Insecure attachment as a transdiagnostic risk factor for major psychiatric conditions: A meta-analysis in bipolar disorder, depression and schizophrenia spectrum disorder

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ARTICLE INFO

ABSTRACT

Insecure attachment has been suggested as a major risk factor for mental health problems as well as a key element for the development and trajectory of psychiatric disorders. The aim of this meta-analysis was to assess whether insecure attachment constitutes a global transdiagnostic risk factor in bipolar disorder, depression, and schizophrenia spectrum disorders. We conducted a PRISMA-based systematic quantitative review to explore the prevalence of insecure attachment among patients of three representative psychiatric disorders - major depression, schizophrenia spectrum disorders and bipolar disorder - in comparison with healthy controls (HC) from a transdiagnostic point of view. Effect sizes on differences of *anxious*, *avoidant* and *insecure* prevalence were calculated based on 40 samples including a total of n = 2927 individuals. Overall, results indicated a large effect on prevalence of insecure attachment across all disorders compared to HC (k = 30, g = 0.88, I^2 = 71.0%, *p* < 0.001). In a transdiagnostic comparison, the only difference was found in *avoidant* attachment, which was significantly lower (*p* = 0.04) compared to HC in the schizophrenia spectrum disorder subgroup (k = 10, g = 0.31, I^2 = 76.60%, *p* < 0.0001) than the depression subgroup subgroup (k = 12, g = 0.83, I^2 = 46.65%, *p* < 0.0001). The lack of further transdiagnostic differences between three distinct psychiatric disorders corroborates insecure attachment as a general vulnerability factor to psychopathology. Our findings warrant further investigations, which should explore the pathways from attachment insecurity towards psychopathology. Insecure attachment likely has implications on assessment, prediction and treatment of psychiatric patients.

1. Introduction

Negative experiences with attachment figures might accumulate in insecure attachment and may be among global potential risk factors for diverse disorders, such as bipolar disorder, schizophrenia spectrum disorder and depression (Carr et al., 2018; Dagan et al., 2018; Kefeli et al., 2018). Insecure attachment affects interpersonal functioning (Couture et al., 2007), emotion regulation (Fuchshuber et al., 2019; Pascuzzo et al., 2015) and entails adverse representations about the self and others such as a low self-worth and unreliability of others

(Bartholomew and Horowitz, 1991; Bylsma et al., 1997; Collins and Read, 1994; Gamble and Roberts, 2005). Insecure attachment is associated with increased sensitivity to stress, hyperarousal, a negative self-view and ineffective coping strategies in times of crisis like the loss of a loved one (Mikulincer and Shaver, 2012). Thus, attachment insecurity in adulthood is associated with several negative consequences at the psychological level, which characterize (or increase the risk for) several psychiatric conditions (Mikulincer and Shaver, 2012; Pielage et al., 2000).

Research on adult attachment over the past 30 years follows two

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distinct conceptualizations (Antonucci et al., 2018; Belsky, 2002; Roisman et al., 2007): The developmental trajectory of adult attachment made use of the Adult Attachment Interview (AAI, George et al., 1986) and examines the adult's "attachment state of mind" with respect to childhood attachment experiences (Main et al., 1985). Here, attachment security (or insecurity) is assessed through a narrative assessment of an individual's childhood experiences with caregivers, i.e. attachment figures, and their impact on personality development and behaviour in close relationships in adulthood (Main et al., 1985). This meta-analysis, however, reviews studies focused on the attachment concept from the social and personality psychology conceptualization, mostly referred to as *adult attachment* (Bartholomew, 1997; Belsky, 2002; Crowell et al., 2008; Feeney, 2008; Hazan and Shaver, 1987). Within this line of research, it is proposed that attachment security and insecurity are shaped by actual relationships and attachment is regarded as a "work in progress" system (Belsky, 2002). Adult relationships are interpreted as attachment processes: In the face of threat or stress, adults seek proximity to their partner and a feeling of security is established when the attachment figure is near (Bartholomew and Horowitz, 1991; Collins, 1996; Crowell et al., 2008; Hazan and Shaver, 1987). Adult attachment is thought to integrate different psychological domains such as cognitive structures, behavioral strategies and conscious and subconscious representations of attachment experiences (Crowell et al., 2008; Mikulincer et al., 2002). For the most part, attachment is conceptualized as a domain-general interpersonal construct (Crowell et al., 2008), i.e. most assessments of adult attachment do not focus on specific relationships but regard attachment as a global psychological variable with implications on interpersonal relationships in general. The developmental aspects of childhood experiences on adult attachment security (or insecurity), though not denied, are no major focus within this line of research.

Adult attachment research identified three main types of insecure attachment styles (Bartholomew and Horowitz, 1991; Feeney et al., 1994). "Anxiously" (also referred to as "preoccupied") attached individuals focus on the attachment figures' availability, fear rejection, express high need for approval and panic when confronted with abandonment or unresponsiveness (Bartholomew and Horowitz, 1991; Hazan and Shaver, 1987). "Dismissing"-avoidantly (also referred to as "avoidant") attached individuals feel discomfort with closeness, blind out personal vulnerabilities or needs and downplay their desire to be close to attachment figures (Bartholomew and Horowitz, 1991; Hazan and Shaver, 1987). "Fearful"-avoidantly attached individuals show a labile self-worth, desire for close bonds and fear of being abandoned (Bartholomew, 1998; Bartholomew and Horowitz, 1991). However, due to their negative concept of self and others, they mostly rely on deactivating strategies resisting closeness (Bartholomew, 1998; Bartholomew and Horowitz, 1991).

In an attempt to improve on the categorical assessment and to reveal latent structures of a growing body of different measurements, two higher-order factors were identified: "attachment anxiety" and "attachment avoidance" (Brennan et al., 1998). To measure individual differences of attachment more precisely and to improve on psychometric validity many newer attachment measurements are based on these dimensional variables instead of categorical assessments of attachment styles (Berry et al., 2006; Brennan et al., 1998; Fraley et al., 2011).

Taken together with the observation that putatively distinctive psychiatric diagnoses often overlap in symptoms (Widiger, 2005), there is a growing call for a transdiagnostic approach to psychiatric disorders, in which risk factors should be examined more globally (Dalgleish et al., 2020; McGorry and Nelson, 2016). In doing so, transdiagnostic approaches focus on processes that are common to often highly comorbid disorders (Kessler et al., 2005), and may thus advance our understanding of psychiatric comorbidities.

Insecure attachment, among many transdiagnostic risk factors, has been linked to different psychopathologies (Mikulincer and Shaver, 2012). This set of putatively transdiagnostic risk factors comprises increased sensitivity to stress (Hammen, 2015), childhood maltreatment (Jaffee, 2017), trauma (Lindert et al., 2014), genetics (Foley et al., 2017; Howard et al., 2019), gender (Abel et al., 2010; Kuehner, 2017; Van de Velde et al., 2010) and rumination (Beck, 1979). The transdiagnostic relevance of attachment *insecurity* is implied by its strong association with various disorders such as anxiety disorders (Huang et al., 2019; Marganska et al., 2013; Schimmenti and Bifulco, 2015), obsessive-compulsive-disorder (Doron et al., 2012), post-traumatic stress disorder (Ein-Dor et al., 2010), eating disorders (Illing et al., 2010), personality disorders (Crawford et al., 2007), and bipolar disorder (Citak and Erten, 2021; Morriss et al., 2009). In meta-analyses, strong links between attachment insecurity on the one hand and psychotic disorders (Carr et al., 2018; Korver-Nieberg et al., 2014), risk conditions for psychotic disorders such as schizotypy (Goodall et al., 2015; Hugill et al., 2017; Tiliopoulos and Goodall, 2009), and major depression (Dagan et al., 2018) on the other hand were established. Taken as a whole, these findings have made way for positioning attachment insecurity within transdiagnostic models of general psychopathology in recent years (Ein-Dor and Doron, 2015; Ein-Dor et al., 2016; Kobak and Bosmans, 2019; Mikulincer and Shaver, 2012). Thus, a more global perspective and an objective estimate of the magnitude insecure attachment has on different psychiatric disorders is needed.

The aims of this meta-analysis were to assess whether *insecure* attachment is more prevalent in bipolar disorder, depression and schizophrenia spectrum disorder subgroups as compared to HC. Further, we aimed to investigate the difference in prevalence of *anxious* attachment and *avoidant* attachment in bipolar disorder, depression and schizophrenia spectrum disorder subgroups as compared to HC. Consequently we examined whether a significant difference emerges in a transdiagnostic comparison of effect sizes for *insecure, anxious,* and *avoidant* attachment.

2. Methods

2.1. Search strategy

Relevant peer-reviewed studies investigating attachment and the psychiatric disorders of interest were searched for via two databases, *Pubmed* and *Web Of Science* using the search term *("attachment" or "adult attachment")* in combination with the disorders of interest *("bipolar disorder" OR "bipolar" OR "affective disorder"), ("major depression" OR "depressive" OR "affective disorder")* or *("psychosis" OR "schizophrenia" OR "schizophrenic" OR "psychotic")* All results published up to September 14, 2020 were included in the screening process and no geographical restrictions were imposed. Further hand searches were conducted in relevant references lists, and findings were cross-referenced with already existing meta-analysis and reviews. In case studies investigated attachment but did not provide sufficient information to be included into our meta-analysis, authors were contacted twice via e-mail and asked to provide additional data. If there was no response, studies were excluded. Our workflow complied with the information assessment as suggested by the PRISMA statement (Moher et al., 2009). The meta-analysis was publicly registered on April 29, 2020 in advance on the open science framework (https://osf.io/4eqw2/).

2.2. Inclusion criteria

For a systematic screening of each study, we defined the following *a priori* hierarchically ordered inclusion criteria: (i) article was published in English, (ii) published in a peer-reviewed journal, (iii) reported original data, (iv) article compared a group of patients (n $>= 3$) with either bipolar disorder (bipolar disorder I, bipolar disorder II and no restriction to a specific mood state), major depression or a schizophrenia spectrum disorder, diagnosed with a standardized diagnostic instrument such as the Diagnostic and Statistical Manual of Mental Disorders

(American Psychiatric Association, 2013) or the International Classification of Diseases (World Health Organization, 1992) with a group of HC, (v) article reported quantitative scores based on an established instrument to assess attachment in adults (e.g. Experiences in Close Relationship-Questionnaire (ECR (Brennan et al., 1998)), Experiences in Close Relationship-Revised-Questionnaire (ECR-R (Fraley et al., 2000)), Attachment Style Questionnaire (ASQ (Feeney et al., 1994)), Bartholomew–Horowitz Relationship Questionnaire (RQ (Bartholomew and Horowitz, 1991)). Studies were excluded if participants had a diagnosis with one of the three psychiatric disorders due to another medical condition or due to substance abuse. Studies were excluded as soon as one inclusion criterion was not sufficiently met.

3. Attachment

Contrary to our original registration (https://osf.io/4eqw2/), due to limited availability of studies reporting data on the concept *attachment state of mind*, we restricted the search and inclusion to studies using the concept of *adult attachment* (Bartholomew and Horowitz, 1991; Brennan et al., 1998; Hazan and Shaver, 1987). Attachment theories and their scales based on the adult attachment concept (Crowell et al., 2008; Hazan and Shaver, 1987) were considered eligible if they either (i) included measures of specific attachment styles assessed categorically (e.g. "anxious", "avoidant" and "fearful") or (ii) allowed a consistent interpretation of multiple dimensional scales as either toward insecure or secure attachment by mean values and standard deviations or (iii) allowed a consistent interpretation of multiple dimensional scales as either toward "attachment anxiety" or "attachment avoidance" by mean values and standard deviations. Three independent researchers came to agree on eligibility of questionnaires.

In case studies reported data on "fearful" attachment, this data was included into our analysis of *insecure* attachment but excluded from *anxious* attachment or *avoidant* attachment. Although some overlap with the "avoidant-dismissing" attachment category exists, "fearful" attachment style constitutes a phenotypically separate attachment category (Bartholomew and Horowitz, 1991).

3.1. Study selection

Screening was performed separately per diagnosis (major depression, schizophrenia spectrum disorder and bipolar disorder) and each step was performed by two authors. Interrater conflicts were discussed with a third author until consensus was reached. The final sample comprised 8 studies on bipolar disorder, 12 on depression and 10 on schizophrenia spectrum disorder.

3.2. Coding procedure

Data was extracted from eligible articles by one author (SH), and probed randomly by a second author (LB, NP) for approximately 30% of all data entries. Extracted data included sample characteristics (e.g. gender, age), if available further specifications of clinical sample characteristics (type of bipolar disorder i.e. bipolar I, II or none other specified, current mood state, severity and type of negative and positive symptoms in schizophrenia spectrum disorders e.g. as assessed with Positive and Negative Syndrome Score (Kay et al., 1987), symptomatic schizophrenia spectrum disorder or in remission, severity of depression based on common scores and inventories such as Beck's Depression Inventory (Beck et al., 1961), socio-economic status, educational level, current medication, length of illness, age of onset), if available diagnostic specifications of non-affective/non-psychotic comorbidities, the type of scale that has been used to assess attachment dimensions and relevant outcome data (e.g. means, standard deviations, proportions). If necessary, effect sizes were derived from other reported statistics (e.g. t-values, F-values) as specified in Cochrane's Handbook for Meta-Analyses (Higgins et al., 2019).

3.3. Strategy for data synthesis

All statistical analyses were conducted in the *R* language for statistical computing (Version 4.0.2 (R Development Core Team, 2020)); for the meta-analytic procedure, we used the 'metafor' package (Viechtbauer, 2010). Three random-effects meta-analyses of *anxious* attachment, *avoidant* attachment and *insecure* attachment were conducted to compare their prevalence between patient groups and HCs in terms of the standardized mean difference (SMD, computed as Hedge's g). Our synthesis strategy allowed for inclusion of a) dichotomous and b) continuous data.

a) Dichotomous data represented the assignment of individuals into attachment categories or styles. First, we calculated ORs based on the dichotomous data. The ORs represent the likelihood of the clinical sample being categorized as "anxious", "avoidant" or "insecure". Next, we transformed these ORs into SMDs using the formulae specified in Cochrane's Handbook for Meta-Analyses (Higgins et al., 2019).

b) Continuous data obtained from primary studies represented the scoring on scales assessing attachment dimensionally, e.g. as "attachment anxiety" or "attachment avoidance" in the ECR (Brennan et al., 1998). If a study reported more than one measure for a specific attachment dimension (e.g., two variables representing "attachment anxiety"), measures were aggregated by using their unweighted mean. Mean values and SDs of continuous scales were then used to calculate a SMD. Analogously, these analyses were repeated with outcomes for *anxious* and *avoidant* attachment aggregated into an *insecure* outcome domain.

In the following, we use the terms *anxious* attachment and *avoidant* attachment *in italic* to refer to our synthesized effect sizes which combine.

a) primary dichotomous data transformed into continuous data based on categorical assessment of "anxious" or "avoidant" attachment as styles and

b) primary continuous data representing attachment assessed dimensionally as "attachment anxiety" and "attachment avoidance".

Our aggregated effect sizes *anxious* and *avoidant* attachment are thus not equivalent to the dimensions of "attachment avoidance" or "attachment anxiety", which constitute modern measurements of adult attachment (e.g. the ECR or PAM).

If studies reported data on "fearful" attachment, this data was included into our analysis of *insecure* attachment but excluded from *anxious* attachment or *avoidant* attachment. Although some overlap with the "avoidant-dismissing" attachment category exists, "fearful" attachment style constitutes a phenotypically separate attachment category (Bartholomew and Moretti, 2002).

The effect sizes in Hedge's g expresses the difference in insecure attachment between the diagnostic subgroup and the HC group in the pooled standard deviation (SD). A Hedge's g of 0.2 indicates a small, of 0.5 a medium and of or above 0.8 a large effect size (Cohen, 2013). We calculated the effect sizes and 95% confidence intervals (CIs) for prevalence of *avoidant, anxious* and *insecure* attachment. If data for several independent subgroups were reported per study, these were merged into one group, using the formulae specified in Cochrane's Handbook for Meta-Analyses (Higgins et al., 2019). We calculated a funnel plot to identify possible heterogeneity between the studies and conducted outlier analyses. In case of outliers, the analysis was repeated after excluding them to assess the influence on results. Analogously, these analyses were repeated with outcomes for *anxious, avoidant* and *fearful* attachment aggregated into an *insecure* outcome domain. At the heart of the analysis was the comparison of *anxious* attachment, *avoidant* attachment and *insecure* attachment across the psychiatric conditions of

interest. To this end, we conducted subgroup analyses using mixed-effects meta-regression models (i.e., a meta-regression model with *psychiatric condition* as a categorical moderator based on all studies).

3.4. Assessment of heterogeneity, risk of bias and quality assessment

We examined and quantified statistical heterogeneity using Q and I^2 statistical tests for identification and rejection of outliers in line with the guidelines proposed in Cochrane's Handbook for Meta-Analyses. Publication bias was assessed with Egger's tests (Egger et al., 1997) and the trim and fill method by Duval (2005). Meta-regression (using a mixed-effects model) was implemented to examine the influence of age, gender and publication year on effect sizes. Further, we conducted a transdiagnostic moderator analysis including only attachment data reported continuously instead of categorically. Moderator analyses were implemented if at least 10 studies were available for the outcome domain of interest. The Newcastle-Ottawa Scale was used to assess eligible studies with respect to study quality (Wells et al., 2014).

4. Results

4.1. Literature search

Our literature search went back as far as to the year 1949. After removal of duplicates, abstracts and titles of a total of 6141 articles were screened: 917 articles on bipolar disorder, 3835 on major depression and 1389 on schizophrenia spectrum disorder were screened according to our eligibility criteria. Of those, full-texts of 73 articles on bipolar disorder, 224 major depression and 208 on schizophrenia spectrum disorder were examined (See supplementary figures 1,2 and 3 for the respective PRISMA-Diagrams). A total of 23 studies were included, four of which reported on two disorders and one of which reported data on three disorders. Overall, 8 studies reported data on bipolar disorder, 12 reported data on depression and 10 reported data on schizophrenia spectrum disorder.

4.2. Study characteristics

Characteristics of the included studies and demographic information on their samples is displayed in Table 1. Effect sizes of the analysis of *insecure* attachment prevalence were computed based on 40 samples and

Table 1

Demographic information of included studies for the meta-analyses in patients with bipolar disorder, patients with depression and patients with schizophrenia spectrum disorders.

First Author (Year)	N Patients	N Controls	Gender of patients (female %)	Gender of controls (female %)	Mean agepatients	Mean agecontrols	Attachment Measure	anx	avd	fear
Bipolar:										
Marazziti et al. (2007)	62	126	50%	53.90%	37.3	33.2	ECR	✓	✓	✓
Morriss et al. (2009)	104	39	na	na	45	48	RQ	✓	✓	✓
Costa et al. (2009)	92	192	68.50%	69.30%	40.92	42.17	ASQ	✓	✓	-
Harnic et al. (2014)	90	86	50%	63%	45.41	37.13	ECR	✓	✓	-
Özcan et al. (2016)	26	63	100%	100%	46.96	46.55	AASS	✓	✓	-
Kefeli et al. (2018)	40	40	47.50%	47.50%	33.13	33.7	ECR	✓	✓	✓
Fuhr et al. (2017)	61	46	na	na	42.31	42.31	RSQ	✓	✓	-
Picardi et al. (2019)	21	21	47.60%	47.60%	54.1	53.3	ECR	✓	✓	-
total	496	613	58.90%	65.70%	42.56	40.28				
Depression:										
Marazziti et al. (2007)	22	126	55%	53.90%	40.1	33.2	ECR	✓	✓	✓
Costa et al. (2009)	93	192	67.70%	69.30%	44.37	42.17	ASQ	✓	✓	-
Paradiso et al. (2012)	73	47	60.30%	59.60%	60.36	61.8	ECR	✓	✓	-
Weisman et al. (2011)	76	47	43.40%	61.70%	28.6	29.5	ECR	✓	✓	-
O'Shea et al. (2013)	31	31	71.00%	71.00%	15.19	15.19	ASQ	✓	✓	-
Özer et al. (2015)	62	60	88.70%	90%	34.66	34.66	ECR	✓	✓	-
Özcan et al. (2016)	16	63	100%	100%	51.25	46.55	AASS	✓	✓	-
Koelkebeck et al. (2017)	38	40	60.50%	42.50%	40.3	39.7	AAS	✓	✓	-
Kwon et al. (2017)	52	31	67.30%	71%	40.38	38.74	ASI	✓	✓	-
Fuhr et al. (2017)	61	46	na	na	42.31	42.31	RSQ	✓	✓	-
Adams et al. (2018)	100	62	70%	72.60%	29.22	26.08	ECR	✓	✓	-
Picardi et al. (2019)	21	21	47.60%	47.60%	53.2	53.3	ECR	✓	✓	-
Total	645	766	63.80%	68.10%	39.19	38.55				
Schizophrenia Spectrum Disorders:										
Ponizovsky et al. (2007)	30	30	0%	0%	38.4	34.4	HZ	✓	✓	-
Donohoe et al. (2008)	73	78	32.90%	42.30%	41.4	38.3	RQ	✓	✓	✓
Michail et al. (2014)	67	22	40.30%	59.10%	24.4	24.2	RAAS	✓	✓	✓
Shin et al. (2015)	16	15	0%	0%	32	32	RSQ	✓	✓	✓
Fett et al. (2016)	39	100	41.00%	50%	17	16	PAM	✓	✓	-
Özcan et al. (2016)	21	63	100%	100%	48.8	46.55	AASS	✓	✓	-
Aydin et al. (2016)	35	35	37.10%	60%	29.91	31.05	ECR-R	✓	✓	-
Chatziioannidis et al. (2019)	63	61	30.20%	29.50%	40.44	39.33	ECR-R	✓	✓	✓
Speck et al. (2019)	35	35	34.30%	34.30%	40.4	36	PAM	✓	✓	-
Ascone et al. (2020)	60	40	63.30%	67.50%	40.2	40	RSQ	✓	✓	-
Total	439	479	38.70%	49.50%	35.15	33.22				

1. AASS - Adult attachment style scale (Mikulincer et al., 1990), 2. AAS – Adult Attachment Scale(Collins and Read, 1990), 3. ASQ (Feeney et al., 1994), 4. ASI – Attachment Style Interview (Bifulco et al., 2002), 5. ECR (Brennan et al., 1998), 6. ECR-R (Fraley et al., 2000), HZ – Hazan and Shaver Questionnaire (Hazan and Shaver, 1987), 7. PAM – Psychosis Attachment Measure (Berry et al., 2006), 8. RAAS - Revised Adult Attachment Scale (Collins, 1996), 9. RQ (Bartholomew and Horowitz, 1991), 10. RSQ - Relationship Scales Questionnaire (Griffin and Bartholomew, 1994).

2927 individuals. Our analysis on *anxious* attachment and *avoidant* attachment comprised equally many samples and individuals. 615 of patients and 738 of HC individuals were female, with three studies not stating gender distribution for 165 patients and 85 controls. Overall mean age was 39.12 years for patients and 36.31 for controls. All studies (k = 30) were designed cross-sectionally. For participants in the schizophrenia spectrum disorder subgroup, diagnosis ranged from the first diagnosed psychotic episode to schizophrenia spectrum disorders. One study of the bipolar subgroup contained 15 cyclothymic individuals, whilst other samples comprised bipolar disorder I and II only. Of 33 contacted authors, two authors provided additional information which allowed for inclusion of two studies (Fuhr et al., 2017; Özcan et al., 2016).

4.3. Measures of attachment

In the studies included in this meta-analysis, ten different measurements of adult attachment were used (see Table 1). The ECR was the most frequently used instrument (ten studies). The ECR assesses attachment along two dimensions of "attachment anxiety" and "attachment avoidance" and allows for reporting of continuous data (eight studies, see Table 1). Two studies, which employed the ECR, assigned individuals into attachment style categories using statistical methods originally not foreseen by the scoring system of the ECR

(Chatziioannidis et al., 2019; Marazziti et al., 2007). Six studies allowed for a similar approach based on their instruments, the ASQ (Costa et al., 2009; O'Shea et al., 2014), RSQ (Fuhr et al., 2017; Shin et al., 2015) and PAM (Ascone et al., 2020; Fett et al., 2016). One study assessed attachment via a semi-structured interview but was based on the adult attachment concepts investigated in this meta-analysis (Kwon et al., 2017). Two studies relied on underlying attachment dimensions and reported categorical attachment styles of participants (Michail and Birchwood, 2014; Özcan et al., 2016). The remainder of studies presented participants with short paragraphs describing different attachment styles. In this case, participants had to rate on Likert scales to which extent they related to each. The majority of studies assessed "anxious" or "avoidant" attachment style or "attachment anxiety" or "attachment avoidance" only. Seven studies included the additionally proposed "fearful" attachment style. With regards to our transdiagnostic approach, "fearful" attachment as a category was not assessed in enough primary studies on bipolar disorder and depression for a meta-analytic approach (k < 3). Overall, 14 studies reported attachment as continuous data, with the remainder nine presenting a categorical approach.

4.4. Prevalence of insecure attachment

All studies (k = 30) reported prevalence of *insecure* attachment. The results of the clinical subgroups are presented in Fig. 1.
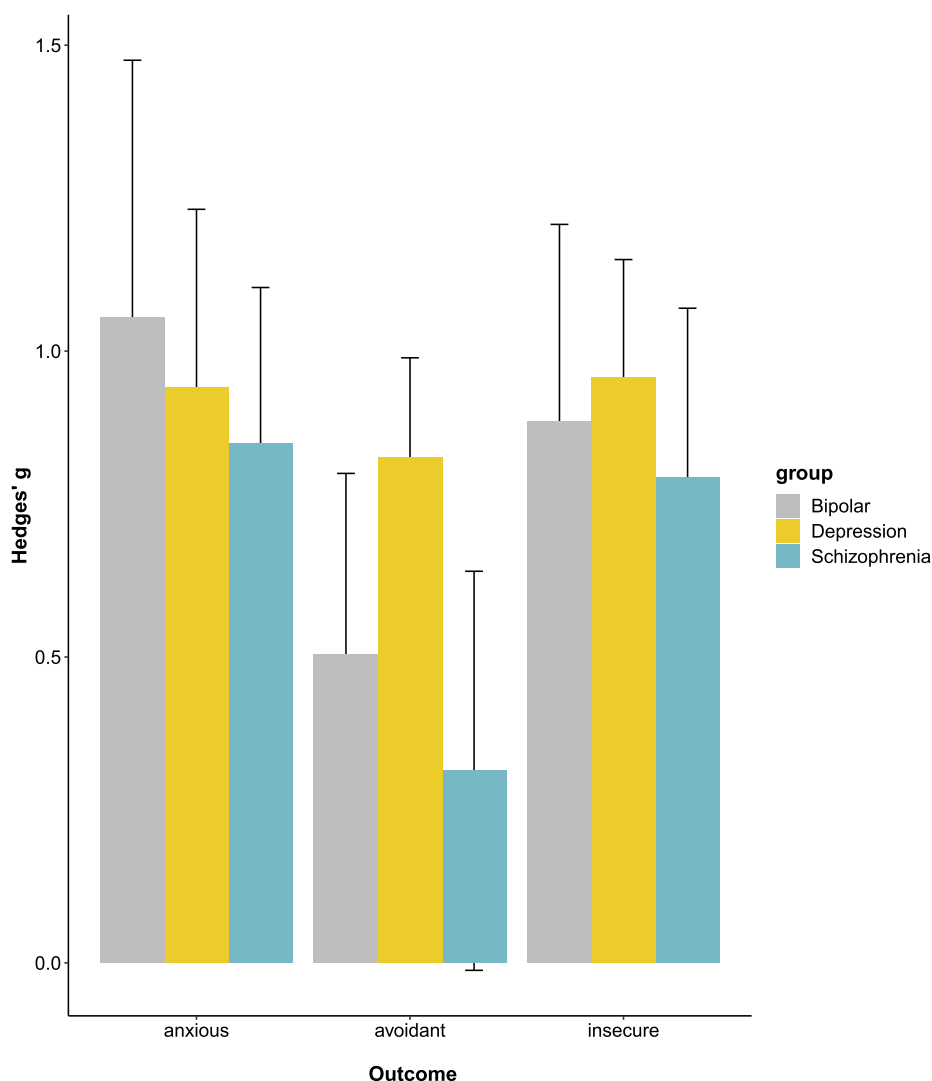

Fig. 1. Overview of the meta-analytic results for *anxious*, *avoidant* and *insecure* attachment in the three diagnostic groups.

Overall, results indicated a large effect of prevalence of *insecure* attachment within all disorders of interest, the bipolar disorder subgroup (k = 8, g = 0.89), the schizophrenia spectrum disorder (k = 10, g = 0.79) and depression (k = 12, g = 0.96) subgroup (Fig. 2). In the transdiagnostic comparison, between diagnostic subgroups no significant difference in effect sizes of prevalence between patients and HC were found.

4.5. Prevalence of anxious attachment and avoidant attachment

Across all three psychiatric subgroups, *anxious* attachment (k = 30, g = 0.94, Fig. 3) and *avoidant* attachment (k = 30, g = 0.63, Fig. 4) were more prevalent compared to HC. For *avoidant* attachment a moderate effect size in the bipolar disorder (k = 8, g = 0.50) and a small effect size in the schizophrenia spectrum disorder subgroup (k = 10, g = 0.31) could be observed. In the depression subgroup a large effect size (k = 12, g = 0.83) emerged. Outliers were identified in three cases (Chatziioannidis et al., 2019; Harnic et al., 2014; Picardi et al., 2019). After removal, effect sizes changed moderately for *anxious* attachment in the schizophrenia spectrum disorder subgroup (k = 9, g = 0.75, 95% CI [0.55, 0.95], z = 7.37, p = 0.16), *anxious* attachment in the bipolar subgroup (k = 7, g = 0.82, 95% CI [0.58, 1.07], z = 6.57, p = 0.02) and for *avoidant* attachment in the bipolar subgroup (k = 7, g = 0.34, 95% [0.19, 0.48], z = 4.52, p = 0.42). In our transdiagnostic analysis, no statistically significant differences in effect sizes between subgroups concerning prevalence of *anxious* attachment could be observed (all ps > 0.13). However, the effect size of prevalence of *avoidant* attachment between HC and psychiatric samples was significantly lower in the schizophrenia spectrum disorder subgroup than in the depression subgroup (p = 0.011 for overall transdiagnostic comparison in *avoidant*, p = 0.04 for comparison of schizophrenia spectrum disorder and depression subgroup in *avoidant*).

4.6. Heterogeneity and risk of bias

Overall, heterogeneity of our analysis ranged from moderate to high (see Figs. 2–4). Our most extensive and thus exemplary analysis of *insecure* attachment prevalence across all studies (k = 30) presents an effect size variability of 71.0% accountable to between-study variance and a Q-value indicating considerable amount of heterogeneity. Egger's test indicated no significant funnel plot asymmetry (all *ps* > 0.1) for our transdiagnostic analysis of *anxious* and *avoidant* attachment indicating a low risk for publication bias. However, for our analysis of insecure attachment Egger's test indicated significant funnel plot asymmetry (p = 0.010). A trim and fill analysis for *insecure* attachment estimated seven missing studies on the left side and led to a smaller, but still medium effect size (k = 37, g = 0.75, 95% CI [0.6, 0.90], z = 9.75, p = < 0.001).

4.7. Meta-regression

Available data did not allow neither for moderator analysis in the bipolar subgroup, nor for the effect of gender in the depression subgroup. Moderator analysis of publication year, gender and age proved to be insignificant (all *ps* > 0.09). Reporting of continuous data only, compared to continuous data merged with dichotomous data, did not yield a significant effect on the outcome of the analyses (all *ps* > 0.25).

5. Discussion

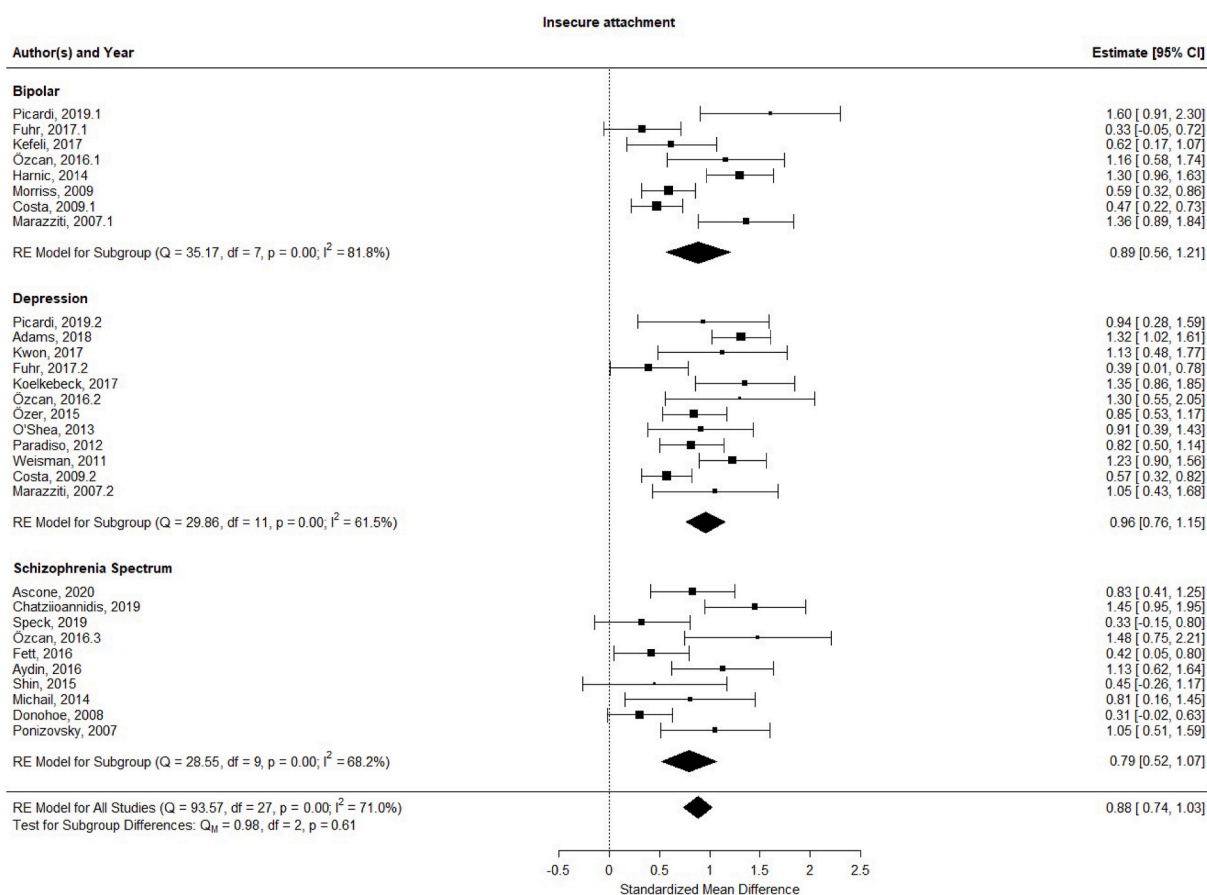Our results show that *insecure, avoidant and anxious* attachment are

Fig. 2. Forest plot for the meta-analyses of *insecure* attachment in patients with bipolar disorder, patients with depression and patients with schizophrenia spectrum disorder.
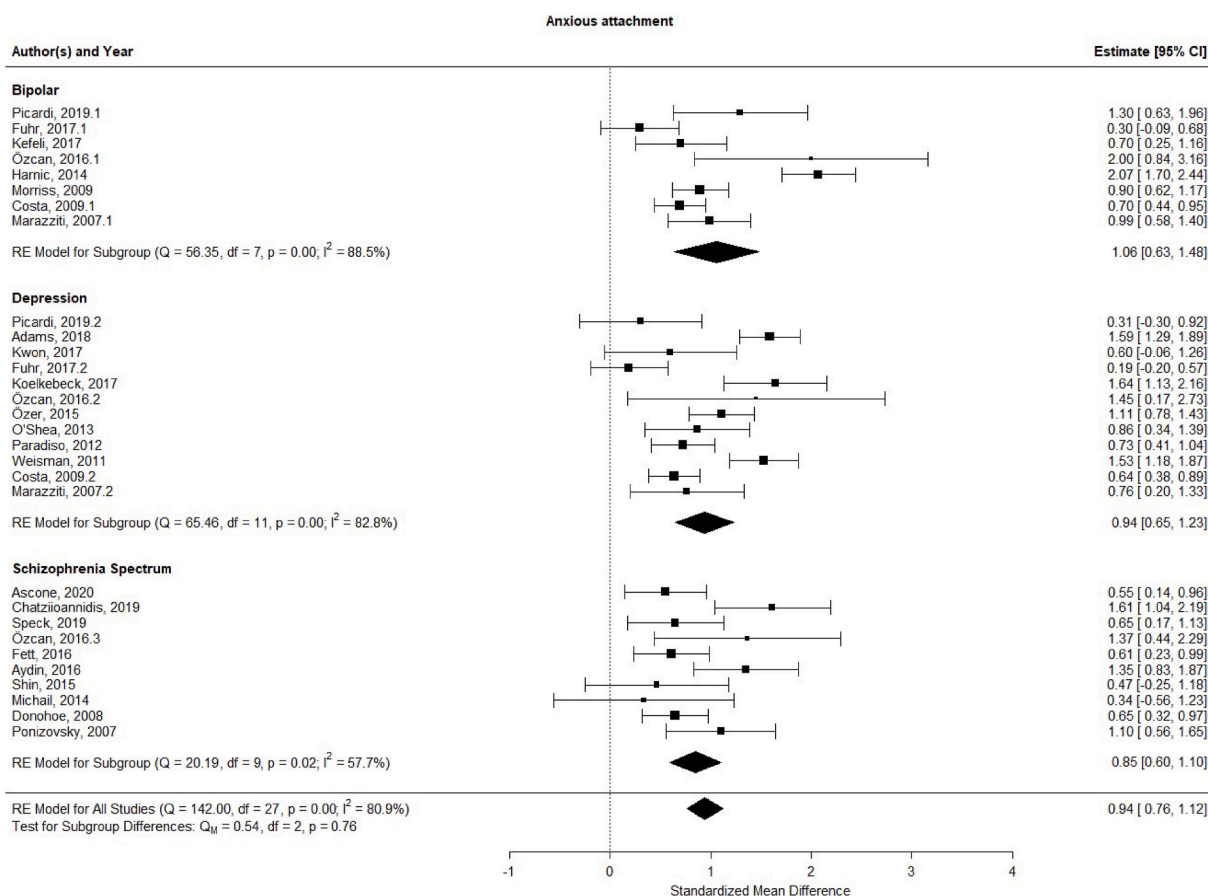
Fig. 3. Forest plot for the meta-analyses of *anxious* attachment in patients with bipolar disorder, patients with depression and patients with schizophrenia spectrum disorder.

substantially more prevalent in bipolar disorder, schizophrenia spectrum disorder and major depression than in HC. These results point to the potential relevance of *insecure* attachment as a possible general vulnerability factor to psychopathology (Mikulincer and Shaver, 2012, 2019). This notion is already implied in attachment theory, as insecure attachment is considered to be a nondeterministic developmental risk factor for subsequent psychopathology especially when it co-occurs with other environmental aspects (Bowlby, 1969; Cassidy et al., 2013). Insecure attachment's possible non-specific contribution to increased psychopathology is further corroborated by findings of increased attachment insecurity in anxiety disorders (Huang et al., 2019; Marganska et al., 2013), obsessive-compulsive-disorder (Doron et al., 2012), post-traumatic stress disorder (Ein-Dor et al., 2010), auto-aggressive tendencies (Gormley and McNiel, 2009), eating disorders (Illing et al., 2010), personality disorders (Crawford et al., 2007) and at-risk states for psychosis and early psychosis (Antonucci et al., 2021).

Our results indicate that *anxious* attachment and *avoidant* attachment are both more prevalent in psychiatric patients compared to healthy individuals. However, the magnitude of effect sizes suggest that *anxious* attachment is slightly more related to the assessed diagnoses than *avoidant* attachment. Generally, this finding is in line with the hypothesis that different dimensions of attachment insecurity go along with "particular configurations of psychopathology" (Mikulincer and Shaver, 2012).

As another finding, in the schizophrenia spectrum disorder subgroup we observed *avoidant* attachment to have a significantly smaller effect size compared to the depression subgroup in a transdiagnostic comparison. *Anxious* attachment, from a transdiagnostic point of view, was similarly prevalent across diagnostic subgroups.

Previous reviews on the importance of "avoidant" attachment (and

"attachment avoidance") and schizophrenia spectrum disorders led to differing results. Some analyses and reviews suggested that especially "attachment avoidance" is associated with psychosis spectrum disorders (Berry et al., 2007; Korver-Nieberg et al., 2014). Our results yield a more mixed picture and are among recent studies reporting stronger associations of attachment anxiety with paranoia (Korver-Nieberg et al., 2015; Lavin et al., 2020; Murphy et al., 2020). One meta-analysis found a strong correlation between the "fearful" style and psychosis spectrum disorders (Carr et al., 2018). Those findings have so far been explained to have come into place as "avoidantly" attached individuals tend to underreport symptoms (Murphy et al., 2020) or due to poor methodological qualities of primary studies (Lavin et al., 2020). Our results suggest that *anxious* attachment is more relevant as a risk factor specifically linked to schizophrenia spectrum disorders than is *avoidant* attachment.

In depressed patients compared to HC, prevalence of both *avoidant* attachment and *anxious* attachment was greater. This finding has previously been shown in longitudinal research on attachment *insecurities* and was linked to subsequent emergence of depression in adolescence (Spruit et al., 2020) and adults (Hankin et al., 2005). Authors suggest various pathways through which both "attachment avoidance" and "attachment anxiety" could have a detrimental effect on mental health, thus increasing the risk for developing depression (Ein-Dor and Doron, 2015; Ein-Dor et al., 2016; Hankin et al., 2005; Mikulincer and Shaver, 2012). For example, attachment insecurity may lead to ineffective overly self-reliant coping strategies, insufficient social support seeking behaviour (Ein-Dor and Doron, 2015) and covert self-criticism (Blatt, 1974).

Our results highlight that insecure attachment is strongly related to psychopathology. Attachment insecurity is associated with a broad
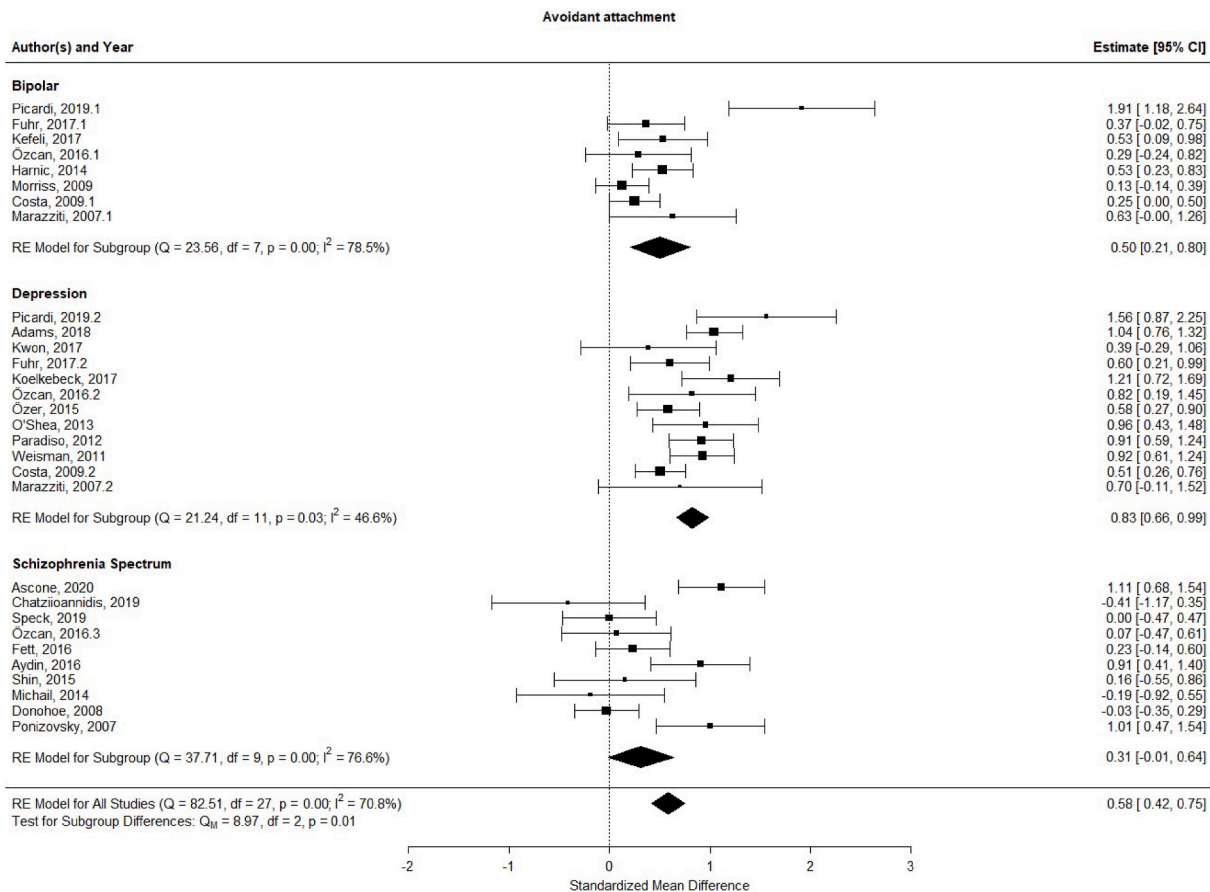
Fig. 4. Forest plot for the meta-analyses of *avoidant* attachment in patients with bipolar disorder, patients with depression and patients with schizophrenia spectrum disorder.

range of detrimental effects on general psychological well-being (Mikulincer and Shaver, 2012). Attachment security, on the other hand, is associated with greater resilience (Karreman and Vingerhoets, 2012) and more effective coping strategies (Mikulincer and Shaver, 2012). While social relationships and romantic relationships contribute to resilience and coping with mental illness (Braithwaite and Holt-Lunstad, 2017; Kaplan, 2002; Turner et al., 1983), it is a replicated finding that attachment insecurity impairs relationship satisfaction (Candel and Turliuc, 2019; Feeney, 2002; Kafetsios and Nezlek, 2002; McNelis and Segrin, 2019) and impedes social support (Gillath et al., 2019; Kafetsios and Sideridis, 2006). Attachment insecurity, especially "attachment anxiety", has also been previously associated with less positive psychotherapy outcomes (Levy et al., 2011). This finding might in part be explained by weaker therapist alliances, which are associated with attachment insecurity (Diener and Monroe, 2011). Strength of therapist alliances are known to influence outcome of therapy interventions (Flückiger et al., 2018; Newhill et al., 2003). Overall, our findings give rise to the prospect of *insecure* attachment as an important factor implicated in mental illness, warranting greater attention in future research, and potentially clinical management.

5.1. Limitations and implications for further attachment research

We advise to interpret our findings considering some important limitations of our analysis. Only one of the primary studies reporting on schizophrenia spectrum disorder patients assessed axis-II comorbidities. Patients with schizotypal personality disorder and schizophrenia spectrum disorders, especially schizophrenia, can exhibit similar traits and symptoms (Kwapil and Barrantes-Vidal, 2012). Moreover, while in some studies on major depression and bipolar disorder psychotic

comorbidities led to exclusion (Adams et al., 2018; Fuhr et al., 2017; Harnic et al., 2014; Koelkebeck et al., 2017; Özer et al., 2015; Weisman et al., 2011), one study allowed psychotic accompanying symptoms (Picardi et al., 2019) and the latter did not assess psychotic comorbidities specifically. In conclusion, with regard to psychotic symptoms some overlap between our subgroups cannot be ruled out. Screening for an axis-II and psychotic comorbidities might help increase overall specificity on assessment of disorder diagnoses and assess possible effects on attachment insecurity.

In our analysis, high heterogeneity was observed, which may be explained by various differing attachment instruments used by the included studies. Consensus exists in attachment research that attachment base structures are two underlying dimensions, "attachment anxiety" and "attachment avoidance" (Sperling et al., 1992). There is a growing consensus to report and asses attachment by means of continuous data (Crowell et al., 2008; Fraley et al., 2015; Sperling et al., 1992). However, many included studies assessed attachment with categories.

Two studies transformed dimensional assessment of attachment into categorical assignments of attachment styles, although this was not foreseen by their used questionnaire (Chatziioannidis et al., 2019; Marazziti et al., 2007). Nonetheless, we decided to include these studies, as they met our inclusion criteria. One of the studies (Chatziioannidis et al., 2019) proved to be an outlier in the schizophrenia disorder spectrum subgroup analysis, leading to a smaller effect size for *anxious* attachment when we excluded this study in the sensitivity analyses.

In the present meta-analysis, effect sizes based on continuous data did not differ significantly from combined categorical and continuous data. However, in general, effect sizes based on continuous variables are more precise. Continuous data would also allow for better synthesis of attachment data by eliminating attachment categories which are

potentially high on both dimensions of attachment insecurity, i.e., the "fearful" style. In our synthesis strategy we included dichotomous data and continuous data. As such, our concepts of *anxious*, *avoidant* and *insecure* attachment represent statistical approximations.

"Fearful" attachment as a category was assessed in an insufficient number of primary studies on bipolar and depression for a meta-analytic assessment. There is some evidence that "fearful" individuals, if attachment is assessed dimensionally, score high on "attachment anxiety" and "attachment avoidance" (Fraley and Bonanno, 2004; Simpson and Rholes, 2002). Our effect size synthesis of dichotomous data cannot take into account "fearful" individuals' "attachment anxiety" and "attachment avoidance". Thus, the difference between prevalence of effect sizes of *avoidant* attachment and *anxious* attachment might be more pronounced than our estimate indicates. In psychosis spectrum disorders the "fearful" style was shown to be the most prevalent category (Carr et al., 2018). For depressive and bipolar disorder no statistically sound assertion on prevalence of the "fearful" attachment style can be made according to the literature available. It is possible that this will not change, as future research is likely to lean more towards assessing attachment dimensionally.

Numerous aspects need to be considered when interpreting our findings in the context of existing reviews on attachment. Firstly, despite an unwieldy body of different attachment instruments, new instruments for special purposes have been developed such as the ASI (Bifulco et al., 2002) for fostering and parenting and PAM (Berry et al., 2006) for psychosis spectrum disorder patients. Some of the attachment measures employed show non-excellent psychometrics (Özcan et al., 2016) and others, such as the PAM have lately been called into question due to weak construct validity in the population it has been developed for (Olbert et al., 2016). Due to the vast number of measurements, comparing results between studies can prove to be difficult. In meta-analytic research on adult attachment, there is no clear consensus regarding the synthesis of effect sizes derived from different attachment measurements. Consequently, already existing reviews in the field differ methodologically. Some merged AAI-results and self-report-measurements (Carr et al., 2018; Lo et al., 2019), which may be problematic, given evidence that correlation between these instruments is only as high as 0.09 (Haydon et al., 2011; Roisman et al., 2007). Others did not include categorical assessments of attachment (Levy et al., 2018; Zheng et al., 2020) or reported on a "fearful"-subgroup (Carr et al., 2018), which has not been reported often enough in bipolar disorder and depressive samples to allow for a valid transdiagnostic meta-analytic assessment.

We addressed these methodological challenges in our effect size synthesis: Firstly, we refrained from merging studies investigating adult attachment from the developmental trajectory point of view (e.g. with the AAI) into our effect size synthesis. Secondly, we did not compute a separate effect size for "fearful" attachment, as not enough studies for a separate transdiagnostic analysis were available. Last, we included categorical as well as continuous measurements. Overall, our synthesis strategy and subsequent analyses are inclusive with respect to different measurements of adult attachment. However, this might reduce specificity of our findings and future studies should take into account different methodological aspects and measures of attachment insecurity.

As common in the field of self-report measurement of adult attachment, the majority of studies included in our analysis employed no separate measurement of "attachment security". A separate meta-analysis on this dimension would have reduced validity due to a smaller count of included studies. Hence, we refrained from giving an analysis of secure attachment prevalence in patient groups versus HC. Future research should look into the prevalence of "attachment security" and its role as a possible contributor to resilience of psychiatric samples compared to healthy controls.

The complexities mentioned should be taken into consideration when putting our results into context with other review findings. The observed heterogeneity points to the importance of unifying

measurements and constructs, as was done before in the field of attachment research by Brennan et al. (1998) with the development of the ECR. Moreover, it remains unclear whether insecure attachment functions as a risk factor for psychiatric disorders or whether psychiatric disorders moderate attachment insecurity as most studies are designed cross-sectionally (Boyette et al., 2014). However, evidence from prospective studies indicates that insecure attachment in childhood promotes psychopathology emerging later in life (Bifulco et al., 2006; Fonagy et al., 1996; Ogawa et al., 1997; Sroufe, 2005; Warren et al., 1997).

5.2. Outlook and conclusion

Our analysis shows that insecure adult attachment is a strong transdiagnostic contributor to psychopathology in bipolar disorder, major depression and schizophrenia spectrum disorder. This finding is in line with existing research which showed insecure attachment is more prevalent in other disorders. Taken together, these findings warrant further investigations aimed at exploring the pathways from attachment insecurity towards psychopathology. One present suggestion in transdiagnostic research is a network view of psychopathology. In these networks symptoms and risk factors allegedly interconnect and amplify each other through feedback loops (Borsboom, 2017). Mikulincer and Shaver (2012) proposed that attachment insecurity affects psychopathological vulnerability through amplifying or converging with attachment experiences making way for psychopathology. It would be interesting to see with which other factors attachment insecurity is associated and whether pathways to psychopathology are configured in a network. Attachment insecurity is a rich concept touching upon many aspects of psychological health and should be taken into consideration in clinical contexts. The strong correlation insecure attachment has with psychopathology and findings in prospective studies strongly suggest that it should be incorporated in tools assessing risk for psychiatric disorders.

Funding and disclosure

CRediT author statement

Simon Herstell – Conceptualization, Methodology, Formal analysis, Investigation, Data Curation, Writing - Original Draft, Visualization
Linda Betz – Conceptualization, Methodology, Software, Formal analysis, Investigation, Data Curation, Writing - Review & Editing, Visualization
Nora Penzel – Conceptualization, Methodology, Validation, Investigation, Writing - Review & Editing
Ruth Chechelnizki – Data Curation, Writing - Review & Editing
Laura Filihagh - Data Curation, Writing - Review & Editing
Linda Antonucci - Writing - Review & Editing
Joseph Kambeitz – Conceptualization, Methodology, Resources, Writing - Review & Editing, Visualization, Supervision, Project administration

Funding

Declaration of competing interest

No conflict of interest arises from this research.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychires.2021.10.002.

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