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REVIEW

Loneliness in psychosis: a systematic review

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Abstract

Purpose The aim of the review is to understand the relationships between loneliness and related psychological and social factors in individuals with psychosis. Loneliness is poorly understood in people with psychosis. Given the myriad of social challenges facing individuals with psychosis, these findings can inform psychosocial interventions that specifically target loneliness in this vulnerable group.

Methods We adhered to the PRISMA guidelines and systematically reviewed empirical studies that measured loneliness either as a main outcome or as an associated variable in individuals with psychosis.

Results A total of ten studies examining loneliness in people diagnosed with a psychotic disorder were examined. Heterogeneity in the assessment of loneliness was found, and there were contradictory findings on the relationship between loneliness and psychotic symptomatology. In individuals with psychosis, loneliness may be influenced by psychological and social factors such as increased depression, psychosis, and anxiety, poor social support, poor quality of life, more severe internalised stigma and perceived discrimination, and low self-esteem.

Conclusions The relationship between loneliness and psychosis remains poorly understood due to a lack of rigorous studies. Although having strong social relationships is crucial to facilitate recovery from serious mental illness, psychosocial interventions that specifically target loneliness in individuals with psychosis are lacking and sorely needed. Interventions targeting loneliness in those with psychosis will also need to account for additional barriers associated with psychosis (e.g., social skill deficits, impoverished social networks, and negative symptoms).

Keywords Loneliness · Perceived social isolation · Psychosis · Systematic review

Introduction

Loneliness, also referred to as 'perceived social isolation', is a *subjective* experience that arises when there is a difference between one's actual relationships and one's desired relationships—specifically where one perceives their relationships to be inadequate to meet their need for belonging [1]. The experience of loneliness is regarded as a growing public health concern that is largely ignored, despite the wide reaching detrimental impacts on a constellation of physical [2, 3] and mental health indicators [4, 5]. Although loneliness affects everyone from healthy individuals to individuals diagnosed with mental disorders [6], people with psychotic disorders may be particularly vulnerable given that they often report impoverished social networks and lower social support [7, 8].

Loneliness is indeed problematic for individuals with psychosis. In the second Australian national survey of psychosis ($N = 1825$), over 80% of people with psychosis reported loneliness [9] and identified loneliness as one of the three challenges, they faced in recovery [10]. Despite this, loneliness continues to be overlooked as a crucial treatment target within psychosocial interventions aimed at improving psychosocial functioning in people with psychosis [11, 12]. Psychosocial interventions target functional outcomes such

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as improving social skills, providing social opportunities, or both [12–14]. Certain psychosocial interventions such as social skills training (SST) appear to be a primary candidate for reducing loneliness. However, one of the problems with SST studies is that while researchers are interested in reducing loneliness, they do not typically focus on measuring loneliness as a primary outcome. Although psychosis is known to be associated with a myriad of problems in social cognition, from theory of mind deficits, emotion perception difficulties to attributional biases [15], a recent exploratory study suggested that social cognition deficits and loneliness in patients with psychosis may be unrelated [16].

Recently, a strand of research has emerged, using both nonclinical and clinical samples, attempting to examine the relationship between loneliness and psychosis. In a cross-sectional study, the relationship between loneliness and psychotic symptoms was mediated by depression symptom severity in three out of four community samples (total $N = 766$; [17]). Lim et al. found that in their longitudinal study of community participants ($N = 1010$), loneliness had a reciprocal relationship with social anxiety above and beyond depression and paranoia [18].

Consistent with the social defeat hypothesis [19], social adversity (i.e., small social networks, low social support, childhood bullying, and migration, to name a few) has long been proposed as a risk factor for developing psychosis [7, 20, 21]. Jaya et al. found that loneliness, together with social rank comparison, and negative beliefs about the world, explained the relationship between social adversity and negative symptomatology. Only negative schemas, however, explained the relationship between social adversity and positive symptoms [22]. A new study found that in a clinical sample of participants with schizophrenia, negative schemas of others explained the relationship between loneliness and paranoia [23].

That negative schemas of others may be implicated in the relationship between loneliness and psychosis is plausible. Findings from a meta-analytic review of loneliness interventions in nonclinical samples [24] indicated that interventions which addressed maladaptive cognition about others were more effective than interventions that provided more social opportunities. Furthermore, it is possible that the effects of loneliness may not be constrained to an individual. Within a social network study on nonclinical individuals, Cacioppo et al. found that an individual who reported themselves to be lonely is more likely to have friends who also report loneliness; specifically, this trend was found to occur up to three degrees of separation from the lonely individual (i.e., the friend of a friend's friend). Lonely individuals, as opposed to 'non-lonely' individuals, appeared to cluster in the periphery of the social network, reported fewer ties when asked at a later time (i.e., losing 8% of their ties approximately 4 years later; [25]). These findings were interpreted by the authors as being consistent with an induction theory hypothesis which states that loneliness in one person can influence loneliness levels in people they interact with within their social environment [25]. However, the way loneliness can be induced within one's social network is yet to be known. For example, is it an emotional (e.g., increased anxiety), a cognitive (e.g., perception of relationships), or a behavioural (e.g., showing less trusting behaviours) signal that affects other people.

The detrimental impact of loneliness on an individual and its possible impact on people around the lonely individual strengthens the case for helping individuals with psychosis repair their relationships, but this endeavour may not be straightforward. Individuals with psychosis, when compared with individuals without psychosis, do not report feeling less satisfied with their relationships, despite reporting fewer reciprocated relationships and confidants [26]. While relationship satisfaction ratings are related (but not equivalent) to loneliness, the findings of this study suggest that subjective ratings of relationships do not necessarily relate to objective indicators (e.g., number of confidants). In addition, a lack of dissatisfaction with relationships in those diagnosed with a psychotic disorder raises the question as to whether this factor, similar to subjective quality-of-life ratings, is influenced by illness-related factors such as reduced insight or social anhedonia [27, 28]. It is also possible that the need to connect with others is dependent on the stage of psychosis, so promoting the benefits of building meaningful relationships may need to be specific to the different phases of psychosis.

Loneliness in psychosis research is in its infancy; therefore, it is premature to advance a theoretical framework that can fully explain the psychological factors that trigger or maintain loneliness in individuals diagnosed with psychosis. The social defeat hypothesis offers only partial explanation of how social exclusion and adversity (e.g., migration and childhood trauma) may increase the risk of having a psychotic disorder. However, an individual who faced social adversity may not necessarily report problematic loneliness, and vice versa, an individual who is lonely may not have experienced any social adversity. A recent meta-analytic review ($n = 13$) found a moderate association between loneliness and psychosis ($k = 13$, $N = 15\ 647$, $r = .32$; [29]) and that severity of loneliness was not influenced by stage of illness (i.e., first/late onset vs. established psychosis). This research has taken a good first step towards understanding the relationship between loneliness and psychosis, despite being constrained by methodological limitations (e.g., the study included individuals with bipolar disorder, and those without a mental disorder).

Study aims

To further advance our understanding of loneliness and psychosis, we will attempt in this review to clarify our understanding of the associated psychological and social factors that contribute to loneliness severity in individuals with psychosis. To do so, first, we will only review empirical studies that recruited individuals with psychotic disorders as a group of interest, which is different from the previous meta-analytic review [29]. Second, we will put forth a preliminary theoretical model of loneliness in psychosis. To understand the relationships between loneliness, psychosis, and its related factors, it is crucial to not just understand how loneliness is defined and measured (e.g., is loneliness quantified in these studies?), but also consider the methodological quality of these studies. The measurement of loneliness as well as the methodological quality of the studies will allow more accurate judgements about the influence of these psychological and social factors on loneliness.

The objectives of the review were to address the following questions: (1) how was loneliness measured in these studies? (2) what was the methodological quality of these studies? (3) how was loneliness related to psychotic symptoms and what accounts for this relationship? Informed by the results of this review, we will also propose a theoretical model of loneliness for individuals with psychosis, outlining psychological and social factors thought to influence loneliness.

Materials and methods

Search strategy

The following databases were used: Pubmed, Scopus, PsychINFO (EBSCO Host) and Web of Science, including Science Citation Index Expanded [SCI-Expanded], Social Sciences Citation Index [SSCI], and Arts & Humanities Citation Index [A&HCI]. The following search terms were used: ('loneliness' OR 'perceived social isolation' OR 'social isolation' OR 'lonely') AND ('psychosis' OR 'psychotic disorders' OR 'schizophrenia' OR 'psychotic'). These databases were searched for abstracts published from January 1, 1980 to December 31, 2016.

We also manually searched relevant journals including Acta Psychiatrica Scandinavica, British Journal of Clinical Psychology, British Journal of Psychiatry, Early Intervention in Psychiatry, JAMA Psychiatry, Journal of Abnormal Psychology, Journal of Nervous and Mental Disease, Psychiatry Research, Psychological Medicine, Psychology and Psychotherapy: Theory, Research and Practice, Psychosis, Schizophrenia Bulletin, Schizophrenia Research, Social Psychiatry and Psychiatric Epidemiology. Finally, several experts were consulted about additional studies. All online abstracts were saved into a citation database and duplicates were removed. Studies that did not meet our initial inclusion criteria (see below) were first discarded, and then, full-text articles were screened (see Fig. 1).

Inclusion criteria and exclusion criteria

Studies were selected using the following inclusion criteria: (1) sample recruited from a clinical population with a diagnosis of a psychotic disorder; (2) provided data that was specific to participants with psychosis only; (3) loneliness defined as 'subjective loneliness' or 'perceived social isolation' was a dependent, moderating or mediating variable; (4) psychological variables (defined as cognitive, personality, mental health symptom, behavioural variables, and psychosocial treatment) were measured as predictors or correlates of loneliness; (5) published in the English language; (6) peer reviewed; and (7) published between 1980 and 2016, inclusive.

Exclusion criteria included: (1) studies examining non-psychological predictors or causes of loneliness only (e.g., biomarkers, neurocognitive variables, demographic, and medical treatment); (2) studies involving children and adolescents below 18 years of age; and (3) case studies, conference papers, review papers, and qualitative studies. Two reviewers (ML and JFMG) independently assessed relevant articles for inclusion based on a template developed for this systematic review. Disagreements were resolved through discussion.

Data extraction and data tabulation

A data extraction template was developed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist [30]. Two reviewers (MHL and JFMG) then independently tabulated key information from all relevant studies. Any disagreements were resolved through discussion.

Quality criteria

Methodological quality was assessed using the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines [31] and PRISMA checklist [30]. The reviewers (MHL and JFMG) agreed upon the list of quality indicators and confounding variables in the area for loneliness in psychosis. These were implemented in a data extraction tool. The quality indicators included: definition of loneliness as a subjective construct and as an outcome variable, method of measurement of loneliness, verification of psychosis diagnosis, and/or psychotic symptom severity and related psychological factors or correlates associated with loneliness. Potential confounding variables included other

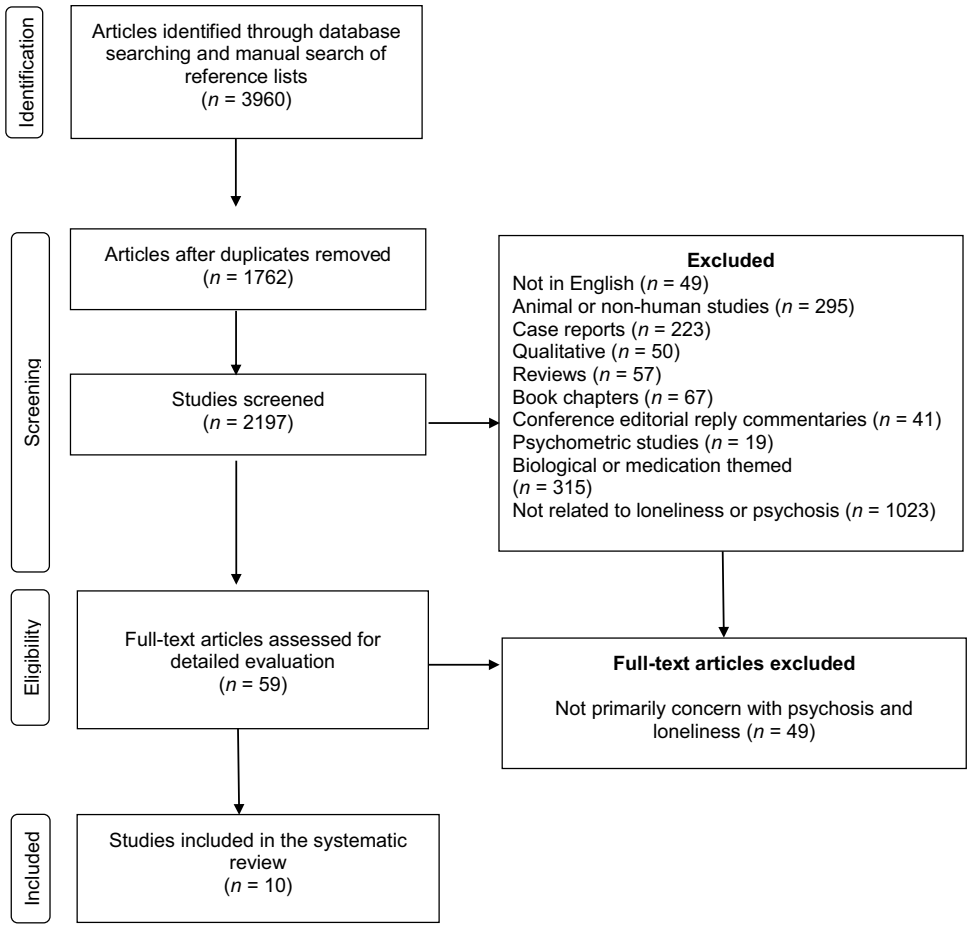

Fig. 1 Flow diagram of the study selection process

co-morbid physical and mental health disorders (including the measurement of associated mental health symptom and its severity).

Results

The search strategy yielded a total of 1762 abstracts. Of those, 58 articles met the initial inclusion criteria and were retrieved for further examination. Next, 49 articles were excluded for different reasons, leaving a total of 9 articles which meet the inclusion criteria (Fig. 1). One additional article was included via hand search [32]. Of these ten articles, there were two studies that recruited from the same participant pool (see [33, 34]; Table 1). We included both studies, because they focused on different psychological constructs and its relationships with loneliness. Table 1 outlines the selected studies, summarising sample characteristics, loneliness, and psychological measures and main study findings.

Study characteristics

The total *N* across all ten studies, including only one of the Świtaj et al.'s studies, was 21,393 participants.[1] The sample sizes ranged from 35 to 212, excluding a comparative control sample of 20, 000 for one study [32]. The participant age range was between 18 and 79 years, and the mean age ranged from 32 to 63 years. There were 1015 participants with a psychotic disorder. Only one study recruited individuals with first-episode psychosis [35]. Women made up anywhere from 0 to 75% across all ten studies.[2] Three studies were conducted in Poland, two from Israel, one from Ireland, Philippines, Serbia, USA, and the UK. There was a mix of recruitment sources[3] from outpatient community [35–39],

[1] This figure accounts for Chrostek et al. (2016) included a random sample of 20 000 controls from the general population.

[2] Pjescic et al. (2014) did not report % females for the psychiatric control sample and Tharayil (2007) recruited only men due to small sample of women who were also diagnosed with a psychotic disorder.

[3] Tharayil (2007) did not report the recruitment source for half of the sample.

Table 1 Summary of studies that examined loneliness in people diagnosed with a psychotic disorder

Study	Location	*N*	Age *M* (SD)	% Female	Diagnosis	Loneliness measure	Psychological and social variables	Measures of psychological and social variables	Key findings and comments relating to loneliness
Chrosek et al. [32]	Warsaw, Poland	207	38.3 (12.6)	49.8	Schizophrenia, Persistent Delusional Disorder, Acute Psychotic Disorder, Unspecified Non-organic Psychosis	De Jong Gierveld Loneliness Scale	Internalised stigma Self-esteem Self-efficacy Social support Social network Interpersonal competences Social functioning Depression	ISMI RSES GSES BSSS LSNS-6 ICQ-R SOFAS IP-SPS BPRS CDSS	Individuals with psychosis reported significantly more loneliness than demographically matched controls from the general population. Loneliness was predicted by more severe internalised stigma, lower social support, lower interpersonal competence, a smaller social network and the number of inpatient hospital admissions. There is a need for comprehensive therapeutic programs targeting internalised stigma, enhancing social support networks, and improving social skills to address loneliness in individuals with psychotic disorders
Cohen et al. [36]	New York, USA	117	63	75	Schizophrenia	Standards of Self-comparison of Life Situations	Subjective well-being Network Analysis Profile Depression	SWB SHORT-CARE	Older adults with schizophrenia reported a higher incidence of loneliness than matched community controls. Within the clinical group, those who reported not being satisfied with life also significantly reported more loneliness than those who reported being satisfied with life. Loneliness, life difficulties and perceptions of social support were predictors of well-being
Gallagher et al. [39]	Dublin, Ireland	40	42.0 (11.45)	32.5	Schizophrenia–hallucinations ($n=20$) and no hallucinations ($n=20$)	UCLA Loneliness Scale	Hopelessness Self-esteem	HS RSES	Those who report auditory hallucinations did not report significantly higher loneliness when compared with those who do not report auditory hallucinations
Pješčić et al. [40]	Belgrade, Serbia	212	Not stated	Not stated	Schizophrenia with depression and suicidal risk ($n=53$) and those without depression and suicidal risk ($n=159$)	Interview—Loneliness question coded as present or absent	Family support Social support Social isolation Insight Depression	Clinical interview CDSS	Individuals with schizophrenia with depression and suicidal risk reported lower levels of family support, social support and higher levels of loneliness and social isolation when compared with those without depression and suicidal risk

Table 1 (continued)

Study	Location	*N*	Age *M* (SD)	% Female	Diagnosis	Loneliness measure	Psychological and social variables	Measures of psychological and social variables	Key findings and comments relating to loneliness
Roe et al. [37]	Israel	159	43.2 (10.7)	33.3	Schizoaffective, Schizophrenia	S-SELAS	Recovery Social support Quality of life Overall functioning	RAS MSPSS MANSA GAF	Higher recovery was related to higher social support and lower levels of loneliness. The relationship between loneliness and recovery was contingent on quality of life
Sündermann et al. [35]	London, UK	38	32.3 (9.6)	39.5	First-episode psychosis	1-item question—how many days they felt lonely and in need of companionship in the past week	Social functioning Social support Depression Anxiety Confidant	TBM MDSS CES-D IAPS	Lowered satisfaction with friend and family social support, higher levels of loneliness and the absence of a confidant were strongly associated with psychotic and depressive symptom severity. The number of friends or family seen was not associated with the number of lonely days. Those without a confidant compared with those with a confidant reported higher levels of loneliness. There was a direct relationship between loneliness and paranoia and anxiety also partially explained this relationship
Schwartz & Gronemann [38]	Israel	97	43.0 (10.1)	33.0	Schizophrenia	UCLA Loneliness Scale	Self-efficacy Social support Use of social services	GSES MOS-SSS PUSCQ	Lower generalised self-efficacy was directly related to higher loneliness, but did not predict lower loneliness over and beyond other factors. The factors were higher social support, higher participation in social activities and living arrangement type (group home residents)
Świtaj et al. [33]	Warsaw, Poland	110	38.4 (11.4)	60.9	Schizophrenia, Schizotypal, Persistent Delusional Disorder, Acute Psychotic Disorder, Induced Delusional Disorder, Schizoaffective Disorder, Non-organic Psychotic Disorder	De Jong Gierveld Loneliness Scale	Internalised stigma Depression Overall functioning	ISMI CDSS GAF	Loneliness was not related to positive or negative psychotic severity scores and related to depression severity. The relationship between internalised stigma and depression is contingent on loneliness severity. Addressing internalised stigma in an intervention aimed at reducing loneliness is warranted

Table 1 (continued)

Study	Location	*N*	Age *M* (SD)	% Female	Diagnosis	Loneliness measure	Psychological and social variables	Measures of psychological and social variables	Key findings and comments relating to loneliness
Świtaj et al. [34]	Warsaw, Poland	110	38.4 (11.4)	60.9	Schizophrenia, Schizotypal Disorder, Persistent Delusional Disorder, Acute Psychotic Disorder, Induced Delusional Disorder, Schizoaffective Disorder, Non-organic Psychotic Disorder	De Jong Gierveld Loneliness Scale	Social support Self-esteem Perceived discrimination	BSSS RSES ISMI	More severe perceived discrimination significantly predicted higher loneliness. The relationship between perceived discrimination and loneliness was contingent on self-esteem. A lowered self-esteem reduced a tendency to seek support and leads to more loneliness
Tharayil [41]	Manila, Philippines	35	36.7	0	Schizophrenia	UCLA Loneliness Scale	Self-perceptions Social perceptions Family perceptions Depression	ISE AOI IFR SDS	Negative perceptions of the self and loneliness were related even after controlling for depression. Depression and loneliness were significantly related (25% variance). Age and duration of psychotic illness were unrelated to loneliness. Higher loneliness was related to more problems with negative social perceptions of others. Negative self-perceptions (e.g., low self-esteem) should be addressed when treating loneliness in people with schizophrenia

ISMI Internalised Stigma of Mental Illness, *RSES* Rosenberg Self-esteem Scale, *GSES* General Self-efficacy Scale, *BSSS* Berlin Social Support Scale, *LSNS-6* Lubben Social Network Scale-6, *ICQ-R* Interpersonal Competence Questionnaire-Revised, *SOFAS* Social and Occupational Functioning Assessment Scale, *IP-SPS* Independence-Performance (IP) subscale of the Social Functioning Scale, *BPRS* Brief Psychiatric Rating Scale, *CDSS* Calgary Depression Scale for Schizophrenia, *SWB* Subjective Well-Being, *SHORT-CARE* Short version of the Comprehensive Assessment and Referral Evaluation, *UCLA* University of California Los Angeles, *HS* Hopelessness Scale, *RAS* Recovery Assessment Scale, *MSPSS* Multidimensional scale of perceived social support, *MANSA* Manchester Short Assessment of Quality of Life, *GAF* Global Assessment Functioning Scale, *TBM* Time budget measure, *MDSS* Multidimensional Support Scale, *CES-D* Center for Epidemiological Studies Depression Scale, *IAPS* International Affective Picture, *GSES* General Self-efficacy Scale, *MOS-SSS* Medical Outcomes Study Social Support Survey, *PUSCQ* Participation and Use of Services in the Community Questionnaire, *ISMI* Internalised Stigma of Mental Illness, *CDSS* Calgary Depression Scale for Schizophrenia, *GAF* Global Assessment Functioning Scale, *BSSS* Berlin Social Support Scales, *RSES* Rosenberg Self-esteem Scale, *ISMI* Internalised Stigma of Mental Illness, *ISE* Index of Self-esteem, *AOI* Acceptance of Others Inventory, *IFR* Index of Family Relations, *SDS* Self-rating Depression Scale

inpatient [40, 41], or a combination of outpatient and inpatient settings [32– 34]. Studies that used mixed recruitment sources did not include specific analyses of subsamples [32–34]. Two studies [39, 40] compared participants with psychosis with or without a presence of other psychiatric symptoms (e.g., depression or auditory hallucinations) and two studies drew a control comparison from the community [32, 36].

Study quality

We considered research quality and design issues that can pose a threat to internal validity when comparing the selected studies. The following were thought to influence results, namely: (1) overall quality of the studies, in terms of heterogeneous measurement of loneliness, psychotic symptom severity, and method of establishing psychosis diagnosis and (2) reliance upon cross-sectional study designs which prohibits interferences regarding a causal relationship between loneliness and the selected factor. The results of the systematic review may further be influenced by either, selection bias, with studies recruiting non-random samples, publication bias, and possibly inadequate statistical power to detect effects.

Measurement of loneliness

Three studies [38, 39, 41] administered the UCLA Loneliness scale (UCLA-LS; [42]). Only the latter two studies [38, 41] reported internal consistency scores (all αs = .89) and only one study provided the descriptive scores for the UCLA-LS [39]. Three studies administered the De Jong Gierveld Loneliness Scale [43], reporting good internal consistency scores (all αs > .83). Świtaj et al. [33, 34] administered the brief six-item version of the De Jong Gierveld Loneliness Scale and reported a mean score of 17.13 (SD = 5.14) out of 30. Chrostek et al. [32] administered the 11-item version and reported the mean item score (M = 2.83; SD = .80) in participants with psychosis.

Roe et al. [37] reported fair internal consistency scores (αs > .74) across the Social and Emotional Loneliness Scale (S-SELSA; [44]) subscales, but did not report descriptive statistics. Three studies did not administer a psychometrically valid loneliness scale [35, 36, 40]. Pješčić et al. [40] and Cohen et al. [36] measured the presence of loneliness in a dichotomous format (present vs. absent). Sündermann et al. measured the number of days one felt lonely in the past week [35]; those with first-episode psychosis reported an average 2.6 days (SD = 2.7) out of the past 7 days [35].

Only two studies examined the difference in loneliness between individuals with psychosis and demographically matched nonclinical controls, with results showing that individuals with psychosis were significantly lonelier when compared with control participants [32, 36]. Chrostek et al. [32] found that individuals with psychosis reported significantly higher loneliness (M = 1.88, SD = .60) when compared with matched individuals in the general population (M = 1.48, SD = .52), $t(403.42) = -7.12$, $p < .001$, Cohen d = .70. Cohen et al. [36] reported 46% of older persons with schizophrenia reported feeling lonely in the past month compared with 25% of the older sample from the general population.

A theoretical model of loneliness in psychosis: a focus of psychological and social factors

Based on the results of this review, we identified several factors that may influence loneliness in individuals with psychosis, as depicted in Fig. 2. Broadly, there are five factors: (1) mental health symptoms, comprised of depression, psychosis, and anxiety; (2) social support, comprised of structural and functional indicators; (3) well-being factors, comprised of quality of life and recovery processes; (4) societal perceptions, comprised of internalised stigma and perceived discrimination; and (5) self-constructs, comprised of self-esteem and self-efficacy. Where multiple factors may be presented within one study, we defer to presenting detailed information within the section where the relationship between loneliness and that factor is considered most relevant. We illustrated the relationship between loneliness and each selected factor using bidirectional, rather than unidirectional arrows to indicate correlations. We did not depict the relationships between each selected factor for clarity.

Mental health factors: depression, psychosis, and anxiety

Depression was measured in six out of ten studies [32, 33, 35, 36, 40, 41], with half of these studies using the clinician-administered Calgary Depression Scale for Schizophrenia (CDSS; [45]). Depression was significantly associated with loneliness, with correlations ranging from .36 to .66, ps < .001 [32, 33, 35, 41]. People with schizophrenia who reported a depression and suicidal risk (n = 53) compared with those with schizophrenia *without* a depression and suicidal risk (n = 159) reported a significantly higher incidence of loneliness, 23 vs. 9%, respectively ($\chi^2 = 6.24$, $p = .012$; [40]). While loneliness was related to depression (r = .41, $p < .001$, N = 207), Chrostek et al. [32] found that depression ($\beta = .09$, $p > .05$) did not predict loneliness above and beyond other factors. The only psychiatric factor that appears to contribute to loneliness is the number of inpatient hospitalisations ($\beta = .14$, $p < .05$) (see results of other factors detailed below).

None of the selected studies assessed the current diagnostic status of their participants, relying on the previous

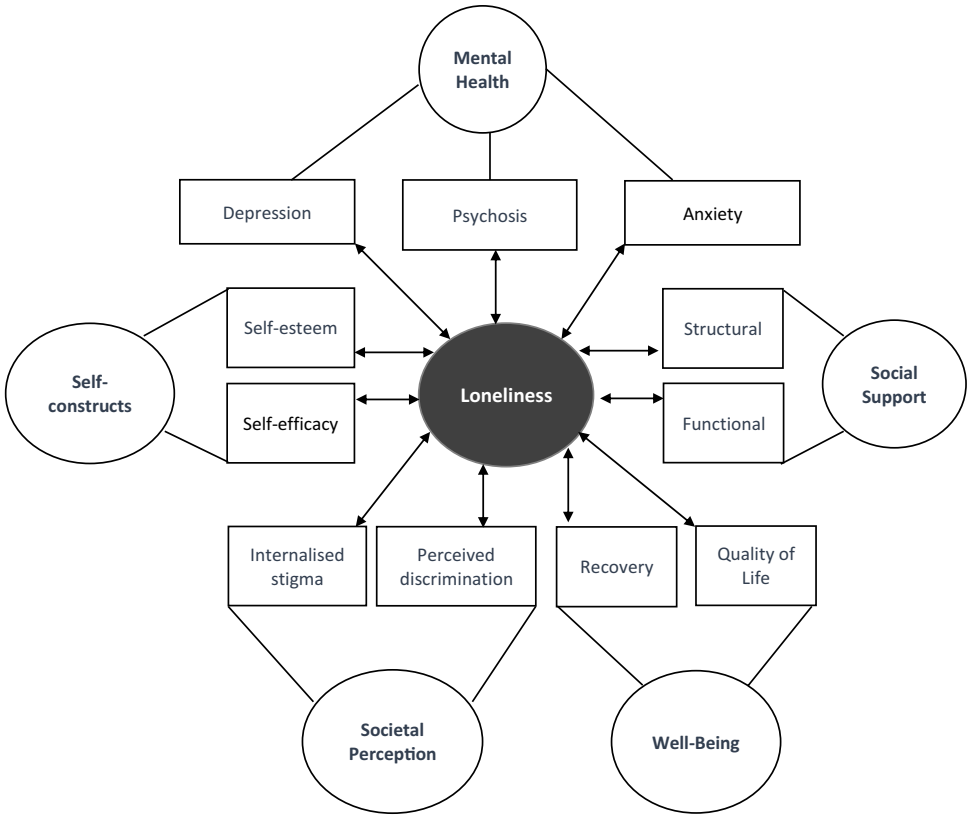

Fig. 2 Theoretical model of loneliness in individuals with psychosis: a focus on psychological and social factors. *Note* Bidirectional arrows are used to indicate possible reciprocal relationships over time that need to be examined. For clarity, we only indicated arrows between loneliness and each specific factor, rather than between specific factors. Additional factors that warranted further investigation, trait anxiety, social anxiety, and social self-efficacy should also be considered

medical history, records, or self-identification. Three out of ten studies did not measure psychotic symptom severity [38, 39, 41]. Four studies measured psychotic symptom severity, but did not examine how it related to loneliness [34, 36, 37, 40]. Neither Chrostek et al. [32] or Świtaj et al. [33] who used the Brief Psychiatric Rating Scale (BPRS; [46]) found a relationship between loneliness and psychotic symptom severity, total BPRS score; $r = .13$, $p > .05$, BPRS positive; $r = .02$, $p > .05$; BPRS negative symptoms; $r = .03$, $p > .05$, respectively. In contrast, Sündermann et al. [35] found positive and negative symptoms, as measured by the Scale for the Assessment of Positive Symptoms (SAPS; [47]) and the Scale for the Assessment of Negative Symptoms (SANS; [48]), respectively, were positively correlated with the number of lonely days reported. Both negative and positive symptoms were correlated with loneliness (positive: Spearman's rho = .41, $p < .05$; negative: Spearman's rho = .46, $p < .001$).[4] The presence of auditory hallucinations did not appear to contribute to more severe loneliness—specifically, participants with schizophrenia with auditory hallucinations ($n = 20$) did not report significantly more loneliness than participants with schizophrenia without auditory hallucinations ($n = 20$; $p = .074$; [39]).

Anxiety, specifically state anxiety, was measured in one study, and was induced via showing mild anxiety-provoking photos; results indicated that while loneliness predicted paranoia, anxiety partially mediated this relationship (ab = .43, $Z = 3.5$, $p < .001$) in individuals with first-episode psychosis ($N = 38$; [35]).

Social support: functional and structural social factors

Particular social network factors, both structural, e.g., smaller network size, and functional aspects, e.g., lower perceived social support, are known to be related to higher loneliness [7]. Five of the selected studies examined how social factors related to loneliness severity [32, 35, 37, 38, 41]. Roe et al. [37] measured perceived social support and loneliness, but did not examine how the two variables related to each other. Chrostek et al. [32] found that loneliness was negatively correlated with perceived social support ($r = -.62$; $p < .01$) as measured by the Berlin Social Support Scales ([49]; $r = -.62$; $p < .01$). Schwartz and Gronemann [38] measured social support in 97 individuals with schizophrenia using the MOS Social Support Survey [50]. They

[4] Although psychotic illness information such as duration of psychosis illness was not part of the study quality criteria, this information was included as the duration of psychotic illness is known to relate to poorer treatment outcomes for those with psychosis [39, 40]. Studies that examined loneliness severity with duration of psychotic illness [22, 31] reported no relationship between loneliness severity and psychotic illness duration.

found that increased social support ($\beta = -.54$, $p < .001$), higher community activity participation ($\beta = -.57$, $p < .01$), and living arrangement type (group home vs. apartment residents; $\beta = -.32$, $p < .01$) predicted lower loneliness, above and beyond demographic and illness variables.

Sündermann et al. [35] measured structural (i.e., number of friends or family seen in the past week) and functional social factors (i.e., the presence of a confidant) with the number of lonely days. The number of friends or family seen was *not* associated with the number of lonely days reported, but those without confidants reported more lonely days than participants who reported a confidant, $t(36) = 3.25$, $p = .002$, $\eta^2 = .23$. There were no available analyses to indicate, however, whether the number of days in which friends or family were seen was positively associated with number of lonely days; or whether clients with confidants reported more contact with friends or family.

Tharayil [41] examined loneliness with negative social perceptions using the Acceptance of Others Inventory (AOI; [51]) and found that those who were lonelier reported more problems with viewing others in a positive light ($r = .295$, $p < .05$).

Well-being: quality of life and recovery

Only one study focused on measuring quality of life and recovery from illness in individuals with psychosis. In their sample of 159 participants with psychosis, Roe et al. found that loneliness was negatively correlated to quality of life ($r = -.42$, $p < .001$) and self-reported recovery ($r = .32$, $p < .001$). However, when loneliness, quality of life and recovery were examined together, quality of life fully explained the relationship between loneliness and recovery in individual with psychosis (Sobel test $Z = -.426$, $p < .001$; [37]). Hence, lower loneliness was only related to higher recovery from illness via the increasing quality of life.

Societal perceptions: internalised stigma and perceived discrimination

Three studies measured internalised stigma and perceived discrimination [32, 34, 45]. Internalised stigma measures the extent to which process, where afflicted individuals themselves endorse mental illness stereotypes on themselves (e.g., believing that they are devalued members of a community and anticipate social rejection due to their status; [52, 53]). Internalised stigma was measured via the Internalised Stigma of Mental Illness Scale (ISMI; [54]) and perceived discrimination by the ISMI discrimination experience subscale, which specifically assesses the degree to which one feel that they are currently mistreated by others due to their mental illness.

Chrostek et al. [32] measured internalised stigma in their sample of 207 participants with psychosis and found that internalised stigma was highly associated with loneliness ($r = .68$, $p < .001$). In a hierarchical multiple regression model (with no multicollinearity issues detected), 64% of the variation of loneliness was predicted by internalised stigma ($\beta = .41$, $p < .001$), lower social support ($\beta = -.36$, $p < .001$), interpersonal competence ($\beta = -.15$, $p < .05$), number of inpatient hospitalisations ($\beta = .14$, $p < .05$), and reduced social network size ($\beta = -.13$, $p < .05$). Świtaj et al. [33] found that loneliness was not only significantly related to internalised stigma ($r = .44$, $p < .001$), but also fully mediated the relationship between internalised stigma and depression, even after controlling for confounds (e.g., socio-demographic variables). In the related study, Świtaj et al. [34] noted that that loneliness and perceived discrimination were also related (estimate = .278. $p < .001$), but this relationship was partially explained by low self-esteem (estimate = .164, $p < .05$).

Self-constructs: self-esteem and self-efficacy

Two self-constructs, self-esteem [32, 34, 41] and self-efficacy [32, 38], were also examined. Two studies used the Rosenberg self-esteem scale (RSES; [55]) to measure self-esteem, with both studies noting a negative association between loneliness and self-esteem ($r = -.52$ to $-.56$, $ps < .001$). Świtaj et al. [34] found that self-esteem directly influenced loneliness (estimate = $-.307$, $p < .001$) and the relationship between self-esteem and loneliness was also partially mediated by a tendency to seek support (estimate = $-.084$, $p < .05$). Tharayil found that negative self-perceptions as measured by the Index of Self-esteem [56] was positively correlated with loneliness, $r = .49$, $p < .001$. Negative self-perceptions, together with depression, significantly predicted loneliness, $t(35) = 3.23$, $p < .01$, over and above other variables such as social and family perceptions, duration of illness and age [41].

Studies [32, 38] that measured self-efficacy used the General Self-efficacy Scale (GSES; [57]). Although Chrostek et al. [32] found that lower general self-efficacy was related to higher loneliness ($r = -.50$, $p < .005$, $N = 207$), similar to that of depression, generalised self-efficacy was not a unique predictor of loneliness. Schwartz and Gronneman did not examine the relationship between general self-efficacy and loneliness. The authors, however, found that there were no differences in general self-efficacy between those with psychosis living in apartments vs. those in group homes, nor those who were employed vs. those who were unemployed. Similarly, general self-efficacy did not predict loneliness after accounting for other factors, such as social support, social participation, and living arrangement type (where apartment dwellers report more loneliness; [38]).

Discussion

Overcoming loneliness is an important challenge for individuals with psychosis [10], and recently, a growing number of studies have attempted to clarify the relationship between loneliness and psychosis [16, 58]. Research in understanding the relationship between loneliness and psychosis, however, remains at its infancy and there were no current theoretical frameworks that guided the selected studies in this review. We used the selected findings opportunity to put forth a theoretical model of loneliness in psychosis.

Mental health: depression, psychosis, and anxiety

First, depression was the most consistently measured mental health symptom in the reviewed studies, which is logical as depression has been found to be a risk factor for loneliness [4, 5]. Depression and loneliness are related, but are distinct constructs. Depression is regarded as a negative view of the general world as opposed to loneliness which is regarded as a negative view specific to interpersonal relationships [59]. The correlations between depression and loneliness in individuals with psychosis (*r*s between .36 and .66) are comparable to those found in the general population (*r*s between .40 and .65; [5]). The presence of depression and suicidal risk was associated with higher loneliness in individuals with psychosis [40]. While depression was highly correlated with loneliness, other factors such as internalised stigma, social support, interpersonal competence accounted for the variance of loneliness [32].

Second, in line with the previous studies [16], the findings of this review indicate that individuals with psychosis are lonelier than nonclinical control comparisons [32, 36]. Findings of our review found contradictory findings on whether loneliness was related to psychotic symptomatology, but findings from a recent meta-analytic review ($n = 13$) found that loneliness and psychosis were moderately related ($k = 13$, $N = 15{,}647$, $r = .32$; [29]). Although these findings attempted to provide understanding between the relationship between loneliness and psychosis, results were constrained by several study limitations. In addition to the heterogeneity of the selected studies, the authors noted the included studies that did not specifically recruit participants with psychosis as their primary focus (e.g., including individuals with bipolar disorder). It is still possible that the complexity of this relationship may not be simply related to the presence or absence, or severity of psychotic symptoms, but rather, specific psychopathology associated with psychosis. A recent study by Babcock et al. who found that loneliness severity was related to only specific psychopathology dimensions such as the presence of thought disorder, and/or anhedonia [60].

Third, anxiety also partly explained the relationship between loneliness and paranoia [35], suggesting that anxiety may be one potential pathway that drives paranoia at least in individuals with first-episode psychosis. One limitation of this study, however, was that state anxiety was induced and measured via experimental manipulations rather than trait anxiety. Trait anxiety is a general tendency to experience anxiety, and may also contribute to the relationship between loneliness and paranoia. However, specific investigations examining the role of trait anxiety in loneliness is required. People who are lonely may find it more difficult to evaluate their beliefs with others if they have less contact with trusted individuals. According to a cognitive model of psychosis [61], emotion such as anxiety have been theorized to contribute to positive symptoms of psychosis such as paranoia [62].

Although social anxiety was not a focus in any of the selected studies, this subtype of anxiety may be relevant in understanding loneliness in individuals with psychosis, given a high co-morbidity (29–50%) between psychotic disorder and social anxiety disorder [9, 63–65]. Individuals experiencing problematic levels of social anxiety or loneliness appear to engage in similar avoidant and self-protective behaviours [66, 67], and it is plausible to consider that social anxiety and loneliness severity can influence each other in individuals with psychosis. In a general population ($N = 1010$), there is a reciprocal relationship between social anxiety and loneliness [18], where higher loneliness predicts higher social anxiety and vice versa over a 6-month period. Hence, those with problematic levels of social anxiety may feel lonelier if they avoid or withdraw from others, and those who are lonely may become increasingly sensitive to rejection and maintain anxious cognitions around their social relationships [68, 69].

Social support: functional and structural indicators

While the number of social contacts was unrelated to loneliness in one study [35], another found that living arrangement type (specifically apartment residents were lonelier than group home residents) appears to contribute to higher loneliness [38]. Group home residents reported significantly lower levels of loneliness than apartment residents, but it remains unclear why this is the case. For example, do group home residents compared with apartment residents, have easier access to others which facilitates the development of close relationships, alleviating loneliness. The most consistent finding, however, was that lower loneliness was associated with higher perceived social support, and this makes sense given that loneliness and perceived

social support are subjective constructs which both relate to the degree to which an individual feels connected with others [1]. While having access to a confidant appears to relate to fewer lonely days [35], this finding requires future study replication and clarification in how a confidant may predict fewer lonely days or less loneliness. For example, does increased contact with friends or family lead to an increased likelihood of having a confidant, and, therefore, reduce loneliness?

In nonclinical populations, the receipt of social support is generally assumed to relieve loneliness, but this may be dependent on the nature of social support, or the meaningfulness of these relationships. For example, it is important to consider the nature and quality of social support, because recipients of social support may not feel less lonely if the support they receive carries expectations of reciprocity (e.g., a sense of debt to repay to the giver; [70]). The establishment of meaningful social relationships may be especially important for individuals with psychosis, especially given the previous research that indicated that characteristics such as the reciprocity (i.e., giving and seeking) of relationships is associated with reduced distress associated with delusional ideation in individuals with psychosis [26].

Well-being: quality of life and recovery

Higher subjective quality of life is related to lower loneliness is not a surprising finding. Improving the quality of life can also positively influence recovery from an illness. Loneliness has been found to predict lower quality of life in older adults [71] and also related to the presence of chronic health conditions (mental and physical health; [3, 72, 73]), a facet that is often included within quality-of-life scales. Loneliness plays an important role in recovery from illness, particularly in individuals with psychosis. The negative relationship between recovery and loneliness appears to be contingent on the individual's self-reported quality of life; notably, these findings should be considered within the limitations of its cross-sectional design [37]. For example, it is also possible that greater sense of recovery from an illness can reduce loneliness via the promotion of establishing social connections. Reducing loneliness within recovery models of psychosis, however, remains an under examined area [74, 75]. Increasing social connectedness, above and beyond symptom management, however, has been identified as a treatment priority for individuals with psychosis [10]. Increasing social connectedness can involve either changing negative appraisals of how one view's their relationships and/or actively doing more prosocial behaviours, both of which may influence loneliness.

Societal perceptions: internalised stigma and perceived discrimination

People with serious mental illnesses like psychosis are well known to experience stigma and discrimination, though not everyone within a stigmatised group feels themselves stigmatised or discriminated [53]. The findings of this review, however, point to the importance of addressing internalised stigma and perceived discrimination as these factors hold the potential to directly reduce loneliness, or indirectly via other factors such as depression, self-esteem, or support-seeking behaviours [32–34]. It is well known that internalised stigma can inhibit the recovery process as patients may withdraw from social activities to avoid feelings of shame and self-devaluation [76]. Future research is also needed in understanding whether addressing internalised stigma and perceived discrimination in an individual with psychosis may also lead to increased contacts with others, facilitating social opportunities to initiate the development of meaningful relationships.

Self-constructs: self-efficacy and self-esteem

In one study, generalised self-efficacy and loneliness were directly related [32]. However, generalised self-efficacy did not predict loneliness when other related factors were accounted for from: (1) psychosocial factors such as internalised stigma, social support, and interpersonal competence; (2) objective indicators such as participation in the community, living in apartment as opposed to a group home; and (3) psychiatric factors such as the number of hospital admissions [32, 38]. It is also plausible that measuring social self-efficacy as opposed to a generalised self-efficacy may also be more relevant to loneliness. Whereas generalised self-efficacy relates to how an individual feels about their ability to cope with non-specific situations (e.g., GSES item: *I can solve most problems if I invest in the necessary effort*), social self-efficacy relates to how much an individual believes he or she is capable of initiating social contact or handling friendships [77].

Low self-esteem, however, may directly or indirectly increase loneliness [32, 34, 41]. These findings are not surprising given that individuals with psychosis are known to report low self-esteem which is related to poorer clinical outcomes [78–80]. Low self-esteem in individuals with psychosis may be a consequence of expected and experienced rejection, though positive coping strategies such as support-seeking styles can help alleviate loneliness [38].

Study quality and methodological limitations

Different study aims and substantial methodological heterogeneity across studies hinder our ability to draw clear

conclusions from the synthesised findings. Specifically, the methodological heterogeneity in the assessment of loneliness and psychotic symptom severity precludes any firm conclusion as to how loneliness relates to psychotic symptoms. Some studies used psychometrically valid scales when measuring loneliness but provided no available descriptive statistics for these scores, or used a different version of the same scale (i.e., 6 items vs. 11), making it difficult to compare loneliness scores between studies.

None of the studies provided psychosis diagnosis verification, which hinders the ability to reconfirm psychosis diagnoses. Recruitment sources varied across studies and data from inpatients and outpatients were combined for analyses. While it is unclear whether inpatient status itself contributes to higher loneliness, the previous research has found no difference in loneliness in a sample of inpatients ($n = 87$) and outpatients ($n = 58$; [16]). In addition, the *number* of inpatient admissions appears to be more relevant—where the number of inpatient admissions was the only psychiatric factor that significantly contributed to variance in loneliness, above and beyond other psychiatric factors from depression and psychotic symptomatology severity to duration of illness [32].

Although addressing loneliness has the potential to improve well-being in individuals with psychosis, this remains untested given the lack of prospective or intervention studies that can monitor loneliness over time. In terms of study design, nine studies were cross section and one study comprised an experiment which involved administering an anxiety-induction task [35]. Many of the relationships are correlational and/or analysed with mediating models constrained within a single time point. Therefore, we were unable to make any casual inferences regarding the relationships between outlined variables and loneliness. For example, while loneliness was associated with negative social perceptions of others [41], the assertion that maladaptive beliefs about others may drive loneliness cannot be inferred.

Loneliness is well known to be associated with multiple adverse physical health indicators in the general population [2], which parallels the existing evidence of the impoverished physical health outcomes in individuals with psychosis, ranging from higher mortality rates [81] to higher cardiometabolic risk, hypertension [82], and insomnia [83]. At present, researchers have not comprehensively understood the detrimental impact that physical health consequences can influence loneliness in those with psychosis. This is unsurprising given the absence of a scientific integration between the large number of studies examining loneliness conducted in nonclinical samples with studies that focus on social recovery in individuals with psychosis. Within our review, we did not exclude co-morbid physical health problems. We found that only one study measured physical health difficulties (e.g., activity limitations) and that those with schizophrenia reported more physical limitations when compared with controls [36]. Emerging research has also indicated that loneliness may be a consequence of poor physical health; within patients with schizophrenia, loneliness was associated with co-morbidity of poor health outcomes including increased drug abuse/dependence, number of drugs used, hypertension, and abnormal hemoglobin levels (hemoglobin A1c; [16]).

Strengths and limitations of the review

We used a systematic research strategy based on the PRISMA guidelines, excluded non-empirical and non-peer reviewed papers, and focused on psychological constructs that were associated with and/or predicted loneliness. All of the potentially eligible studies were first assessed for inclusion and then assessed for methodological quality by two independent raters. Although we contacted researchers for relevant unpublished studies, it is possible that we did not obtain unpublished research data from other sources and any conclusions drawn here are limited by the poor methodological quality of the studies conducted thus far. We also included isolated variables (i.e., variable targeted in one study) because of: (a) the small number of studies selected and (b) the disparate foci within the selected studies in terms of crucial variables to examine in individuals with psychosis. In an area that is in its infancy, we posit that it is useful to include these isolated variables as it provides an indication of the potential relationships that it may have on loneliness and psychosis.

Clinical implications and future directions

While increasing social connectedness has been highlighted as a potential targeted area for recovery in individuals with psychosis [84], there is still a paucity of research that has examined how loneliness can be mitigated. One plausible explanation is that it may be assumed that loneliness resolves once an individual receives appropriate mental health treatment, or resolves once an individual participates in a social activity. However, it is also possible that even after psychotic symptoms are treated, loneliness may remain for various reasons, including illness-related factors, or genetic mechanisms (e.g., heritability; [85, 86]). Although we advocate the establishment of meaningful relationships, individuals with psychosis may not necessarily report feeling lonely despite reported few social contacts [87]. Ongoing negative symptoms and hostility may be few factors that can explain fewer friendships in individuals with psychosis [88].

We presented a new model of loneliness in psychosis and attempted to integrate the findings of the studies in a concise way. Given the infancy of research within loneliness in psychosis, the psychological and social factors outlined within

the model remain priorities for further investigation. In addition, we believe that these factors should also be examined within longitudinal study design, so that we can understand the dynamic relationships between each factor with loneliness (e.g., loneliness with internalised stigma) and the interaction of each factor with each other (e.g., internalised stigma with social anxiety) over time.

We also posit that more research is also required to understand the relationships between different social cognition deficits and loneliness within individuals diagnosed with psychosis. Social cognition is a broad construct that encompasses a set of different skills, including, theory of mind, emotion perception, social perception, and attributional styles [89]. There is only one known study so far that has examined social cognition deficits and loneliness in individuals with psychosis; Trémeau et al. [16] found that within patients diagnosed with schizophrenia, loneliness was related only with self-report social intelligence measures (e.g., social skills and awareness), but not with performance-based measures (e.g., social skills or social perceptions). These findings may indicate that loneliness may be more complex in individuals with psychosis. For example, it is plausible that self-efficacy may influence the relationship between self-reported social skills and loneliness and more investigations in social cognition and loneliness is required.

Cognitive restructuring about how one feels about their interpersonal relationships has been recommended as one effective strategy to adopt within in loneliness interventions [24]. It is, however, also plausible to consider strength-based approaches that promote positive affect within loneliness interventions. There is also growing evidence to suggest that loneliness may be related to attenuated positive emotions, and this relationship occurs across the lifespan [70, 90]. Individuals with psychosis are also well known to experience anhedonia (i.e., an inability to experience pleasurable emotions) [91]; there is evidence that this relationship is more complex than previously thought [92]. Although individuals with schizophrenia report difficulties in anticipating that behaviours (such as initiating social interactions) may be pleasurable, possibly contributing to more loneliness, they do not have problems with consummatory pleasure, including experiencing positive emotions [93].

Individual with psychosis can learn to show more positive emotion, signalling to others an openness to connect, and learn to engage with others in a more prosocial manner (e.g., show kindness or do active-constructive responses; [94, 95]). These positive interpersonal skills can help build intimacy with others [96, 97]. The is consistent with a social-functional approach of emotions which states that emotions match our social interactions with others and can help us develop and maintain beneficial relationships [98]. Positive internal states and emotional behaviours (e.g., joy and smiling) send an accurate signal to others, of a willingness or openness for social interactions [99]. Granholm et al. have found that positive social interaction appraisals can promote positive affect and encourage more social interactions in individuals with schizophrenia over time [100]. The increased chances of having more positive social interactions may lead to an increase in challenges to defeatist beliefs about the social world. This is consistent with the proponents of the broaden-and-build framework of positive emotions who posit that positive emotions and associated processes which broaden one's thinking can trigger upward spirals of positive emotions and consequently improve upon one's overall emotional well-being [101, 102]. Indeed, an increasing number of studies have shown that strength-based interventions, such as positive psychotherapy, can enhance well-being in people with serious mental illness, including psychosis [103–105]. In addition to interventions that can restructure maladaptive cognition about others, positive psychotherapy that promotes positive affect and the use of positive social interactions to build strong meaningful relationships with others may be helpful in mitigating loneliness in individuals with psychosis.

Conclusion

At present, there is a lack of integration between the two scientific lines of enquiry: research in loneliness and psychosocial interventions in psychosis. While loneliness appears to be related to many of the variables reviewed (i.e., social support, depression, and anxiety), which are all common treatment targets within existing psychosocial interventions, loneliness is rarely measured or the specific target of current psychosocial interventions. Given that loneliness is an important issue for individuals with psychosis, measuring and targeting loneliness within a multi-faceted psychosocial intervention is warranted. Designing a psychosocial intervention that can directly target loneliness, as well as include the usual objective targets, may be beneficial for individuals with psychosis and clinicians alike. Tentatively, targeting particular psychological and social factors, such as mental health, well-being, social support, self-constructs, and societal perception factors, may mitigate loneliness and should be considered measured within loneliness interventions. We posit that particular factors require more examination and these include trait anxiety, social anxiety, social self-efficacy, and social cognition deficits. Finally, we also proposed a new theoretical model of loneliness that is relevant to individuals with psychosis.

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Compliance with ethical standards

Conflict of interest The authors declare no conflict of interests.

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