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Prevalence rate of social anxiety disorder in individuals with a psychotic disorder: A systematic review and meta-analysis

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ABSTRACT

Social anxiety disorder (SAD) is characterised as an excessive fear of negative judgment from others and is considered one of the most disabling of the mental ill health conditions. Research findings indicate that it is also a significant issue for individuals diagnosed with a psychotic disorder, with prevalence rates of social anxiety ranging from 8% to 36%. This study was conducted to address the variance of the reported prevalence rates of comorbid SAD amongst individuals with a psychotic disorder diagnosis. Via a systematic review, we collated all available literature on the prevalence of SAD in individuals with a psychotic disorder, and evaluated the prevalence results via meta-analysis. We also synthesised all psychosocial outcomes attributed to SAD comorbidity and conducted a narrative review of the relevant findings. Across 25 studies providing data from 1980 to May 2018 and spanning 13 countries ($N = 92{,}522$), we found a pooled prevalence rate of 21% (16%–26%). In outpatient samples, (17 studies), the prevalence was 25% (19%–31%), statistically significantly higher ($z = 5.12$, $p < .001$) than that of the inpatient studies six studies, which was 9% (7%–12%). We also found that SAD comorbidity is associated with increased depression, poorer social function, poorer subjective quality of life, greater negative self-evaluation, and greater insight. The results from this systematic review and meta-analysis suggest that SAD is prevalent amongst individuals with a psychotic disorder. More consistent screening for SAD and the development of theoretically driven and empirically supported tailored treatments are recommended.

1. Introduction

Social anxiety disorder (SAD), defined as an excessive fear of negative evaluation or judgment from others (American Psychiatric Association [APA], 2013), is considered one of the most prevalent and disabling of the mental ill health conditions (Fehm et al., 2005). A lifetime prevalence rate for SAD has been reported as 13.3% amongst the general population, making SAD the third most commonly reported mental ill health disorder after depression (17%) and alcohol dependence (14%) (Fehm et al., 2005; Stein et al., 2017). A 12-month prevalence rate of 2.3% for the general population has also been reported for SAD (Lampe et al., 2003).

SAD is associated with a variety of poorer quality of life outcomes, including high rates of reported subjective distress and poorer functional outcomes across educational, occupational, financial, and social domains (Kessler et al., 2004; Kessler et al., 2005; Michail and Birchwood, 2014; Michail et al., 2017). Research findings also demonstrate that an early onset and chronic presentation of SAD are associated with an increased vulnerability for experiencing other mental ill health conditions, such as depression and substance use disorders (Magee et al., 1996; McMillan et al., 2009; Ruscio et al., 2008). Data derived from 28 community surveys analysed via the World Mental Health Survey Initiative ($N = 142{,}405$), for example, demonstrated that 80% of individuals with a 12-month or longer SAD diagnosis also met criteria for another mental health disorder (Stein et al., 2017). The high reported rate of SAD comorbidity with other mental ill health conditions is problematic, as unless a clinician is specifically assessing for it, SAD may remain undetected and untreated (Stein et al., 2017).

SAD is also a significant issue for individuals diagnosed with a psychotic disorder (Mazeh et al., 2009; Michail and Birchwood, 2009; Pallanti et al., 2004). A growing body of studies has identified varying percentage rates of SAD prevalence amongst individuals with a psychotic disorder: 8.2% (Goodwin et al., 2003), 9.68% (Kiran and Chaudhury, 2016), 13.3% (Tibbo et al., 2003), and 36.3% (Pallanti et al., 2004). There is also growing evidence that subthreshold social anxiety (SA) symptoms and clinical levels of SA are relatively common

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occurrences following the first episode of psychosis (FEP) (Birchwood et al., 2007; Michail and Birchwood, 2009). Indeed, in the first year following the onset of psychosis, findings indicate that 29% of young people and adults (individuals aged 16–35 years) report symptoms that meet the clinical diagnostic criteria for SAD (Michail and Birchwood, 2009).

However, the precise prevalence of SAD in psychosis remains unclear, which may contribute to the lack of attention to this comorbid condition in individuals with psychosis (Roy et al., 2018a). For instance, reported prevalence rates of SAD within psychosis populations vary greatly across existing studies, perhaps reflecting limitations in methodology; however, this fluctuation hinders clinicians from gaining an understanding of the issue. It is important that clinicians have reliable prevalence estimates to gain an understanding of the proportion of individuals with psychosis who may meet the criteria for SAD at a given point in time, in order to appropriately assess and plan tailored treatment to maximise recovery outcomes.

Second, although much is known about the negative impact of SAD on individuals' overall functioning and well-being, there is scant literature that investigates the presentation and impact of SAD symptomatology in individuals with a comorbid psychotic disorder (Roy et al., 2018b). This is problematic, as psychotic disorders themselves are considered one of the most severely disabling of all mental ill health conditions (Dixon et al., 2018). To better understand the clinical prevalence and implications of SAD comorbidity in individuals with a psychotic disorder, a rigorous synthesis and analysis of the current literature is required.

1.1. Study aim

The study aim was to conduct a systematic review and meta-analysis to estimate the pooled prevalence of SAD in individuals diagnosed with psychotic disorder. We examined the influence of methodological variables, such as differences in patient sampling on pooled estimates. Additionally, we conducted a narrative synthesis to report on psychosocial findings relating to individuals with comorbid SAD and a psychotic disorder diagnosis.

2. Methods

2.1. Search strategy and procedure

A search was performed in five bibliographic databases: Cochrane Central Register of Controlled Trials, EbscoHost, Scopus, PubMed, and Web of Science. The electronic search terms applied included *"Social anxiety OR Social phobia" AND "Psychosis" OR "Psychotic" OR "Schizophr*"*. Abstracts and full texts were screened to determine whether the inclusion criteria were met.

The systematic review has been registered with the International Prospective Register of Systematic Reviews (PROSPERO, http://www.crd.york.ac.uk/PROSPERO, registration number CRD42018086315). This paper is in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol (PRISMA-P) recommendations for systematic review protocols (Shamseer et al., 2015), and the findings will be reported using PRISMA guidelines (Liberati et al., 2009).

2.2. Inclusion and exclusion criteria

Studies were included if (1) all participants were 15 years or older and had a psychotic disorder diagnosis (schizophrenia spectrum) and a diagnosis of social anxiety disorder according to the DSM-5 (American Psychiatric, 2013), DSM-IV (APA, 2000), DSM-III-R (APA, 1987), or ICD-10 (World Health Organization [WHO], 1992), criteria or a well-established, clinically validated measure of social anxiety; (2) the prevalence rates of SAD in psychosis populations were reported; (3) they used cohort, correlational, nonrandomised, randomised controlled trials (RCTS) and quasi-experimental studies; (4) published in English in a peer-reviewed journal; (5) they were published between 1980 and May 31, 2018; and (5) they had a minimum of 20 participants. In the case of missing information, the corresponding author was contacted. In the case of multiple publications on a single data set, the paper with the largest sample size was included. Studies were excluded if they were case studies, conference papers, review papers, or qualitative studies.

2.3. Quality appraisal

Two authors (CMcE and HT) assessed the methodological quality of the studies using the National Heart, Lung and Blood Institute Quality Assessment Tool (NHLBI) for Observational Cohort and Cross-Sectional Studies, which is a widely used quality assessment tool suitable to evaluate the included study designs. This tool measures 14 criteria, used to give each study an overall quality rating of good, fair, or poor. The two reviewers assessed eligible studies independently (CMcE and HT). Concordance was checked, discrepancies were discussed and resolved via consensus. The total agreement (Good/Fair/Poor) between assessors was high (22/25 = 88%). Inter-rater reliability, measured using the Kappa coefficient of Cohen, was moderate to high ($K = 0.72$) (Tabachnick, 2013).

2.4. Statistical analysis

The prevalence rate of social anxiety in each study was calculated by dividing the number of participants in the sample diagnosed with psychosis and social anxiety or social phobia by the total number of participants diagnosed with psychosis. Once the prevalence rates (proportions) were calculated, they were transformed using the Freeman-Tukey (double arcsine) transformation in order to obtain more accurate estimates of the sampling variances (Freeman and Tukey, 1950). The transformed proportions were used to estimate the pooled prevalence and then back transformed for presentation in the results. Cochran's Q statistic and I^2 were used to assess homogeneity between studies. Since there was significant heterogeneity a random-effects model with inverse-variance weighting was used to estimate the pooled prevalence rate (Tabachnick, 2013). Subgroup analyses were conducted to test whether patient sample type (outpatient or inpatient) influenced prevalence rate estimations. All confidence intervals are 95%, and the alpha level used for all hypothesis testing was 0.05. This meta-analysis was conducted using R (R Core Team, 2014) and the R packages metafor and Meta (Schwarzer et al., 2015; Viechtbauer, 2010).

3. Results

The search and cross-reference check yielded 5134 records (Fig. 1), of which 111 full text articles were screened after the articles that did not meet the inclusion criteria ($n = 4270$) and duplicates ($n = 753$) were removed. A total of 25 articles met the study inclusion and exclusion criteria and were included in this meta-analysis.

3.1. Study characteristics

Twenty-five studies met the criteria for inclusion in this meta-analysis and are listed in Table 1. The combined sample size of all 25 studies was 92,522 while the individual study samples ranged from 30 to 87, 006 participants; the median sample size was 82. The studies were conducted in 13 different countries from 1998 to 2018, and over 90% of participants were male. Seventeen of the studies based their prevalence rates on outpatients, six on inpatients, and two studies relied on both inpatients and outpatients (Birgenheir et al., 2014; Gorun et al., 2015).

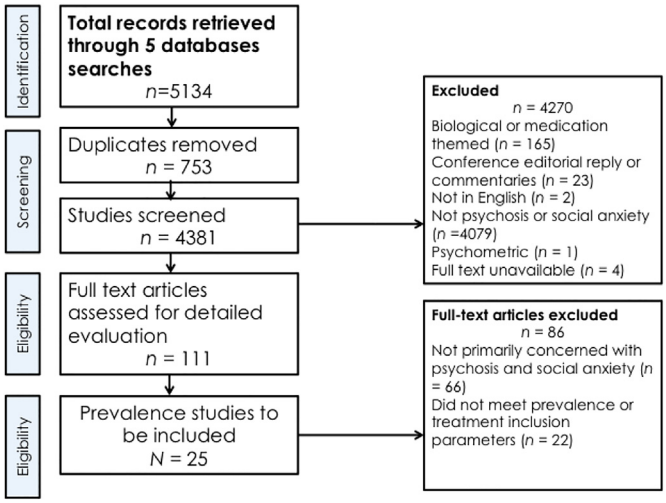

Fig. 1. Summary of study selection according to PRISMA guidelines Shamseer et al., 2015.

3.2. Pooled prevalence rate

The test of heterogeneity between studies was significant, $Q(24) = 396.73$, $p < .0001$. A significant Q-statistic indicates that we cannot assume there is a single population of individuals with psychosis and social anxiety disorder and that any difference in prevalence rate estimations merely reflects sampling errors. Using I^2 we estimate that 97.15% of the variability in prevalence rates is due to real differences between studies. Given the large heterogeneity between studies, we used a random effects model to estimate pooled prevalence.

Fig. 1, a forest plot, shows the prevalence rate of each study, the confidence interval for each prevalence rate, the pooled prevalence rate, and the confidence interval of the pooled prevalence. The prevalence rates range from 0.06 to 0.43 with the pooled rate of 0.21 [0.16, 0.26]. There does not seem to be any bias towards reporting low or high prevalence rates. As we noted, there is a great deal of heterogeneity in the reported prevalence rates with some quite low (e.g., 0.06 and 0.08) while other are relatively high (e.g., 42 and 0.43).

3.3. Subgroup analysis

3.3.1. Study quality

As 22 of the included studies were rated *fair* and three were rated *good*, a statistical subgroup analysis cannot provide meaningful insights into the differences between the prevalence estimates based on quality ratings.

3.3.2. Patient characteristics

Seventeen studies used outpatient samples to estimate the prevalence of social anxiety, and 6 studies relied on inpatient samples. Both Birgenheir et al. (2014) and Gorun et al. (2015) were excluded from this analysis since they used outpatients and inpatients but did not report the number of patients in each subgroup. Fig. 2 shows a forest plot grouped by patient sample. The prevalence estimate for each subgroup and its 95% confidence interval are shown as well as the overall pooled prevalence and its 95% confidence interval.

The overall prevalence estimate without Birgenheir et al. (2014) and Gorun et al. (2015) was 20 [0.15, 0.25], nearly identical to the overall prevalence rate that includes those two studies, 0.21 [0.16, 0.26]. The pooled prevalence rate for the studies using outpatients was 0.16 larger than the prevalence estimated from inpatient samples: 0.25 [0.19, 0.31] and 0.09 [0.07, 0.12] respectively. The difference between the two subgroup estimates was significant, $z = 5.12$, $p < .001$. There was significant heterogeneity between the outpatient and inpatient studies, $Q(1) = 26.21$, $p < .001$, which indicates that outpatients and inpatients represent two different populations with different prevalence rates of social anxiety. However, there was significant heterogeneity within the group of outpatient studies, $Q(16) = 222.75$, $p < .0001$, $I^2 = 93.47\%$, but there was not significant heterogeneity within the group of inpatient studies, $Q(5) = 4.35$, $p = .50$.

4. Discussion

After conducting a meta-analysis of all available studies that adhered to our inclusion/exclusion criteria (25 studies; $N = 92{,}522$; spanning 13 countries), we found a pooled prevalence rate of 21% for SAD comorbidity amongst individuals with a psychotic disorder. Distinct pooled prevalence rates were also calculated for outpatient and inpatient populations, with a significantly higher prevalence rate of 25% found for outpatient populations, compared to 9% for inpatient populations.

4.1. Prevalence rate

Our pooled prevalence rate findings suggest that 21% (CI, 95%: 16%–26%) of individuals diagnosed with a psychotic disorder also meet the clinical criteria for SAD. These findings are higher than the findings of the most recent meta-analysis (Achim et al., 2011) on the subject, which examined 16 eligible studies ($N = 1259$) and reported a pooled prevalence rate of 15% (8%–22%). Only studies that utilized a clinically validated diagnostic tool to diagnoses SAD met inclusion criteria for our meta-analysis. To the best of our knowledge, this is the first study to do this while at the same time conducting a statistical examination of the differences between patient characteristics on reported pooled prevalence rates. Our findings provide support for the notion that SAD comorbidity is prevalent (1 in 5) amongst individuals with a psychotic disorder and may be underdetected (due to the failure to assess for the presence of the disorder) in both inpatient and outpatient settings (Fig. 3).

Heterogeneity in the reported range of pooled prevalence rates is likely due to methodological differences in assessment tools and diagnostic methods. Likewise, heterogeneity between studies is likely due to the disparate settings, in addition to other variables such as demographic make-up, socio-economic status, age, influence of pharmaceutical drugs and psychological interventions, years of education, cultural factors (study location), differences in measures, and duration of illness.

4.2. Outpatient and inpatient groups

Our study findings indicate an overall pooled prevalence rate for outpatient studies of 25% (19%–31%), greater than the 9% (7%–12%) pooled prevalence rate found for inpatient studies. These differences between the two-subgroup estimates were found to be statistically significant, suggesting that outpatients and inpatients may represent two distinct populations with differing rates of SAD prevalence. It may be the case that outpatients demonstrate greater levels of awareness of their SA symptoms and therefore exhibit greater insight when being assessed for SAD (Güçlü et al., 2012; Michail and Birchwood, 2009). For example, if psychotic symptoms are less acute, SA symptoms may be more apparent to both the affected individuals themselves and the clinicians who decide to assess for them. Conversely, the lower reported prevalence rates for inpatients may reflect the difficulties in administering measures with patients who may be experiencing paranoia, an unrelenting mistrust and suspicion of others, and/or disordered thinking (Lowengrub et al., 2015). Finally, it may also be the case that, for some individuals who are outpatients, SAD develops due to the social barriers associated with a psychotic disorder diagnosis, such as poor quality of life and external and internalised stigma, in addition to social isolation.

Table 1
Characteristics of included studies, examining prevalence of sad in individuals with psychotic disorders.

Study	Location	*N*	Age *M* (*SD*)	% male	Psychotic disorder diagnoses	SAD measure	Psychosocial measures	Sample population	Quality assessment	Key prevalence findings	Key psychosocial/symptom findings
Aikawai et al. (2018)	Japan	207	29 (7)	48	DSM-IV: Schizophrenia	MINI	SFS, SDISS and GAF to assess social functioning and QoL	Outpatient	Fair	30 individuals out of 207 (14.5%) met criteria for SAD	Co-morbid SAD associated with poorer social functioning and longer DUP.
Birchwood et al. (2006)	UK	79	24 (4.7)	74	ICD-10: FEP	SIAS	CDSS, PBIQ, OAS, SCS to assess depression, appraisals of psychosis, shame and social rank	Outpatient	Good	23 individuals out of 79 (29%) met criteria for SAD	Co-morbid SAD associated with greater shame and perceived lower social rank.
Birgenheir et al. (2014)	USA	87,006	56	93	USA	ICD-9	ICD-9: SAD	Mixed	Fair	212 individuals out of 87,006 (0.2%) met criteria for SAD	Anxiety disorders reviewed as whole data set. Hospital duration for co-morbid anxiety disorders 6.2 days compared to 4.4 without co-morbidity.
Bosanac et al. (2016)	Australia	1150	39 (11.16)	60	ICD-10: schizophrenia or schizoaffective disorder. The DIP was also used.	MINI	The DIP to assess social functioning and QoL.	Outpatient	Fair	467 individuals of 1150 individuals (41%) with schizophrenia or schizoaffective diagnoses met diagnostic criteria for SAD.	Depressive symptoms in the previous 12 months were significantly associated with social anxiety symptomatology. Social dysfunction significantly associated with SAD comorbidity. Female gender was a significant predictor of social anxiety comorbidity.
Braga et al. (2005)	Brazil	53	37.41 (10.00)	72	Diagnosis of schizophrenia based on DSM-IV criteria	Anxiety Disorders section of SCID-IV	N/A	Outpatient	Fair	Prevalence of SAD in the full sample was reported as 17%.	Anxiety disorders reviewed as a whole data set.[a]
Ciaparelli et al. (2007)	Italy	98	80	74: SCA 83: SCZ	DSM-IV: Schizophrenia and schizoaffective	SCID-IV	N/A	Outpatient	Good	13.2% (percentage of individuals with schizophrenia who have SAD percentage of individuals with schizoaffective/total sample group $= (0.39 \times 23 \quad 0.21 \times 19) / 98$	Anxiety disorders reviewed as a whole data set.[a]
Cosoff and Hafner (1998)	Australia	80	CND	60	Consecutive admissions meeting DSM-IV criteria for schizophrenia ($n = 60$), schizoaffective disorder ($n = 20$)	SCID for DSM-III-R, to determine the presence or absence of anxiety disorder	N/A	Inpatient	Fair	17% of individuals with a schizophrenia diagnosis met criteria for SAD. 10% of individuals with a schizoaffective diagnosis met criteria for SAD. Together, 15% of the total sample of individuals diagnosed with these psychotic disorders met criteria for SAD.	Anxiety disorders reviewed as a whole data set.[a]
Farrelly et al. (2007)	Australia	140	25 (4.50)	68	FEP patients who met DSM-IV criteria for a current psychotic disorder	SCID for DSM-IV	N/A	Outpatient	Good	5% of the total FEP sample was reported to have met criteria for SAD.	Anxiety disorders reviewed as a whole data set.[a] Duration of hospital stay not reported.
Goodwin et al. (2003)	USA	184	33	64	The DIS	The DIS: DSM-III	N/A	Inpatient	Fair	8.2 met criteria for co-morbid SAD (15 individuals out of total of 184 subjects)	Anxiety disorders reviewed as a whole data set.[a]
Gorun et al. (2015)	USA	53	33.4 (9.8): men 32.4 (8.2) - women	53	The Diagnostic Interview for Genetic Studies	The DIS: DSM-III-R criteria & LSAS (a total score ≥ 60 is used as a diagnostic threshold)	Self-report Chapman Scales for physical and social anhedonia. Diagnostic interview for genetic studies (family history). The PANSS	Mixed	Fair	37.7% met criteria for SAD	The PANSS negative symptoms, with the exception of lower blunted affect and higher difficulty in abstract thinking, did not predict social anxiety. A family history of psychosis was a significant predictor of social anxiety.
Güçlü et al. (2012)	Turkey	102	35 (8.31)	77	DSM-IV: Schizophrenia	SCID-IV & LSAS[a]	CDSS, SUMD, STAI, SF36, PANSS	Outpatient	Fair	22 patients (21.6%) met criteria for comorbid SAD.	Individuals with co-morbid SAD demonstrated higher levels of awareness, depression and greater functional impairments.
Karatzias et al. (2007)	UK	138	37 (10)	71	DSM-IV: Schizophrenia	SCID-IV	PANSS, PBIQ, RSES, GAF	Outpatient	Fair	20 (14.5%) individuals with co-morbid SAD out of a total of 138	Anxiety disorders reviewed as a whole data set.[a]
Kessler et al. (2005)	USA	2322	CND	CND	DSM-IV: Schizophrenia	SCID-IV	NAP screen in the DIS	Outpatient	Fair	29.9% of subsample ($N = 2322$) met criteria for co-morbid SAD	Clinical correlates not reported in relation to SAD co-morbidity.
Kiran and Chaudhury	India	93	31 (8.27)	77	ICD-10 diagnostic criteria for schizophrenia	MINI	N/A	Inpatient	Fair	9.68% met diagnostic criteria for SAD.	Anxiety disorders reviewed as a whole data set.[a] Duration of hospital

(2016)											stay not reported.
Lowengrub et al. (2015)	Israel	50	45 (13.40)	48	SCID for DSM-IV (schizophrenia schizoaffective)	LSAS (a total score ≥ 60 is used as a diagnostic threshold).	The SQLS and the GAF. The PANSS was also used.	Outpatient	Fair	38% of the total sample met criteria for a comorbid diagnosis of SAD.	The presence of SAD may lead to a decreased quality of life for patients with schizophrenia.
Mazeh et al. (2009)	Israel	117	41 (13.20)	65	Schizophrenia and schizoaffective disorders were established according to DSM-IV and SCID-P (Hebrew version).	Comorbid anxiety was established according to SCID-P (Hebrew version) for DSM-IV and the LSAS[a]	PANSS and LSAS.	Inpatient	Fair	13 were diagnosed with comorbid social phobia (11%).	There was a tendency for patients with comorbid social phobia to have a higher severity PANSS total score. There was a significant correlation between the score of the LSAS *fear* and PANSS positive subscales. Avoidance scores were higher amongst patients with negative signs. Patients were recruited during their first week of inpatient stay – duration of stay not reported.
Michail and Birchwood (2009)	UK	80	24 (5.10)	66	Structured clinical interview using the SCAN to assess diagnosis of schizophrenia according to ICD-10	SCAN to assess diagnosis of SAD according to ICD-10, SPS, SIAS, B-FNE	The CDSS and the DoT.	Outpatient	Fair	Of the individuals in the FEP group ($n = 80$) 25% were diagnosed with an ICD–10 social anxiety disorder.	The FEP/SaD and SaD groups reported comparable social anxiety, autonomic symptoms, avoidance, and depression. Social anxiety in psychosis was not related to the positive symptoms of the Positive and Negative Syndrome Scale (PANSS), including suspiciousness/persecution.
Nebioglu and Altindag (2009)	Turkey	82	32 (8.90)	77	SCID for DSM-IV (schizophrenia)	SCID for DSM-IV (SAD)	N/A	Outpatient	Fair	13.4% of the total sample met diagnostic criteria for comorbid SAD.	Anxiety disorders reviewed as a whole data set.[a]
Pallanti et al. (2004)	Italy	80	29.9 (6.9)	49	DSM-IV: schizophrenia	SCID for DSM-IV & LSAS[a]	Short-Form Health Survey to assess QoL	Outpatient	Fair	29 individuals with co-morbid SAD in 80 (36%)	Comorbid SAD showed indexes of lower social adjustment and lower quality of life compared with schizophrenia patients without SAD
Seedat et al. (2007)	South Africa	70	35.8	54	MINI: schizophrenia	MINI for DSM-IV	HADS, the Hamilton Anxiety Scale, the Spielberger Anxiety Inventory, and the Stein GAD	Inpatient	Fair	4 out of 80 individuals met criteria for SAD (5.7%)	Anxiety disorders reviewed as a whole data set.[a] Duration of hospital stay not reported.
Sim et al. (2004)	Singapore	142	26.9 (5.9).	67	DSM-IV: FEP	SCID for DSM-IV	PANSS, SUMD and GAF	Inpatient	Fair	5 out of a total of 142 (6%) had co-morbid SAD	Anxiety disorders reviewed as a whole data set.[a] Patients were assessed during their first week of inpatient stay – duration of stay not reported.
Siu et al. (2018)	China	128	32.5 (12.1)	50	DSM-IV: FEP	SCID for DSM-IV	PANSS, SUMD, SOFAS, Simpson–Angus Scale, Barnes Akathisia Rating Scale and Abnormal Involuntary Movement	Outpatient	Fair	14 people with co-morbid SAD out of a total of 128 (11%)	Anxiety disorders reviewed as a whole data set.[a]
Sutliff et al. (2015)	Canada	42	26.3 (4.4)	72	DSM-IV: schizophrenia	SCID for DSM-IV	PANSS and Social Comparison Scale (SCS)	Outpatient	Fair	18 patients met criteria for SAD out of total 42 schizophrenia patients (43%)	Lower perception of social rank. Support for anxiety and negative self-evaluation as characteristic feature of co-morbid SAD in schizophrenia.
Tibbo et al. (2003)	Canada	30	41 (12.7)	80	DSM-IV: schizophrenia	MINI for DSM-IV	PANSS and Global assessment of functioning (GAF)	Outpatient	Fair	7 people with co-morbid SAD in total of 30 (23%)	Anxiety disorders reviewed as a whole data set.[a]
Voges and Addington (2005)	Canada	60	27.45 (SD = 8.28)	68	DSM-IV: schizophrenia	SCID for DSM-IV	SPAI, SFS and quality of life sale (QLS)	Outpatient	Fair	19 people out of total of 60 met criteria for SAD (32%)	Negative symptoms and negative self-statements, but not social anxiety, were significant predictors of social functioning.

Note. CDSS, The Calgary Depression Scale for Schizophrenia; DIP, Diagnostic for Psychosis Module; DIS, Diagnostic Interview Schedule; DOT, The Details of Threat Questionnaire; ICD-10, International Classification of Diseases—Tenth Revision; MINI, Mini-International Neuropsychiatric Interview; SCID, Structured Clinical Interview for DSM Disorders; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition; CND, Could Not Determine; DSM-III-R, Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised; FEP, First-Episode Psychosis; GAF, Global Assessment of Functioning Scale; HADS; The Hospital Anxiety and Depression Scale, LSAS, Liebowitz Social Anxiety Scale; NAP, Non-Affective Psychosis; PBIQ, Personal Beliefs about Illness Questionnaire; RSES, Rosenberg Self-Esteem Scale; SCAN, Schedules for Clinical Assessment in Neuropsychiatry; SDISS, the Sheehan Disability Scale; SPS, The Social Phobia Scale; SIAS, B–FNE, The Brief Fear of Negative Evaluation Scale; STAI, State-Trait Anxiety Inventory SUMD; The Scale of Unawareness of Social Disorders; SQLS, The Schizophrenia Quality of Life Scale; PANSS, Positive and Negative Syndrome Scale. Overall, 90% of participants were male with the percent of males in a single study ranging from 46% to 93%. We have not included any summary statistics for the age of participants because the studies themselves did not use a common reference group. Some studies reported the mean age of participants with psychosis and social anxiety; others studies only reported the mean age of participants with psychosis; and still other studies reported the mean age of all study participants including those without psychosis.

[a] The LSAS was used to evaluate and rate the severity of social phobia symptoms in patients (both fear and avoidance) and not as a diagnostic tool (cut off score therefore not calculated).

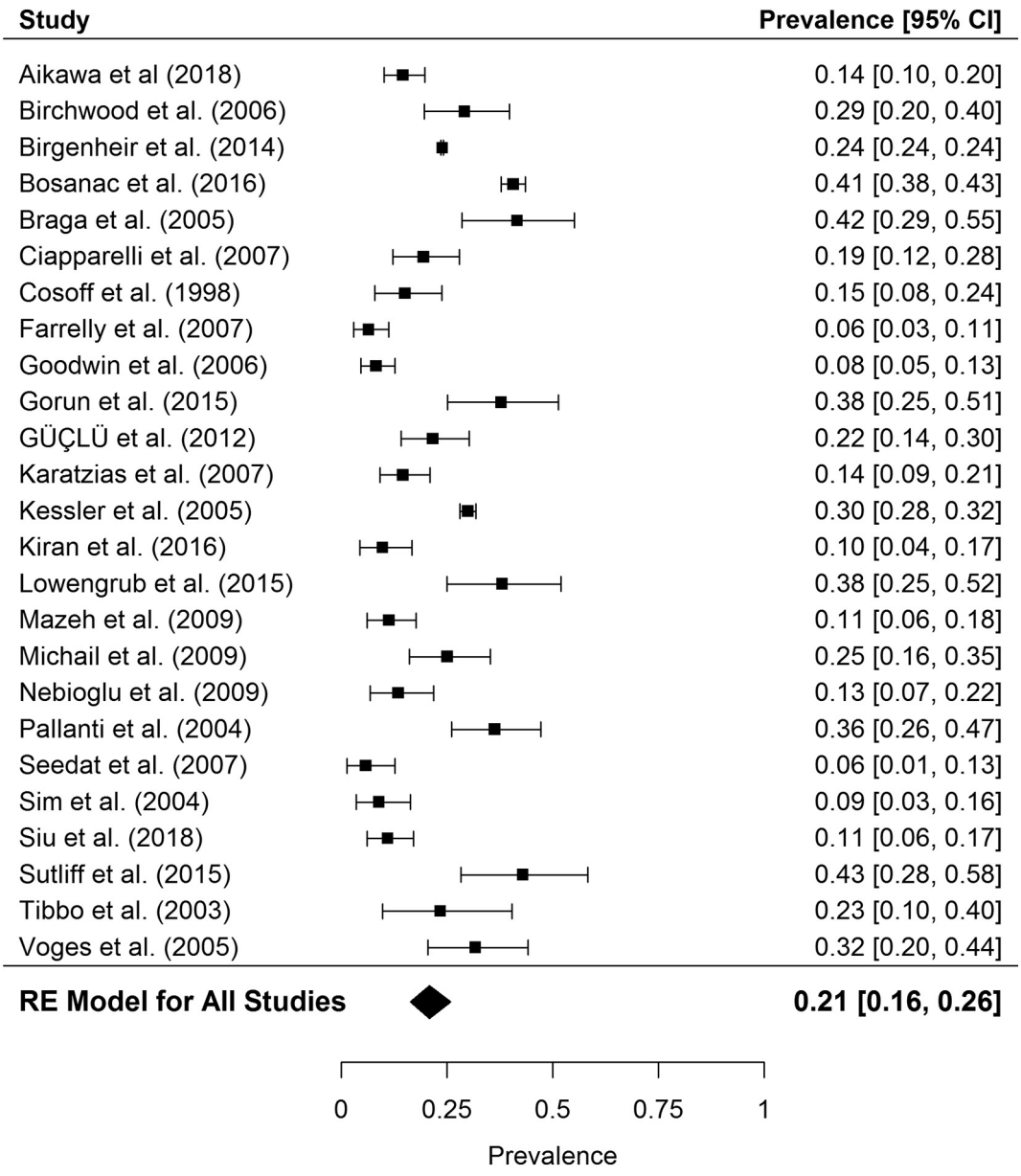

Fig. 2. Forest plot of pooled prevalence for the 25 studies. RE = random effects.

4.3. Clinical factors associated with comorbid SAD and psychosis

4.3.1. Psychosocial outcomes

One major issue for individuals with comorbid SAD and psychotic disorders is that they are more likely to experience and report poorer psychosocial outcomes than those without the comorbidity. Findings from the included studies that reported on psychosocial outcomes for individuals with comorbid SAD and those without indicated that SAD comorbidity was significantly associated with higher levels of depression (Bosanac et al., 2016; Gorun et al., 2015; Güçlü et al., 2012; Michail and Birchwood, 2009), lower functional impairments (Bosanac et al., 2016; Gorun et al., 2015; Mazeh et al., 2009), lower subjective quality of life (QoL) (Güçlü et al., 2012; Lowengrub et al., 2015; Pallanti et al., 2004), and higher levels of awareness (Güçlü et al., 2012). Gorun et al., 2015 also reported that a history of psychosis in patients with schizophrenia may indicate a higher susceptibility to the presence of problematic levels of social anxiety. While the generalisability of findings from one study is limited, awareness of this potential may aid clinicians in identifying individuals to assess for SAD.

While some study findings indicated that individuals with SAD comorbidity experienced increased depression (Bosanac et al., 2016; Gorun et al., 2015; Güçlü et al., 2012; Michail and Birchwood, 2009), Michail and Birchwood (2009) found that FEP/SAD and SAD groups reported comparable levels of depression. This is unsurprising, as research supports a strong relationship between having SAD (early onset) and developing depression later in life (Cummings et al., 2014). It is worth noting that earlier diagnosis and treatment of SAD is also related to better outcomes in terms of depression resulting after social anxiety disorder, highlighting the importance of early detection of SAD in this population (Michail and Birchwood, 2009).

Findings that individuals with comorbid SAD, when compared to their peers without SAD, reported a lower subjective quality of life (Güçlü et al., 2012; Lowengrub et al., 2015; Pallanti et al., 2004) provides important information regarding individuals' subjective experiences of personal functioning. This also supports findings that individuals with comorbid SAD, in comparison to those without, exhibit poorer social functioning and increased social dysfunction (Aikawai et al., 2018; Bosanac et al., 2016; Gorun et al., 2015; Pallanti et al., 2004). This is

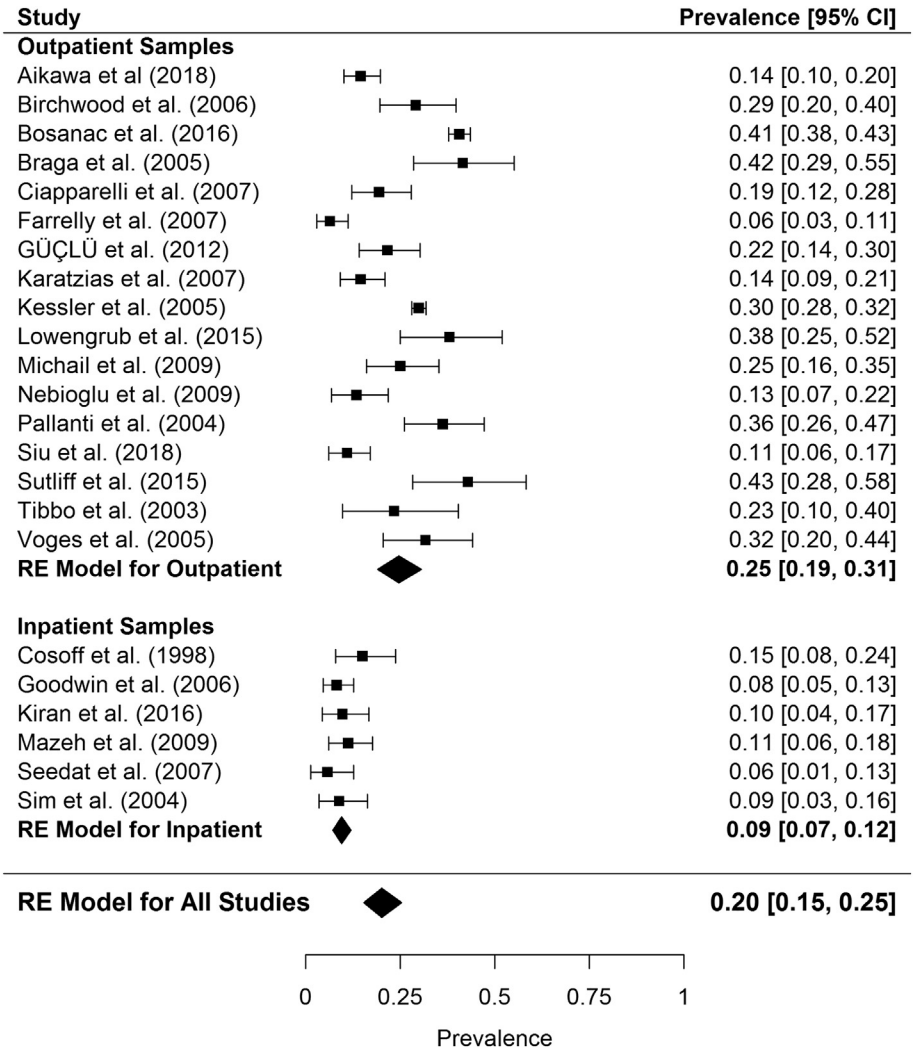

Fig. 3. Forest plot of studies grouped by patient characteristics. RE = random effects.

noteworthy, as a decline in social functioning is already one of the hallmarks of psychotic disorders, and the findings reported above suggest that comorbid SAD may compound and increase social impairment.

Study findings also showed that co-morbid social anxiety was significantly associated with more negative self-statements and that a lack of social anxiety co-morbidity was significantly associated with higher levels of positive self-statements (Sutcliff et al., 2015; Voges and Addington, 2005). These findings fit with the Clark and Wells (1997) theoretical model of social anxiety that negative cognitions about oneself are related to the maintenance of social anxiety and as such represent an important treatment target.

Güçlü et al. (2012) reported that insight levels were higher in individuals with comorbid SAD, compared to those without SAD. It may be that some individuals with a psychotic disorder experience such a high level of impairment that they have limited awareness of the disease, its clinical symptoms, and the social consequences. This may be a strategy for coping with the diagnosis of a serious mental illness itself. On the other hand, for some individuals who develop insight into their illness, social anxiety may develop as a reaction or a response to the shame and social stigma attached to a diagnosis of severe mental illness (Birchwood et al., 2007; Michail and Birchwood, 2009). Because our current understanding of the ontological basis of social anxiety in individuals with a psychotic disorder is limited, more research in this area is required in order to develop effective treatments tailored to the specific nature of the symptoms and difficulties experienced by individuals with comorbid SAD.

4.3.2. Assessment

Psychotic disorders are typically regarded as the most serious, and potentially most debilitating, psychiatric diagnosis, and it is likely (particularly in the acute phase of the illness) that whatever influence anxiety disorders might exert on patients with psychosis, anxiety experiences may be overlooked by clinicians due to the severity of the psychotic symptoms and the consequent precedence placed on their treatment (as clearly demonstrated by both a lack of prevalence and treatment studies in this area). This is understandable, given that the experience of psychotic symptoms can be extremely frightening and confusing for the affected individual.

The hierarchal dominance of acute or positive psychotic symptoms may mean that clinicians miss opportunities to assess for and subsequently treat SAD in individuals with a psychotic disorder (Cosoff and Hafner, 1998). While understandable, this is problematic, as it means affected individuals will typically find themselves back in the community, trying to best manage the myriad of negative functional consequences and subjective distress associated with SAD comorbidity.

Another issue for clinicians in terms of assessment is being able to confidently differentiate SAD symptoms from both positive symptoms (e.g., paranoia, ideas of reference) and negative symptoms (e.g., social withdrawal). One consideration of note is that, while social withdrawal in psychotic disorders is linked to detachment, in SAD it is linked strongly to interpersonal sensitivity (Lowengrub et al., 2015). It is therefore important that clinicians assess for SAD in individuals diagnosed

with psychosis in order to decrease the prospect of compounded functional impairment.

4.4. Recommendations for clinicians

In their recommendation 1.3.1.2 for common mental health disorders, the NICE clinical guidelines (National Institute of Excellence [NICE], 2013) provide two key identification questions for clinicians to gauge the necessity for further assessment if SAD is suspected. Given the high reported prevalence of SAD amongst psychosis populations and the burden placed on individuals with dual diagnoses, it is the authors' recommendation that either the 3-item Mini-Social Phobia Inventory (MINI-SPIN; Connor et al., 2001) or the following two questions (as recommended by NICE) be routinely asked by clinicians when working with individuals with a psychotic disorder: 1) *Do you find yourself avoiding social situations or activities?* and 2) *If so, is it because you are embarrassed or fearful of negative evaluation in such social situations?* If the individual scores 6 or more on the Mini-Spin or answers *yes* to either of the two questions above, a comprehensive assessment for SAD should be conducted. For example, the clinician administered LSAS (Liebowitz, 1987), assesses a range of social interaction and performance situations that individuals with SAD may fear and/or avoid. Most importantly, and given the reported difficulties in differentiating between paranoia and social anxiety evaluative concerns (Roy et al., 2018b), it has been normed for use with individuals diagnosed with a psychotic disorder (Romm et al., 2011).

4.5. Limitations and implications for research and treatment

The heterogeneity between studies included in our meta-analysis and systematic review limits comparisons and interpretation of results. It was not possible for example, to perform moderating subgroup comparisons for assessment methods and diagnostic categories because the groups are greatly unbalanced, making comparisons unreliable. To increase homogeneity in the future, it is advised that researchers, if possible, strive to examine studies that use the same and preferably validated means of assessing and diagnosing SAD, as well as those that examine a similar stage of illness (e.g., FEP versus chronic populations) to capture potential key differences in assessment method, diagnostic category, and clinical presentation.

Likewise, many of the included studies in this review examined mixed psychotic disorder populations (i.e., schizophrenia and schizoaffective populations analysed as one group), which on the one hand, decreases the specificity of our findings, but on the other, is a strength, as it reflects the prevalence of SAD amongst individuals with various psychotic disorder(s) and not just a particular psychotic classification.

Finally, we were unable to account for the impact of inpatient hospital duration on the reported inpatient prevalence rate of 9%, as this information was not available. However, it may be the case that a greater duration of hospital stay is associated with less social anxiety, as a longer stay in hospital may be associated with fewer exposure opportunities to feared interpersonal interactions.

4.6. Future directions

One key consideration when developing psychosocial treatments for individuals with a psychotic disorder is the high reported attrition rates (Nelson et al., 2013). For example, it is well known that young adults with a FEP, including those with psychotic disorders (Álvarez-Jiménez et al., 2012; Rice et al., 2014) are difficult to engage in treatment. Given that the Internet, smartphone applications (apps), and social media connect more and more people to each other, it seems appropriate to consider how to utilise these cost-effective and widely accessible technologies in mental health interventions (Eysenbach et al., 2014), and in particular in treating SAD amongst individuals with a psychotic disorder diagnosis. In particular, the use of online therapeutic modalities should be considered to promote engagement, as importantly, adherence to treatment is strongly associated with better outcomes (Alvarez-Jimenez et al., 2013; Álvarez-Jiménez et al., 2012; Alvarez-Jimenez et al., 2018; Alvarez-Jimenez et al., 2012).

5. Conclusion

Our findings demonstrate that comorbid SAD amongst individuals with a psychotic disorder is prevalent and associated with negative psychosocial outcomes, including impairment in functional domains. Comorbid SAD amongst individuals with a psychotic disorder has been found to be associated with a higher risk of suicide (Roy et al., 2018b), which is a matter of substantial clinical importance. Yet, SAD is generally underreported in clinical settings (Roy et al., 2018b) and this is likely due to difficulty in disentangling symptoms of psychosis from those of SAD. It is important to use appropriate assessment tools to identify SA symptoms in individuals with a psychotic disorder because, if they remain undetected and untreated, these symptoms will persist, with debilitating functional consequences for the affected individual.

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Contributors

Author McEnery designed the review, wrote the protocol, managed the literature searches, quality checks and analyses and led the write up of the manuscript. Author Alvarez-Jimenez and Lim provided methodological and content advice throughout the process of the review. Author Tremain was a second rater in screening articles for quality assessments. Authors Alvarez-Jimenez, Lim and Knowles had input to protocol development and writing up the final manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest

The authors have no conflicts of interest to declare.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.schres.2019.01.045.

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