI [-0.006; 0.041]). Thus, only preoccupied and fearful attachment were tested as parallel mediators alongside dissociation.

### 3.2.1. Attachment insecurity and dissociation as parallel mediators

The results of the parallel mediation analyses can be found in Table 3 for preoccupied attachment and Table 4 for fearful attachment. Overall, the total, direct, and total indirect effects of each model were all significant according to the bias-corrected bootstrapped 95% CI. Dissociation was a significant mediator in the models for both self-reported and interview-assessed paranoid traits. Also, preoccupied attachment significantly mediated the relation of emotional abuse with both self-

reported and interview-based paranoid traits. Figure 1 displays the parallel mediation model estimating the indirect effect of emotional abuse on interview-based paranoid traits via preoccupied attachment and dissociation. All regression pathways were significant, indicating that emotional abuse predicts dissociation ( $a1: b = 0.343$ , 95% CI [0.121; 0.565],  $p = .03$ ) and preoccupied attachment ( $a2: b = 0.077$ , 95% CI [0.010; 0.143],  $p = .03$ ), which in turn predicted interview-based paranoid traits. When entered as a parallel mediator alongside dissociation, results indicated that fearful attachment was a significant mediator between emotional abuse and self-reported paranoid traits ( $b = 0.019$ ; 95% CI [0.003; 0.050]), but not interview-based paranoid traits ( $b = 0.024$ ; 95% CI [0.000; 0.075]).

### 3.2.2. Serial multiple mediation

The results of the serial multiple mediator models can be found in Table 5 for preoccupied and Table 6 for fearful attachment. All four models revealed significant total, direct, and overall indirect effects. However, none of the models resulted in a significant serial mediation effect. Neither fearful ( $b = 0.006$ ; 95% CI [0.000; 0.024]) nor preoccupied attachment ( $b = 0.050$ ; 95% CI

**Table 3.** Preoccupied attachment and dissociation as parallel mediators of the effect of emotional abuse on paranoid traits.

	Raw parameter estimate	Standard error	95% Bias-corrected Confidence Interval (CI)	
			Lower	Upper
<b>Self-reported paranoid traits</b>				
Total effect	0.171*	0.044	0.083	0.259
Direct effect	0.115*	0.039	0.038	0.192
Total indirect effect	0.056*	0.023	0.019	0.112
Indirect effect via dissociation	0.042*	0.020	0.010	0.091
Indirect effect via preoccupied attachment	0.014*	0.009	0.001	0.038
<b>Interview-based paranoid traits</b>				
Total effect	0.252*	0.076	0.101	0.403
Direct effect	0.164*	0.059	0.047	0.281
Total indirect effect	0.088*	0.038	0.027	0.179
Indirect effect via dissociation	0.043*	0.030	0.004	0.128
Indirect effect via preoccupied attachment	0.046*	0.021	0.011	0.098

Results are based on 10,000 bias-corrected bootstrap samples.

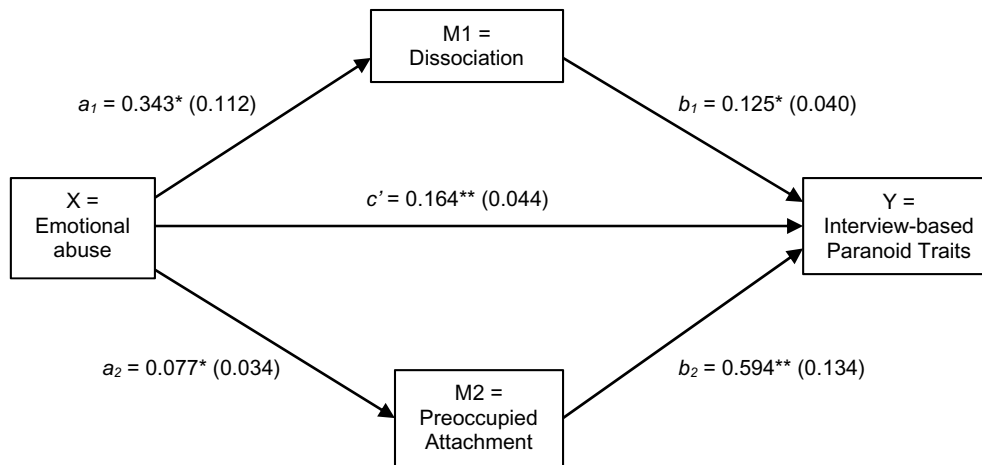
\*95% CI does not include zero.

**Table 4.** Fearful attachment and dissociation as parallel mediators of the effect of emotional abuse on paranoid traits.

	Raw parameter estimate	Standard error	95% Bias-corrected Confidence Interval (CI)	
			Lower	Upper
<b>Self-reported paranoid traits</b>				
Total effect	0.171*	0.044	0.082	0.259
Direct effect	0.111*	0.037	0.038	0.184
Total indirect effect	0.060*	0.026	0.017	0.122
Indirect effect via dissociation	0.041*	0.020	0.011	0.093
Indirect effect via fearful attachment	0.019*	0.011	0.003	0.050
<b>Interview-based paranoid traits</b>				
Total effect	0.252*	0.076	0.102	0.403
Direct effect	0.182*	0.066	0.050	0.314
Total indirect effect	0.070*	0.043	0.010	0.189
Indirect effect via dissociation	0.047*	0.032	0.004	0.136
Indirect effect via fearful attachment	0.024	0.018	0.000	0.075

Results are based on 10,000 bias-corrected bootstrap samples.

\*95% CI does not include zero.



**Figure 1.** Parallel mediation model.

Note. X = independent variable; M1 = first mediator; M2 = second mediator; Y = dependent variable. Standard errors are reported in parenthesis. \* $p < .05$ ; \*\* $p < .01$ .

**Table 5.** Preoccupied attachment and dissociation as serial mediators of the effect of emotional abuse on paranoid traits.

	Raw parameter estimate	Standard error	95% Bias-corrected Confidence Interval (CI)	
			Lower	Upper
<b>Self-reported paranoid traits</b>				
Total effect	0.171*	0.044	0.083	0.259
Direct effect	0.115*	0.039	0.038	0.192
Total indirect effect	0.056*	0.023	0.019	0.114
Indirect effect via dissociation	0.038*	0.019	0.007	0.089
Indirect effect via preoccupied attachment	0.014*	0.009	0.001	0.038
Serial indirect effect (EA → PREO → DIS → Self-reported Paranoid Traits)	0.005	0.004	-0.001	0.018
<b>Interview-based paranoid traits</b>				
Total effect	0.252*	0.076	0.101	0.403
Direct effect	0.164*	0.059	0.047	0.281
Total indirect effect	0.088*	0.038	0.026	0.180
Indirect effect via dissociation	0.038*	0.028	0.002	0.120
Indirect effect via preoccupied attachment	0.046*	0.021	0.010	0.096
Serial indirect effect (EA → PREO → DIS → Interview-based Paranoid Traits)	0.005	0.005	-0.001	0.022

Results are based on 10,000 bias-corrected bootstrap samples (EA = Emotional Abuse; PREO = Preoccupied Attachment; DIS = Dissociation). \*95% CI does not include zero.

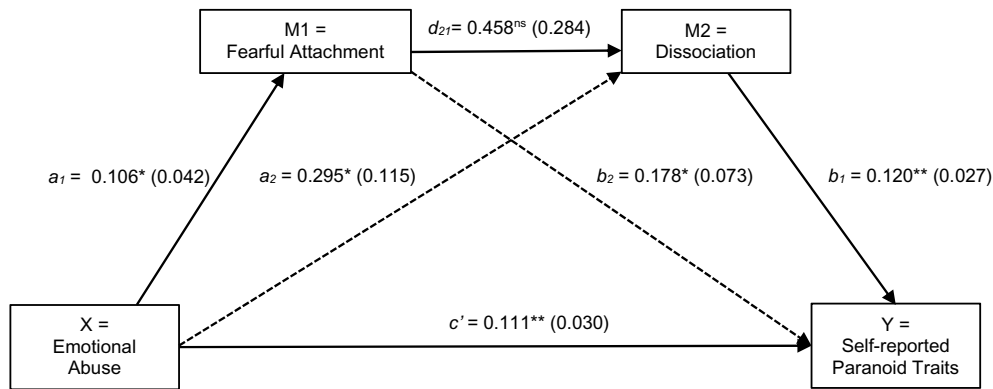
[-0.001; 0.018]) significantly predicted dissociation in the serial mediation model for self-reported paranoid traits (see example in Figure 2). Comparable results

were obtained for interview-based paranoid traits (fearful:  $b = 0.007$ ; 95% CI [0.000; 0.037]; preoccupied:  $b = 0.005$ ; 95% CI [-0.001; 0.023]).

**Table 6.** Fearful attachment and dissociation as serial mediators of the effect of emotional abuse on paranoid traits.

	Raw parameter estimate	Standard error	95% Bias-corrected Confidence Interval (CI)	
			Lower	Upper
<b>Self-reported paranoid traits</b>				
Total effect	0.171*	0.044	0.083	0.259
Direct effect	0.111*	0.037	0.038	0.184
Total indirect effect	0.060*	0.027	0.015	0.049
Indirect effect via dissociation	0.035*	0.019	0.007	0.086
Indirect effect via fearful attachment	0.019*	0.011	0.002	0.049
Serial indirect effect (EA → FEAR → DIS → Self-reported Paranoid Traits)	0.006	0.005	0.000	0.023
<b>Interview-based paranoid traits</b>				
Total effect	0.252*	0.076	0.101	0.403
Direct effect	0.182*	0.066	0.050	0.314
Total indirect effect	0.070*	0.043	0.012	0.118
Indirect effect via dissociation	0.040*	0.028	0.004	0.121
Indirect effect via fearful attachment	0.024	0.018	0.000	0.077
Serial indirect effect (EA → FEAR → DIS → Interview-based Paranoid Traits)	0.007	0.007	0.000	0.036

Results are based on 10,000 bias-corrected bootstrap samples (EA = Emotional Abuse; FEAR = Fearful Attachment; DIS = Dissociation). \*95% CI does not include zero.



**Figure 2.** Serial multiple mediator model.

Note. X = independent variable; M1 = first mediator; M2 = second mediator; Y = dependent variable. Standard errors are reported in parenthesis. \* $p < .05$ ; \*\* $p < .01$ .

#### 4. Discussion

The present study aimed to extend previous findings suggesting dissociation and attachment insecurity serve as traumagenic pathways from childhood adversity to paranoid traits in adulthood. In order to overcome previous methodological shortcomings, interview-based measures for childhood trauma and paranoid traits were used. Additionally, an alternative model testing a serial mediation relationship between attachment and dissociation was explored. Overall, results support dissociation as an explanatory link between emotional abuse and paranoid traits. When comparing all insecure attachment styles, only styles high in attachment anxiety (preoccupied and fearful) were significant mediators. When examined simultaneously with dissociation, preoccupied attachment, not fearful attachment, was the most robust mediator. Meanwhile, the current findings did not support the hypothesis that insecure attachment and dissociation are linked in serial in the pathway to nonclinical paranoid traits.

At first glance, the pathway from emotional abuse to paranoid traits via preoccupied attachment may appear odd considering that preoccupied people tend to have negative self-schema, but positive views of others (Bartholomew & Horowitz, 1991). However, an association between preoccupied attachment and paranoid traits has been reported in nonclinical (Ciocca et al., 2017; Sheinbaum et al., 2015) and clinical cohorts (Ponizovsky, Vitenberg, Baumgarten-Katz, & Grinshpoon, 2013). A relevant model for understanding this finding is that of Trower and Chadwick (1995) that posits the existence of two types of paranoia. The first type is ‘poor me’ paranoia, in which the perceived hostility is undeserved. In contrast, individuals with the second type, called ‘bad me’ paranoia, blame themselves for the persecution. Congruent with the ‘bad me’ paranoia type, there is substantial research emphasizing the crucial role of low self-esteem and negative self-schemas in

the aetiology of persecutory delusions (Kesting & Lincoln, 2013). It appears that even subtle paranoid traits are related to the hyperactivation of attachment needs and the core belief that one is insufficient and unwanted (Lorenzini & Fonagy, 2013; Sheinbaum et al., 2015).

The empirical findings correspond with theories that experiences of (interpersonal) childhood adversity can result in a sensitized stress system (Rutten et al., 2013). As a common feature in the model of latent vulnerability, the heightened stress reactivity in trauma-exposed individuals increases susceptibility to daily life and interpersonal stressors (McCrorry, Gerin, & Viding, 2017). Specifically, insecure attachment styles containing the hyperactivation of attachment needs (fearful and preoccupied attachment) appear to aggravate vigilance towards threat cues (Mikulincer & Shaver, 2019). As a consequence, these trajectories may amplify the risk for psychotic experiences, including paranoid traits (Sheinbaum et al., 2015, 2014).

The second main finding of this study was that dissociation significantly mediated the effect of emotional abuse on both paranoid trait measures even when accounting for insecure attachment styles. Combined with the clinical evidence of Pearce and colleagues (Pearce et al., 2017), the results support the notion of an explanatory pathway from childhood trauma to paranoid traits via dissociation in the extended psychosis phenotype (Van Os & Reininghaus, 2016). But how exactly could dissociative experiences contribute to the development of paranoia? One possibility relates to the strong resemblance of nonclinical dissociation and basic symptoms in the prodromal phase of psychosis. Basic symptoms contain perceptual anomalies triggered by everyday situations, for instance ‘decreased emotional and gestalt connection with the environment’ (Schultze-Lutter, 2009, p. 7). Furthermore, both dissociative and basic symptoms fall within the boundaries of positive schizotypy. The main difference between these anomalous experiences and full-blown psychosis is that the individual immediately recognizes them as subjective sensory

disturbances, instead of externally attributing them to someone or something else taking control over mind and body. According to Sass and Parnas (2003), these subtle forms of reality disturbance reflect the psychosis prodrome defined by a 'loss of inhabiting one's own actions, thoughts, feelings, impulses, bodily sensations, or perceptions', called diminished self-affection (Sass & Parnas, 2003, p. 431).

This corresponds with Morrison, Frame, and Larkin (2003) who argue that psychosis might be related to post-traumatic intrusions following traumatic experiences. In consequence, it is suggested that what the world regards as 'being psychotic' might actually reflect for some patients a culturally inappropriate interpretation of post-traumatic intrusions. The model states that dissociation and paranoia, e.g. elevated suspiciousness about other's trustworthiness, could function as (maladaptive) coping strategies to avoid further abusive experiences and cope with distressing intrusions. In other words, dissociation may play an ambivalent role in the face of adversity. On the one hand, it serves a protective function in allowing the maltreated child to maintain physical proximity to the caregiver offering food and security while also dissociating from the abusive behaviour of the caregiver (Debbané et al., 2016). On the other hand, one might speculate that dissociation, potentially fostering a sense of isolation (Morrison et al., 2003) and diminished self-affection (Sass & Parnas, 2003), also increases feelings of paranoia.

Bentall et al. (2014) proposed that dissociation as a response to severe trauma (e.g. sexual abuse) is primarily related to hallucinations, whereas paranoia may arise from insecure attachment originated in childhood neglect. Although a certain degree of aetiological specificity might seem parsimonious (Bentall et al., 2014), our results together with those of prior studies (Cole et al., 2016; Pearce et al., 2017) suggest that other types of childhood maltreatment might also confer risk for dissociative experiences and insecure attachment styles in the context of psychosis. Moreover, both factors, not only attachment insecurity, seem to facilitate the development of paranoid experiences. Alternatively, Berry and Bucci (2016) have introduced a cognitive attachment model of hearing voices, in which emotional abuse internalized as disorganized attachment is a precursor of dissociated self-states. Combined with source-monitoring deficits, dissociation is proposed to reinforce the vicious cycle from hearing voices to maladaptive appraisals and dysfunctional coping of the auditory hallucinations. Arguably, a modified model for paranoia, including interactions between maladaptive appraisals (e.g. of interpersonal ambiguity) and coping strategies (e.g. self-to-blame coping responses) may present similar trauma-attachment anxiety-dissociation trajectories.

It was further speculated that insecure attachment precedes dissociative experiences as a coping response to elevated interpersonal stressors related to insecure attachment. However, the current findings did not

support such a serial mediation model. Meanwhile, prior research found that fearful attachment uniquely predicted dissociation in undergraduate females (Sandberg, 2010) and that insecure attachment mediated the association of abuse with dissociation in clinical and at-risk cohorts (Byun et al., 2016; Kong et al., 2018). With respect to the inconsistent results, and considering that the current marginally insignificant estimates may be due to insufficient statistical power, more research is warranted to elucidate the (potentially reciprocal) relationship of insecure attachment styles and dissociation in psychosis.

Some limitations of this study should be acknowledged. First, it could be argued that the current sample size ( $N = 89$ ) is not sufficiently large in light of multiple statistical analyses including different predictors and dependent variables. However, we limited the study to a narrow range of a priori hypotheses, and the current results may provide unique information considering the extensive interview-based assessment of childhood trauma and paranoid traits. Considering the established dose-response relationship between childhood adversity and psychosis risk, it was crucial that the severity of early traumatic material was carefully assessed based on parameters such as frequency and duration. Nevertheless, replication studies with larger samples are clearly needed. Second, the results appeared to represent relatively small effects and should be interpreted with caution. Still, it is worth noting that significant effects were detected in a highly protected sample of nonclinical psychology undergraduates. Third, due to the lack of longitudinal data or experimental manipulation on current symptomatology, no statement about causality can be made with regards to dissociation, attachment styles, and paranoid traits. For example, theoretical and empirical literature suggested a causal relationship between insecure attachment and dissociation, but the reverse may also be the case. Therefore, future path model analyses should account for the possibility that dissociative experiences (e.g. feelings of detachment) might reinforce insecure attachment behaviour. Fourth, the current models do not account for depressive symptoms as a potentially confounding factor despite the fact that prior research has established meaningful associations of depression with dissociation (Sar, Akyüz, Öztürk, & Alioğlu, 2013), attachment insecurity (Roberts, Gotlib, & Kassel, 1996), and paranoia (Freeman & Garety, 2014). Fifth, the present sample consisted of a predominantly female and Caucasian cohort which might impede generalization of our findings to male populations and other ethnic backgrounds (Iacovino, Jackson, & Oltmanns, 2014). At last, a challenging issue in the study of trauma in relation to paranoid traits is to what extent some of the traits defining paranoid personality might be actually tapping trauma-based mistrust. Although this fact *per se* would not make the causal contribution invalid, it would make it challenging to differentiate the constructs investigated,

that is, the causal mechanism and the resulting phenotype. In this sense, the fact that the sample of this study was *unselected* in terms of trauma history, makes this issue less problematic.

To our knowledge, this is the first study to test both dissociation and insecure attachment styles as parallel mediators within the traumagenic model of paranoid traits with the use of interview-based measures. The investigation of aetiological trajectories in a cohort with a wide distribution of schizotypy scores can be crucial to advancing our understanding of the impairments in reality monitoring and social-cognitive deficits expressed in the overall population without the risk of clinical confounding factors such as antipsychotic medication (Barrantes-Vidal, Grant, & Kwapil, 2015). Our results provide tentative support to former findings emphasizing the role of dissociation and attachment insecurity as risk factors for paranoid traits and suggest that experiences of childhood emotional abuse reported by a nonclinical cohort can have pervasive and long-lasting consequences into adulthood. As a next step, replication studies and longitudinal designs are necessary to validate the cross-sectional mediation models and further explore the relationship between attachment anxiety and dissociation. We are hopeful that future research will pay more attention to dissociation as a risk factor for both clinical and nonclinical paranoid traits.

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No potential conflict of interest was reported by the authors.

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### Data availability statement

The data that support the findings of this study are available on request from the corresponding author N.B.V. The data are not publicly available due to privacy or ethical restrictions.


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