

Abstract

Background: Outcome measurement in bipolar disorder (BD) traditionally focused on clinical improvement without considering other domains. Improvement trajectories in clinical and social-functional domains are different and can simultaneously appear in one whilst not in other domains. Measuring personal recovery (PR) has become a priority internationally. This review explored the shift in research investigating operational recovery definitions and underpinning factors of recovery in BD over the past four decades.

Methods: Studies defining recovery domains (other than clinical recovery) in BD were systematically reviewed; operational recovery definitions and factors assessed in association with recovery were thematically categorised and integrated in a narrative synthesis.

Results: Thirty-three studies, comprising 3638 participants from 19 countries were included. Identified operational recovery definition themes included i) PR ii) social-functional (SFR), and iii) occupational-residential (ORR) recovery. Examined factors were grouped as demographic, clinical and psychosocial factors. Predominantly demographic factors were linked to ORR and clinical factors to SFR. Depressive symptomatology was the only clinical factor associated with PR. Research investigating psychosocial factors in PR is emerging and has showed that resilience and appraisals of mood seem to be associated with PR.

Limitations: Studies not available in English or examining functioning without defining recovery were excluded.

Conclusions: Earlier operational recovery definitions of ORR and SFR were often arbitrary and inconsistent, and predominantly focused on clinical and demographic underpinning factors. Whilst research attempts to follow the significant policy shifts towards personalised care by measuring what matters to individuals and exploring broader underpinning psychosocial factors, it is still lagging behind.

Keywords: bipolar disorder, social recovery, functional recovery, occupational recovery, personal recovery.

Introduction

Bipolar disorder (BD)¹ affects 1-1.5% of the population (Goodwin and Jamison, 2007); over 1 million people in England alone (McCrone et al., 2007). A study of Europe, the US and Asia indicated lifetime prevalence of 2.4% (Merikangas et al., 2011). Outcome measurement in BD traditionally focused on clinical improvement; however, incomplete clinical recovery with ongoing symptomatology between episodes is common in BD (Gitlin et al., 1995; Judd et al., 2002; Judd et al., 2003). A focus on clinical recovery alone can be limiting for this group as many do not experience symptom free periods during which functional and social outcomes might naturally improve.

Service users with mental health problems have highlighted the importance of measuring change beyond symptoms. Personal recovery (PR) is a user-led definition of recovery and it was introduced as a movement by mental health service users in the 1980s, who wrote about their experiences of coping with symptoms, getting better, and gaining a new identity to move beyond the role of mental health patient (Coleman, 1999; Deegan, 1988; Leete, 1989).

An extensively used definition of PR from the 1990s described it as “a deeply personal, unique process of changing one’s attitudes, values, feelings, goals, skills and/or roles. It is a way of living a satisfying, hopeful, and contributing life even with limitations caused by the illness. Recovery involves the development of new meaning and purpose in one’s life as one grows beyond the catastrophic effects of mental illness” (Anthony, 1993). PR does not require symptom resolution. It is an idiosyncratic and multifaceted concept, which may include functional, existential and social outcomes (Winsper et al., 2020)

This movement from the 1980s and 1990s brought a system wide paradigm shift in recovery and placed the recovery model in the forefront of mental health systems by the 2000s. Recent policy shifts towards personalised care and evidence-based practice put the measurement of health outcomes at the heart of decision making, influencing funding allocation, service planning and commissioning. As a result of this, the significance of PR has been recognised internationally in mental health policy (Department of Health, 2011; Mental Health America, 2020; New Freedom Commission on Mental Health, 2003), requiring mental health services internationally to foster the recovery model.

¹Abbreviations- BD: Bipolar disorder; PR: Personal recovery; SFR: Social-functional recovery; ORR: occupational-residential recovery

In response to the paradigm and policy shifts, research has embarked on exploring the conceptualisation of PR in mental health. The REFOCUS research programme identified and validated the CHIME (connectedness; hope and optimism about the future; identity; meaning in life; and empowerment) conceptual framework of PR (Bird et al., 2014; Leamy et al., 2011; Slade et al., 2012). Consistent with CHIME, service users often refer to social and functional outcomes when describing their recovery, such as better quality of life, wider engagement with the society, employment and control over life choices (Jones et al., 2013).

Conceptual reviews following CHIME predominantly endorsed it, but its limitations have also been identified. Van Weeghel and colleagues (2019) discussed some of these limitations in a recent review. This review highlighted that the CHIME framework was not sensitive to population characteristics, specifically emphasising the lack of research on PR in mood disorders. Another identified limitation was the fact that the CHIME framework solely focused on the positive aspects of PR and omitted personal recovery themes relevant to difficulties (for review see van Weeghel et al., 2019).

In response to this, Jagfeld and colleagues (2021) have investigated the qualitative literature on PR in BD and identified that the CHIME framework is useful for understanding PR in BD, but recommended the POETIC (Purpose, Optimism and hope, Empowerment, Tensions, Identity, Connectedness) conceptual framework. This extends the CHIME framework with a Tensions domain that is specific in BD.

Systematic reviews of PR in psychosis and schizophrenia have focused on two key areas: factors predicting elements of the CHIME framework (Soundy et al., 2015; Tew et al., 2012; Wood and Alsawy, 2018) and instruments measuring PR (Law et al., 2012; Shanks et al., 2013; Sklar et al., 2013; Williams et al., 2012). The first area of work explored potential mediators of PR, e.g. social support and inclusion, and barriers to PR, e.g. stigma (Soundy et al., 2015; Tew et al., 2012). However, it is challenging to separate mediators/predictors of recovery from outcomes, i.e. elements of the CHIME framework. The second area of work focused on self-reported instruments assessing recovery in mental health problems, considering psychometric properties (Law et al., 2012; Shanks et al., 2013; Sklar et al., 2013); service users' involvement in development (Sklar et al., 2013); and clinical utility and acceptability (Law et al., 2012). The results of these reviews identified i) that there is no gold standard measure to evaluate PR and ii) challenges in comparing PR measures due to a lack of conceptual transparency (Williams et al., 2012). These issues cause difficulties for researchers and mental health services in operationalising recovery and selecting appropriate measures. Van Weeghel

and colleagues (2019) also identified the need for future research, which focuses on the underpinning mechanisms of PR.

To date there has been no review synthesising quantitative evidence to explore operational definitions, measurements and underpinning factors of recovery in BD specifically. The present review aims to fill this gap by systematically reviewing quantitative research on recovery in BD since the emergence of the recovery movement. The aims of the review are to: 1) to systematically investigate how recovery definitions (beyond clinical recovery) and measurements evolved over time in BD and 2) to inventory factors examined in association with the different recovery domains.

Methods

Search procedure

Electronic searches of PsycINFO, PubMed, and Web of Science databases were conducted- first on 7th December 2014/ updated 15th June 2020. These databases were chosen to identify multidisciplinary, psychology and life sciences literature. BD relevant search terms were identified with a subject librarian, based on the APA Thesaurus of Psychological Index Terms, and reviews in the field (i.e. Justo et al., 2007). The PR search strategy was consistent with Leamy and colleagues (2011). Search terms included “bipolar disorder” OR “bipolar affective disorder” OR “manic depression” OR “rapid cycling” OR “bipolar I” OR “bipolar II” OR “bipolar 2” OR “bipolar NOS” OR “bipolar spectrum disorder” OR hypomani* OR "mixed states" OR "mixed episodes" OR cyclothymi* OR manic OR mania OR “bipolar mood disorder” AND (recover*). The search was restricted to peer-reviewed articles published from 1980. This year was chosen as the start date for the review in order to coincide with the DSM-III’s more precisely operationalised definition of BD (American Psychiatric Association, 2017) and with the start of the recovery movement (Coleman, 1999; Deegan, 1988; Leete, 1989).

Following PRISMA guidelines (Moher et al., 2009) all articles were screened at title, abstract and full-text levels by two raters (BM and LH). The second rater (LH) was blinded to the decisions of the first (BM). Where disagreements could not be resolved between the raters, the research team (BM, SJ, FL and LH) agreed inclusion/exclusion decisions. Reference lists of the eligible studies and articles that cited eligible studies were scanned to identify further relevant literature.

Eligibility criteria

Table 1 presents the inclusion/exclusion criteria using the PICOS system (Centre for Reviews and Dissemination, 2009).

Table 1. Inclusion and exclusion criteria (see Table A.1 for more information on the use of the criteria)

| PICOS | Inclusion criteria | Exclusion criteria |
|----------------------------|---|--|
| Population | Adults (age>16) with BD, diagnosis of BD was verified based on DSM or ICD criteria | Not investigating BD separately from other mental health problems. Not reporting minimum age. Not verifying diagnosis of BD. Including participants under age 16. |
| Intervention | A correlate(s)/predictor(s) has been examined for association with PR outcome. No restriction applied to the type of factors examined for association with the outcome. | Comparing PR in BD to PR in other mental health problems, but not examining factors in association with PR in BD. |
| Comparison | Not restricted | N/A |
| Outcome | A recovery (other than clinical or symptomatic) definition was provided and operationalised as an outcome measure. | Recovery definition was not provided/ operationalised. |
| Study design | Peer-reviewed primary research articles using quantitative designs | Secondary research articles, i.e. reviews; articles with qualitative design; dissertations, theses, case studies, discussion articles, and theoretical and policy papers. |
| Additional criteria | English full-text available | English full-text not available |

Data extraction and quality assessment

Data was extracted across two domains- study design, methods and key findings (Table A.2) and sample characteristics (Table A.3). The Effective Public Health Practice Project quality tool (Effective Public Health Practice Project, 2009) was used consistent with Leamy et al. (2011). Data extraction and quality assessment were conducted by BM and checked by LH (data extraction 100%; study quality 50%).

Data analysis

Narrative synthesis (Popay et al., 2006) was used to integrate primary studies focusing on recovery in association with a range of different potential predictor variables. Operational recovery definitions were thematically categorised by BM, SJ, FL and DC at regular consensus meetings and examined factors were inventoried and grouped to enable data synthesis and

explore i) how operational recovery definitions have evolved over time and ii) which factors have been examined and linked to recovery in BD on aggregate over the past four decades. The review protocol was pre-published:

http://www.crd.york.ac.uk/prospero/display_record.asp?ID=CRD42015019187.

Results

Study selection and quality assessment

Search identified 2309 unique articles of which 1836 were screened on both title and abstract (see Figure 1). 479 articles were subjected to full text screening of which 33 met inclusion criteria. Cohen's *Kappa* indicated substantial interrater agreement for full text screening ($n = 464$; 15 full-texts were not available in English); exclusion/inclusion decisions: 0.689, agreement on exclusion reasons: 0.818.

BM assessed the quality of eligible studies, LH also assessed 17 of these. Raters originally agreed on the quality categorisation of 10 articles, with consensus on the remaining seven after discussion. Most common category was 'Weak' ($n = 20$, 61%), then 'Moderate' ($n = 12$; 36%); one article achieved 'Strong' (3%) categorisation (see Table 2).

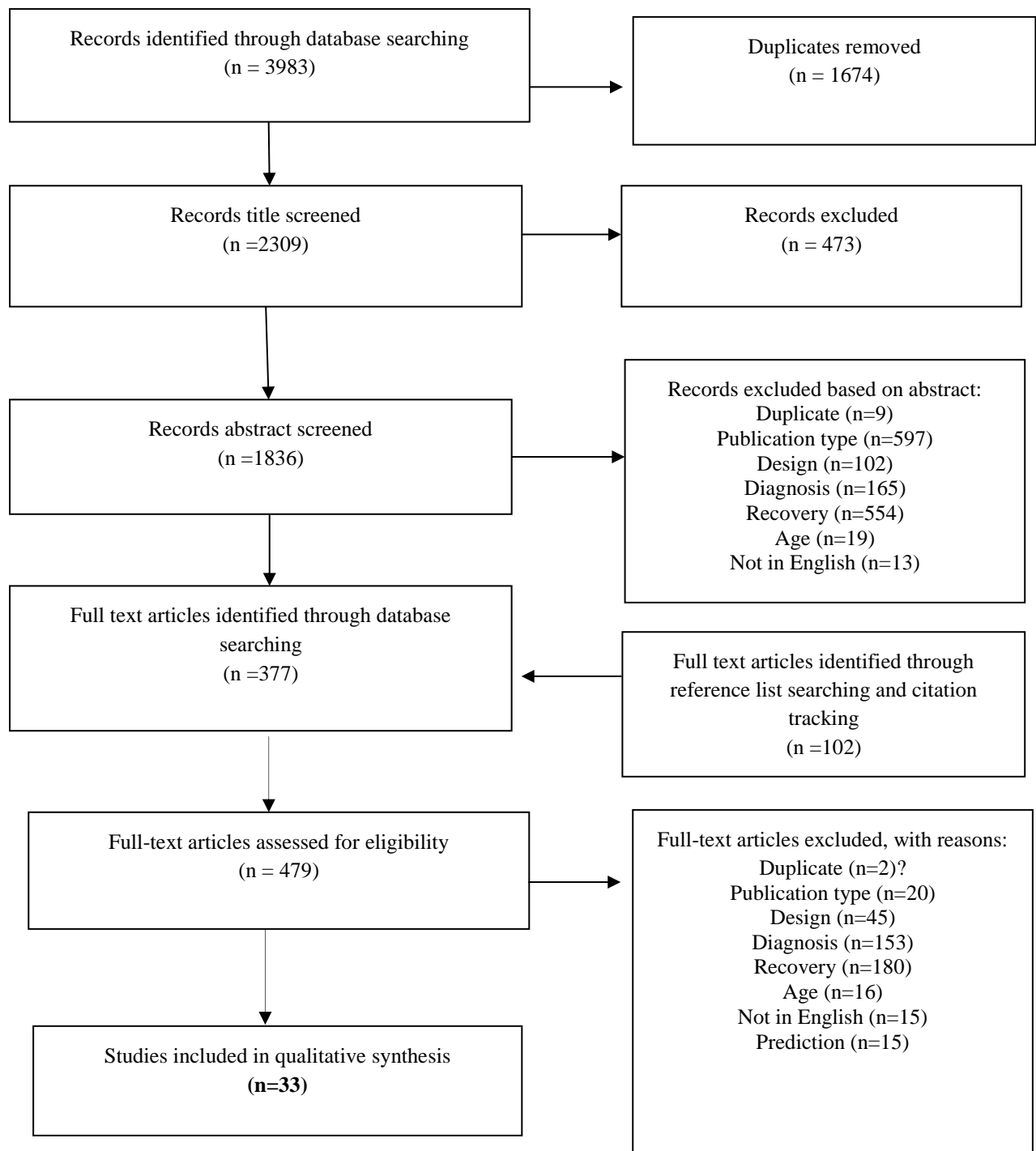


Figure 1 Flowchart illustrating the search and screening process

Overall summary of the studies

Study participants

3638 participants with BD from 19 countries took part in the eligible studies. Occasionally, data from the same cohort was reported in multiple publications, however, the authors operationalised recovery differently and/or investigated different factors associated

with recovery in each and therefore were eligible (see Table 2). Study sample sizes ranged from $N = 13$ -631. Only eight studies reported age range (17-80 years). More commonly, mean age was provided ($n = 32$; 22.10-46.13), the weighted mean age and standard deviation were $M = 38.81$ ($SD = 10.87$).

DSM-IV criteria was mostly used to verify research diagnosis of BD ($n = 23$; 70%), other tools included ICD-10 or DSM-III. Thirteen studies (39%) included individuals with BD-Type-I only: either with first and current ($n = 6$) or with current ($n = 3$) manic or mixed episodes or with participants who had recently achieved clinical recovery ($n = 4$). The other 20 studies (61%) included individuals either in clinical remission ($n = 11$) or did not restrict inclusion based on clinical state ($n = 9$). Twenty-three studies (70%) used a formal interview, five (15%) used clinician confirmed DSM or ICD criteria, one used (3%) a DSM-III checklist and four (12%) did not provide information on the method of verifying diagnosis based on DMS or ICD criteria.

Design characteristics

The most common study design was longitudinal ($n = 19$). Eleven studies used cross-sectional designs; three applied prospective designs but relevant information was cross-sectional.

Definition and operationalisation of recovery in BD

Table 2 presents study keys (used subsequently) for each study, authors' conceptual and operational recovery definitions and the thematic categorisation of the current review. Eligible studies used diverse recovery definitions and operationalisations; most provided one eligible recovery definition ($n = 30$, 91%); one study defined two (M2), and one used a composite recovery measure (M1). Functional recovery ($n = 18$; 55%) was the most frequently used recovery concept, followed by PR ($n = 11$; 33%). Remaining studies defined and operationalised psychosocial ($n = 1$), occupational functional ($n = 1$) social functional ($n = 1$) occupational and residential role ($n = 1$) recovery. To allow data synthesis, eligible studies were grouped thematically based upon their operational recovery definitions. This identified three main recovery concepts: i) PR ($n = 11$) ii) social-functional recovery (SFR; $n = 16$), and iii) occupational and residential recovery (ORR; $n = 8$).

PR: included studies explicitly defining and measuring PR from the perspectives of individuals living with BD (P1-P10 and M2). PR recovery definitions were consistent with Anthony's definition (1993) and considered domains such as: growing beyond the effect of

mental health problems; having awareness and control over symptomatology; seeking and relying on social support; fostering hope, and optimism, involving- focusing on future goals and successes. The first included study operationalising PR in BD was published in 2013 (P8) and operational PR definitions have subsequently been used more frequently. PR was predominantly measured on self-report questionnaires (see Table 2), except study P6, which used clinician rating on the Recovery Assessment Scale (RAS; Corrigan et al., 2004). Three PR measures were used; the Bipolar Recovery Questionnaire (BRQ; Jones et al., 2013) was the most common ($n = 6$; 55%).

SFR: included studies that originally defined and measured (psycho)social or functional recovery by using a global/psychosocial functioning or a quality of life measure (S1-S15, and M1). SFR definitions considered functioning on various domains, including interpersonal relationships, work functioning, leisure time, sexual activity, autonomy/independent living, financial issues, and cognitive functioning. SFR definitions first appeared in 2000 (based on the eligible literature) and are still widely used. Four studies used multiple measures; in total, eleven measures and two questions developed by authors were used to evaluate SFR (see Table 2). The Functioning Assessment Short Test (FAST; Rosa et al., 2007) was the most common ($n = 5$; 31%), followed by ($n = 4$; 25%) the Global Assessment of Functioning (American Psychiatric Association, 1987). SFR was predominantly operationalised as a binary clinician-rated variable ($n = 10$; 62.5%); three studies (19%) used a self-report measure and four (25%) operationalised SFR as a continuous variable (out of these only one was self-report). The most common basis for categorising individuals as ‘recovered’ or ‘not recovered’ was by threshold score on a continuous measure ($n = 7$; 44%); or by evaluating whether premorbid functioning was achieved ($n = 5$; 31%).

ORR: included studies that defined and measured occupational and/or residential recovery, and studies that used vocational and/or residential indexes to define and measure functional recovery (study keys: O1-O6 and M1-M2). The definitions specifically focused on two domains, occupational functioning/status and residential status. ORR definitions were first applied in eligible research in the 90s and have been less prevalent in the past 10 years. The most common operational strategy was creating binary categorical variables for achieving premorbid levels of occupational functioning and residential status ($n = 5$; 62.5%). Two studies used a threshold score on a functioning scale (one on self-report and one on clinician-rated) to evaluate ORR. One study evaluated ORR using two ordinal scales (M2) and one used self-reported measures (O1). The most frequently used measures for the occupation component of

ORR were the Modified Vocational Coded Index ($n = 2$; 25%) (Dion, 1985) and the Modified Vocational Status Index ($n = 2$; 25%) (Tohen et al., 1990); for the residential component this was the Modified Location Code Index ($n = 4$; 50%) (Dion et al., 1988).

The evolution of operational recovery definitions over time

There was a clearly emerging pattern in the evolution of the operational recovery definitions in BD. Earlier literature, until the end of 1990s, predominantly defined recovery in terms of improvements in occupational and residential domains. From the early 2000s the definitions have broadened and incorporated other domains, including (psycho)social functioning and quality of life. The first eligible study explicitly operationalising personal recovery in BD was published in 2013 (P8), more than thirty years after the start of the recovery movement.

Table 2 Studies eligible for inclusion

| Study key | Publication, location | Authors' operational definitions of recovery | Recovery outcome variable | Recovery measure(s) used | Quality Rating* |
|--|---|---|--|--------------------------|-----------------|
| Assigned recovery category for analysis: PR | | | | | |
| P1 | Dodd, Mezes, Lobban, & Jones (2017), UK | PR: experience of recovery from the perspective of those living with BD. Higher BRQ scores represent better recovery. | Continuous score | BRQ (self-report) | Weak |
| P2 | Echezarraga et al. (2018), Spain** | PR: participants' wellness, being able to manage mental health, and live a fulfilling life. The higher BRQ scores represent better recovery. | Continuous score | BRQ (self-report) | Weak |
| P3 | Echezarraga et al. (2017), Spain | PR: experience of recovery from the perspective of those living with BD. Recovery operationalised in two ways: 1) Higher BRQ scores represent better recovery. 2) Participants with total BRQ scores above the 75 percentile (BRQ \geq 277) were categorised as "recovered"; while participants with a BRQ score $<$ 277 were labelled as "not recovered". | Continuous score and binary categories | BRQ (self-report) | Weak |
| P4 | Echezarraga et al. (2019), Spain** | PR: experience of recovery from the perspective of those living with BD. Higher BRQ scores represent better recovery. | Continuous score | BRQ (self-report) | Weak |
| P5 | Girard et al. (2016), France | PR: consumer's perspective on recovery (subscales: personal confidence and hope, willingness to ask for help, goal and success orientation, reliance on others, no domination by symptoms). | Continuous score | RAS (self-report) | Weak |
| P6 | Grover, Hazari, Singla, et al. (2016b), India** | PR: consumer's perspective on recovery (subscales: personal confidence and hope, willingness to ask for help, goal and success orientation, reliance on others, no domination by symptoms; defeated/overcome the illness, personal confidence, seeking and relying on social support, awareness and control over the illness, goal and success | Continuous score | RAS (clinician rated) | Weak |

| Study key | Publication, location | Authors' operational definitions of recovery | Recovery outcome variable | Recovery measure(s) used | Quality Rating* |
|---|--|---|---------------------------|--------------------------|-----------------|
| P7 | Grover, Hazari, Aneja, et al. (2016a), India** | orientation). Higher subscale scores represented better recovery. PR: consumer's perspective on recovery (subscales: personal confidence and hope, willingness to ask for help, goal and success orientation, reliance on others, no domination by symptoms; and based on current factor structure: defeated/overcome the illness, personal confidence, seeking and relying on social support, awareness and control over the illness, goal and success orientation). Higher subscale scores represented better recovery. | Continuous score | RAS (self-report) | Moderate |
| P8 | Jones et al. (2013),UK | PR: individual experiences of recovery. Higher BRQ scores represent better recovery. | Continuous score | BRQ (self-report) | Weak |
| P9 | Jones et al. (2015), UK | PR: personal experiences of recovery; measured on BRQ. Higher BRQ scores represent better recovery. | Continuous score | BRQ (self-report) | Strong |
| P10 | Tse, Murray, et al., (2014b), China ** | PR: Anthony's definition (1993), contrasted to clinical and functional recovery. The total score is used to define the four stages of recovery: (i) overwhelmed by the disability (score: 0–57), (ii) struggling with the disability (score: 58–90), (iii) living with the disability (score: 91–119), and (iv) living beyond the disability (score: 120–135). | Categorical | SRS (self-report) | Moderate |
| Assigned recovery category for analysis: SFR | | | | | |
| S1 | Bahorik, Newhill, & Eack (2013), USA | Functional recovery: defined as psychosocial and occupational functioning. Higher GAF score represented higher recovery. | Continuous score | GAF (clinician rated) | Weak |

| Study key | Publication, location | Authors' operational definitions of recovery | Recovery outcome variable | Recovery measure(s) used | Quality Rating* |
|-----------|--|---|---------------------------|--|-----------------|
| S2 | Barekatin, Khodadadi, & Maracy (2011), Iran | Functional recovery: recovery achieved if: participants presented rating resembles or is better than premorbid psychosocial functioning in role performance, interpersonal relationships, recreational enjoyment and sexual activity for at least 2 months. | Categorical, binary | GAF (clinician rated) LIFE-RIFT (clinician rated) | Weak |
| S3 | Bonnin et al. (2015), Spain** | Functional recovery: global functionality (lower level of functional disability in autonomy, occupational functioning, cognitive functioning, financial issues, interpersonal relationships and leisure time) – recovery was defined as FAST total score <12. | Categorical, binary | FAST (clinician rated) | Weak |
| S4 | Bonnin et al., (2019) Spain | Functional recovery: Reduced/no difficulties in autonomy, occupational functioning, cognitive functioning, finances, interpersonal relationships and leisure time. Operationalised as FAST global score between 0-20 (scores >20 formed the functionally impaired group). | Categorical, binary | FAST (clinician rated) | Moderate |
| S5 | Conus et al. (2006), Australia | Functional recovery: operationalised in two ways: returning to premorbid functioning and measuring on a quality of life scale. 1) PAS (less than or equal to the premorbid ratings on at least 4 out of 5 items) 2) QLF ratings of individual items –item mean score ≤ 4.0 was a marker of dysfunction in a particular dimension (including interpersonal relations, instrumental role, intrapsychic foundation and common objects and activities) | Categorical, binary | 1) PAS (score extracted from QLS and RPMIP-clinician rated measures) 2) QLS (clinician rated) | Moderate |
| S6 | de Barros Pellegrinelli et al.(2013), Brasil | Functional recovery: Higher scores represent better recovery. | Continuous score | WHOQOL-BREF; GAF (clinician rated measures) and SAS (self-report) | Moderate |

| Study key | Publication, location | Authors' operational definitions of recovery | Recovery outcome variable | Recovery measure(s) used | Quality Rating* |
|-----------|---|---|---------------------------|--|-----------------|
| S7 | Dunayevich et al.(2000), USA | Functional recovery: recovery achieved if returned to premorbid levels of global functioning for at least 8 continuous weeks. | Categorical, binary | LIFE (clinician rated) | Moderate |
| S8 | Heilbronner et al. (2015), Germany | Psychosocial recovery: difference score between the current GAF score (assessing the last remission) and the worst GAF score ever during an illness episode | Continuous score | GAF (clinician rated) | Weak |
| S9 | Jaeger, Berns, Loftus, Gonzalez, & Czobor (2007) USA | Functional recovery: global rating of functioning, including role position, support and performance ratings for work and/or school functioning and independent living. Higher subscale scores represent better recovery. | Continuous score | MSIF (clinician rated) | Weak |
| S10 | Madera, Such, Zhang, Baker, & Grande (2019), Canada, France, Hungary, Japan, Malaysia, Poland, Romania, South Korea, Taiwan, and US | Functional recovery: Reduced/no difficulties in autonomy, occupational functioning, cognitive functioning, finances, interpersonal relationships and leisure time. Operationalised as a FAST total score ≤ 11 for ≥ 8 consecutive weeks. | Categorical, binary | FAST (clinician rated) | Weak |
| S11 | Martino et al., (2017), Argentina | Functional recovery: Operationalised as a dichotomous variable (yes/no) based on the question "have you reached the level of family, social and work functioning that you had before the onset of illness?" | Categorical, binary | No tool was used, a recovery assessment question | Weak |
| S12 | Reinares et al. (2015), Spain ** | Functional recovery: lower functional disability in autonomy, occupational functioning, cognitive functioning, financial issues, interpersonal relationships and leisure time; recovery-total score rated on scale and recovery achieved if score lower than 12. | Categorical, binary | FAST (clinician rated) | Weak |
| S13 | Strakowski, Williams, Fleck, & Delbello (2000), USA | Functional recovery: including role performance, interpersonal relationships, sexual activity and recreational enjoyment. Recovery areas assessed separately, and recovery of one area achieved if ratings equal to or better | Categorical, binary | LIFE (clinician rated) | Moderate |

| Study key | Publication, location | Authors' operational definitions of recovery | Recovery outcome variable | Recovery measure(s) used | Quality Rating* |
|---|---|---|---------------------------|--|-----------------|
| S14 | Wingo, Baldessarini, Compton, et al. (2010a), USA** | <p>than participants' highest functioning in 5 years prior to hospitalization and maintained for two contiguous months. "Good functional outcome" was defined if recovery was achieved of at least 3 out of 4 areas.</p> <p>SFR: Recovery achieved if current social functioning scores equal to or better than previous highest social functioning score.</p> | Categorical, binary | FAST- IRQ Interpersonal Relationship Questionnaire (clinician rated) | Weak |
| S15 | Yan-Meier et al.(2011), USA | <p>Functional recovery: a mean score of ≤ 1.5 across items in role functioning domains of leisure time with friends, leisure time with family, duties at home, and duties in the workplace/school; measured over the preceding month. Compared individuals with concurrent clinical and functional recovery, delayed functional recovery and functionally not recovered individuals.</p> | Categorical, binary | LFQ (self-report) | Weak |
| Assigned recovery category for analysis: ORR | | | | | |
| O1 | Bearden et al., (2011), USA | <p>Occupational/ functional recovery: recovery achieved if: ≤ 1.5 mean score of occupational functioning questions (obtained on 4 items-higher score indicates more problems in occupational functioning): amount of time worked (quantity worked) job performance (quality of work), conflict with co-workers and enjoyment (interest and satisfaction at work).</p> | Categorical, binary | LFQ- workplace subscale (self-report) | Moderate |

| Study key | Publication, location | Authors' operational definitions of recovery | Recovery outcome variable | Recovery measure(s) used | Quality Rating* |
|---|---|--|---------------------------|---------------------------------------|-----------------|
| O2 | Loftus & Jaeger (2006), USA | <p>1) Occupational role recovery: the highest global role score was dichotomized to create good (part-time to full-time competitive employment or college enrolment) and poor functioning (supported employment/ nonmainstream vocational training to unemployment) groups.</p> <p>2) Residential role recovery: global score of the residential role subscale. Higher scores represent better recovery.</p> | Categorical, binary | MSIF (clinician rated) | Moderate |
| O3 | Strakowski, Stoll, Tohen, Faedda, & Goodwin (1993), USA | Functional recovery: residential status and occupational status (from medical records) compared to outcomes at 6 months follow-up. Recovery achieved if premorbid levels were attained. | Categorical, binary | MLCI and MVCI (clinician rated) | Moderate |
| O4 | Tohen et al. (1992), USA | Functional recovery: Recovery was achieved if premorbid (6 month prior to hospitalisation for index episode) occupational and residential status attained at 6-month follow-up. | Categorical, binary | MLCI and MVCI (clinician rated) | Weak |
| O5 | Tohen et al.(2003), USA | Functional recovery: Recovery was achieved if both occupational and residential status returned to or exceeded the highest levels within the pre-intake year, using best estimate procedure based on information from participants, medical records and family members. | Categorical, binary | MVSI and MLCI (clinician rated) | Moderate |
| O6 | Wingo, Baldessarini, Holtzheimer (2010b), USA** | Functional recovery: current occupational and residential status equal or better than previous estimated highest levels of residential and occupational functioning, using information from patients and relatives. | Categorical, binary | RSI and VSI (clinician rated) | Weak |
| Assigned recovery category for analysis: multiple recovery definitions | | | | | |
| M1 | Drake, Xie, McHugo, & Shumway (2004), USA | Recovery: composite recovery definition consisting of several variables. Recovery was measured on each variable | Categorical, binary | Clinical outcomes were not considered | Weak |

| Study key | Publication, location | Authors' operational definitions of recovery | Recovery outcome variable | Recovery measure(s) used | Quality Rating* |
|-----------|--|--|---|--|-----------------|
| | | <p>using cut-off points to dichotomise the scores. Cut-off scores were decided upon clinical meaningfulness or common sense:</p> <p>1) Clinical recovery: symptom control (BPRS subscale average >3), active participation in managing one's illnesses (substance abuse SATS>5),</p> <p>2) Regular contact with friends who do not use alcohol or drugs (at least weekly), and overall satisfaction with life (>5 on the QOLI) global satisfaction rating. Categorised here as SFR.</p> <p>3) Independent living (>80% of days residing in one's own housing), competitive employment (any competitive job). Categorised here as ORR.</p> <p>Summary of an individual's recovery outcomes, were calculated by adding together the number of scores above threshold on these six items.</p> | | <p>further in this review.</p> <p>SFR-Regular contact with friends who do not use alcohol or drugs</p> <p>QOLI (clinician rated measures)</p> <p>ORR-Competitive employment</p> <p>Independent living (clinician rated measures)</p> | |
| M2 | Tse, Davidson, et al. (2014a), China** | <p>1) Functional recovery: estimated current residential and employment levels based on participants' self-report and clinical case notes. Categorised here as ORR.</p> <p>2) PR: consumer based PR; Higher scores represent better recovery.</p> | <p>Ordinal categories</p> <p>Continuous score</p> | <p>ORR: MLCI and MVSI (clinician rated)</p> <p>PR: SRS (self-report)</p> | Moderate |

Measures: BPRS: Brief Psychiatric Rating Scale (Lulroff et al., 1986); BRQ: Bipolar Recovery Questionnaire (Jones et al., 2013); FAST: Functioning Assessment Short Test (Rosa et al., 2007); GAF: Global Assessment of Functioning (American Psychiatric Association, 1987, 2000, 2003); IRQ-FAST: Interpersonal Relationship Questionnaire of the Functioning Assessment Short Test (Rosa et al., 2007); LFQ: Life Functioning Questionnaire (Altshuler et al., 2002); LIFE: Longitudinal Interval Follow-up Evaluation (Keller et al., 1987); LIFE-RIFT: Longitudinal Interval Follow-Up Evaluation-Range Impaired Functioning Tool (Leon et al., 2000); MLCI: Modified Location Coded Index (Dion, 1985; Dion et al., 1988); MSIF: Multidimensional Scale of Independent Functioning (Jaeger et al., 2003); MVCI: Modified Vocational Coded Index (Dion, 1985); MVSI: Modified Vocational Status Index (Tohen et al., 1990); PAS: Premorbid Adjustment Scale (Cannon-Spoor et al., 1982); QLS: Quality of Life Scale (Heinrichs et al., 1984); QOLI: Quality of Life Interview

(Lehman, 1988); RAS: Recovery Assessment Scale (Corrigan et al., 2004); RPMIP: Royal Park Multidiagnostic Instrument for Psychosis (McGorry et al., 1990a; McGorry et al., 1990b); RSI: Residential Status Index (Tohen et al., 2003); SAS: The Social Adjustment Scale Self Report (Weissman and Bothwell, 1976); SATS: Substance Abuse Treatment Scale (McHugo et al., 1995); SRS: Stages of Recovery Scale (Song and Hsu, 2011); VSI: Vocational Status Index (Tohen et al., 2003); WHOQOL-BREF: Quality of Life Scale of the World Health Organisation Quality of Life Assessment- shorter version; (Fleck et al., 2000).

* Effective Public Health Practice Project tool overall quality rating

** Studies using data from the same cohort, pairs include i) Bonnin et al. (2015) and Reinares et al. (2015), ii) Wingo, Baldessarini, Compton, & Harvey (2010a) and Wingo, Baldessarini, Holtzheimer, & Harvey (2010b); iii) Tse, Davidson, Chung, Ng, & Yu (2014a) and Tse, Murray, et al. (2014b), and iv) Grover, Hazari, Aneja, et al. (2016a) and Grover, Hazari, Singla, et al., (2016b); v) Echezarraga, Calvete, & Las Hayas (2019); Echezarraga, Calvete, Gonzalez-Pinto, & Las Hayas (2018); Echezarraga, Las Hayas, Gonzalez-Pinto, & Jones (2017).

Factors associated with PR in BD

Eleven studies investigated PR; four used a longitudinal design (but two only reported relevant cross-sectional findings). Most had a weak quality rating ($n = 8$; 73%). An extensive range of demographic, clinical and psychosocial factors have been examined in association with PR, itemised in Table 3.

Table 3 Factors examined for association with PR

| Variables | Cross-sectional findings | | | Longitudinal findings | | | N |
|-------------------------|--|---|--|-----------------------|-------|-------|---|
| | - | 0 | + | - | 0 | + | |
| Demographic factors | Age | | P1(W) P6(W) P7(M) P10(M) ^b | P10(M) ^b | | P2(W) | 5 |
| | Education | | P1(W) P6(W) P7(M) P10(M) | | | | 4 |
| | Family type (nuclear/ extended) | | P6(W) P7(M) | | | | 2 |
| | Gender | | P1(W) P6(W) P7(M) P10(M) | | P2(W) | | 5 |
| | Income (Individual/ Family) | | P7(M) ^a P10(M) | P7(M) ^a | | | 2 |
| | Marital status | | P6(W) P7(M) P10(M) | | | | 3 |
| | Number of children | | P10(M) | | | | 1 |
| | Locality (rural/urban) | | P6(W) P7(M) | | | | 2 |
| | Age of onset | P10(M) ^b | P6(W) P7(M) P10(M) ^b | | | | 3 |
| | Illness duration | | P1(W) P6(W) P7(M) | | | | 3 |
| | Hospital appointments in last 3 months (n) | | P6(W) | | | | 1 |
| | Hospitalisation (length) | | P10(M) | | | | 1 |
| | Hospitalisations (n) | | P7(M) P10(M) | | | | 2 |
| | Medication use | | P1(W) | | | | 1 |
| | Clinical factors | Remission duration | | P6(W) P7(M) | | P2(W) | |
| Substance use | | | P10(M) ^b | P10(M) ^b | | | 1 |
| Symptoms: depressive | | P1(W) ^b P2(W) P6(W) P7(M) P8(W) ^c | P10(M) P8(W) ^c | P1(W) ^b | P2(W) | | 6 |

| Variables | Cross-sectional findings | | | Longitudinal findings | | N | |
|--|-----------------------------|---|---|-----------------------|--------------------|-------|---|
| | - | 0 | + | - | 0 | | + |
| Symptoms: manic | P8(W) ^{bc} | P1(W) P2(W) P6(W) P7(M) P8(W) ^{bc} P10(M) | | | P2(W) | | 6 |
| Total episodes (n) | | P6(W) P7(M) | | | | | 2 |
| Appraisals of internal states (positive/negative) | P1(W) ^b | P1(W) ^b | | | | | 1 |
| Autonomy | | | P5(W) | | | | 1 |
| Internalised stigma | P7(M) | | | | | | 1 |
| Interpersonal support | | P2(W) ^b P5(W) ^a | P2(W) ^b P3(W) P5(W) ^a | | P2(W) | | 3 |
| Negative illness model | P1(W) ^c | P1(W) ^c | | | | | 1 |
| Negative religious coping | | P7(M) | | | | | 1 |
| Negative self-dispositional appraisals | P1(W) ^b | P1(W) ^b | | | | | 1 |
| Normalising appraisals of hypomania and depression | | P1(W) ^b | P1(W) ^b | | | | 1 |
| Perceived conflict (internal state) | P2(W) P8(W) ^b | P8(W) ^b | | P2(W) ^d | P2(W) ^d | | 2 |
| Physical wellbeing | | | P5(W) | | | | 1 |
| Positive illness model | | | P1 (W) | | | | 1 |
| Positive religious coping | | P7(M) ^{ab} | P7(M) ^{ab} | | | | 1 |
| Positive self-dispositional appraisals | | P1(W) | | | | | 1 |
| Post-traumatic growth | | | P8(W) | | | | 1 |
| Recovery enhancing environment (organisational) | | P10(M) | | | | | 1 |
| Recovery focused CBT | | | | | | P9(S) | 1 |
| Religion and religiousness | | P7(M) ^{ab} P6(W) P10(M) | P7(M) ^{ab} | | | | 3 |
| Resilience | | | P2(W) P3(W) P5(W) | | | P2(W) | 3 |
| Resilience-turning point | | P2(W) ^b P3(W) | P2(W) ^b | | P2(W) ^b | | 2 |
| Self-care | | | P2(W) P3(W) | | | P2(W) | 2 |

| Variables | Cross-sectional findings | | | Longitudinal findings | | | N |
|----------------------------------|---|---|---|--|---|--------------------|---|
| | - | 0 | + | - | 0 | + | |
| Self-confidence | | | P2(W) P3(W) | | | P2(W) ^b | 2 |
| Self-esteem | | | P5(W) | | | | 1 |
| Self-management | | | P2(W) P3(W) | P2(W) ^b | | P2(W) ^b | 2 |
| Sentimental life | | | P5(W) | | | | 1 |
| Stigma resistance | | | P7(M) | | | | 1 |
| ORR or employment status | | P6(W) ^a P7(M) ^a M2(W) P10(M) | P1(W) P6(W) ^a P7(M) ^a | | | | 5 |
| SFR, ORR and other PR components | PR-Baseline | | | | | P2(W) | 1 |
| | PR: Strength-based recovery, social role recovery element, recovery enhancing environment | | P10(M) | | | | 1 |
| | PR: hope, respect, empowerment | | | P10(M) | | | 1 |
| | SFR: global/psychosocial functioning | | P8(W) ^{bc} | P2(W) P4(W) P7(M) P8(W) ^{bc} | | P2(W) | 4 |
| | SFR: Quality of life | | P5(W) | P2(W) P5(W) | | P2(W) | 2 |
| | SFR: Well-being | | | P2(W) P5(W) P8(W) | | P2(W) | 3 |

Abbreviations: N: Number of studies examined the predictors; W: weak quality assessment; M: Moderate quality assessment; S: Strong quality assessment

For each factor the directions of identified effect are presented separately according to applied design (i.e. cross-sectional and/or longitudinal).

‘-’: significant negative association ($p < .05$); ‘0’: no association, ‘+’: significant positive association ($p < .05$); findings. In case of significant categorical variables the reference category is also presented

Detailed information on the statistical analyses is presented in Table A.2.

^a Results differ depending on the examined areas/domains of PR—associations present with one or more domains of recovery, but not with other areas or domains.

^b Results vary depending on analyses used (correlation, regression or comparison of recovered vs non-recovered groups) within the same study.

^c Results vary depending on the operationalisation of the predictor variable (i.e. using different measures or subscales)

Demographic factors and ORR components: Five studies (45%) examined associations between demographic factors ($n = 8$) and PR. Most were not associated with PR; some associations were reported by single studies, e.g. higher income was positively associated with specific PR domains, i.e. ‘goal orientation’ and ‘not being dominated by the symptoms’; but not with others or with overall PR (P7). Tse et al. (P10) did not identify differences in age across recovery stages (overwhelmed, struggling, living with or living beyond the disability)

in bivariate analysis, but in a decision tree analysis, individuals aged over 45 were more likely to be in a more advanced recovery stage.

Five studies (45%) examined association between ORR components and PR. Most reported no or mixed associations (P6, P7, M2, P10). For example, participants in paid employment showed better PR in the ‘willingness to ask help’ PR domain, but not on others (P6, P7). In contrast, Dodd et al (P1) found employed participants reported higher PR and employment status was a predictor of PR in the regression model.

Clinical factors: Six studies (54.5%) investigated 11 clinical factors, with most not finding associations with PR ($n = 7$). Some associations with substance use, manic symptomatology and age of onset were identified by single studies. Engaging in lifetime binge drinking was linked to higher PR in those over 45 (P10). Furthermore, the majority of the studies found that the age of illness onset (P1, P6, P7) and current manic symptoms (P1, P2, P6, P7, P10) did not impact on PR. There were two exceptions: for those under the age of 45, an earlier age of onset (under age 22) was associated with more advanced PR in the decision tree analysis (P10); observer-rated manic symptoms were negatively correlated with PR, but not significant in the regression model (P8).

In contrast, most studies found negative cross-sectional and longitudinal associations between depressive symptoms and PR (P2, P6, P7, P8). Self-reported (but not observer-rated) depressive symptoms remained a significant predictor in a regression model (P8). Dodd et al. (P1) reported mixed results; recent depression was negatively associated with PR, but once current depressive symptoms were controlled for, recent depression showed positive association with PR. Only one study found that current depressive symptoms were not associated with PR (P10).

Psychosocial factors and SFR components: Nine studies (82%) investigated psychosocial factors ($n = 26$) in relation to PR. The studies were diverse, resulting in the majority of these factors only being examined by one study or multiple studies using data from the same cohort (itemised in Table 3). For instance, resilience and its components (such as self-care, self-confidence, and self-management) showed positive bivariate cross-sectional and longitudinal associations with PR (P2, P3, P5) with self-confidence and self-care remaining significant in multivariate cross-sectional and longitudinal analyses (P2). Other factors were only examined in cross-sectional analysis; positive associations were found with positive thinking processes, i.e. positive illness models and characteristics, which focus on control and

personal agency (i.e. autonomy, post-traumatic growth, personal and treatment control; P1, P5, P8) and religious coping (P7). Similarly negative personal attributes and illness models, showed negative associations with PR, for example internalised stigma, perceived conflict or negative self-dispositional appraisals (P1, P2, P7, P8).

Other studies reported inconsistent findings depending on operational or analysis strategies. For example, perceived conflict in internal states and endorsement of positive and negative appraisals of internal states showed negative bivariate associations with PR, but they did not predict recovery in the regression models (P1, P8). Grover et al. (2016b) reported negative associations between internalised stigma and recovery (P7). Positive religious coping showed positive bivariate associations with some PR subdomains, such as personal confidence and reliance on others, but these variables did not remain significant in the regression model (P7). Access to PR-focussed intervention versus to usual treatment predicted improvement in PR at both 6 and 12 months follow-up, reported by the only study that achieved a strong quality rating (P9).

Five studies (45%) explored associations between SFR components and PR, including global or psychosocial functioning, quality of life and wellbeing, most reporting positive associations (P2, P4, P5, P7, and P8). There were two mixed results: overall functioning showed bivariate associations and predicted PR in a regression model, but this did not remain significant after adjustment for mood, additionally, wellbeing remained significant after adjusting for mood (P8). Most quality of life and resilience subscales were positively associated with PR, but subscales linked to interpersonal support, such as family and friend relationship did not show positive association with all PR domains (P2, P5). Finally, one study compared individuals with less and more advanced PR and found that 'respect, hope and self-directed empowerment' and 'meaningful role' recovery elements were more important to individuals in more advanced stages of recovery, compared to those with less advanced PR (P10).

In summary, a broad range of potential predictors were examined in association with PR, predominantly in bivariate cross-sectional analyses. While most demographic and clinical factors seem to be independent of PR, depressive symptoms seem to play an important role in service users' recovery experiences. There is an emerging area of research focusing on psychosocial factors underpinning PR. Most of these factors were investigated by a single study/in a single cohort each. However, the ways in which individuals think about their mood experiences, their engagement in a PR focused intervention, resilience and quality of life seem to be linked to their PR experiences.

Factors associated with SFR in BD

Sixteen eligible studies focused on SFR, 13 (81%) used longitudinal designs. Most studies had a weak quality rating ($n = 11$; 69%). The eligible studies examined an extensive range of potential predictors, outlined in Table 4.

Table 4 Factors examined in association with social-functional recovery

| | Variables | Cross-sectional findings | | | Longitudinal findings | | | N |
|---------------------|--|--------------------------|---------------------|---|-----------------------------|--|----------------------|---|
| | | - | 0 | + | - | 0 | + | |
| Demographic factors | Age | S4 (M) S14(W) | | | S3(W) | S1(W) S7(M) S13(M) | S5(M) | 7 |
| | Education | | S4(M) S14(W) | | | S13(M) ^a | S13(M) ^a | 3 |
| | Ethnicity /race | | S14(W) | | | S1(W) S7(M) S13(M) | | 4 |
| | Gender | S4(M)- Male | S14(W) | | S1(W)- Male ^d | S1(W) ^d , S3(W) S7(M), S8(W) S13(M) | | 7 |
| | Marital status | | S14(W) | | | S3(W) | | 2 |
| | Parental education | | S14(W) | | | | | 1 |
| | SES | | | | | S7(M) S13(M) ^a | S13(M) ^a | 2 |
| | Age of onset | | S14(W) | | | S3(W) S8(W) S13(M) ^a | S13(M) ^a | 4 |
| | BD subtype | | S4(M) S14(W) | | | | | 2 |
| | BMI | | | | S3(W) | | | 1 |
| Clinical factors | Family psychiatric history | | S4(M) | | | S3(W) S5(M) S8(W) | | 3 |
| | Gene CACNA1C | | | | | S3(W) ^b | S13(M) ^a | 1 |
| | Hospitalisation/ Index episode (duration) | S13(M) ^a | S13(M) ^a | | S3(W) ^b | S3(W) ^b S13(M) ^a | S13(M) ^a | 2 |
| | Hospital admissions | S4(M) | S14(W) | | | | | 2 |
| | Illness duration | S4(M) S14(W) | | | S3(W) ^b | S3(W) ^b S8(W) | | 4 |
| | Medication: aripiprazole | | S10(M) | | | S10(M) ^{ab} | S10(M) ^{ab} | 1 |
| | Medication: lithium, benzodiazepines, antidepressants | | S14(W) | | | S9(W) | | 2 |
| | Medication: number of psychotropic medication | S14(W) | | | | | | 1 |
| | Mental health contact/month | | | | | S13(M) | | 1 |
| | Number of episodes: depressive | S4(M) | S14(W) | | S3(W) | | | 3 |
| | Number of episodes: total | S11(W) | S14(W) | | S3(W) | S11(W) | | 3 |

| Variables | Cross-sectional findings | | | Longitudinal findings | | | N |
|---|-----------------------------|-------------------------------|---------------------|--|---|------------------------------|---|
| | - | 0 | + | - | 0 | + | |
| Number of episodes: manic | | S4(M) S14(W) | | | S3(W) S7(M) | | 4 |
| Polarity of first episode | | | | | S3(W) | | 1 |
| Psychiatric and/ or medical comorbidities | | S14(W) | | PD: S7(M) ^e | S3(W) PD: S7(M) ^e | | 3 |
| Rapid cycling | | S4(M) S14(W) | | | S3(W) | | 3 |
| Sleep (hours) | | | | | S3(W) | | 1 |
| Substance use | | M1(W) S14(W) | | S1(W) – alc. ^d S2(W) ^c S5(M) S9(W) | S1(W)-can. S2(W) ^c S3(W) S13(M) | | 8 |
| Suicide: previous attempts | | S14(W) | | | S3(W) | | 2 |
| Symptoms: global psychiatric | M1(W) ^c | M1(W) ^c | | | | | 1 |
| Symptoms: depressive | S4(M) S14(W) | S9(W) | | S15(W) ^{a, b} | S9(W) S13(M) S15(W) ^{a, b} | | 5 |
| Symptoms: manic | S9(W) | S4(M) S14(W) | | S15(W) ^{a, b} | S9(W) S13(M) S15(W) ^{a, b} | | 5 |
| Symptoms: mixed | | S12(W) | | | S3(W) S12(W) S13(M) | | 3 |
| Symptoms: negative | | | | S5(M) ^f | S5(M) ^f | | 1 |
| Symptoms: psychotic | S4(M) ^b S9(W) | S4(M) ^b S14(W) | | S3(W) ^b S13(M) ^a | S3(W) ^b S13(M) ^a | | 5 |
| Symptomatic remission/ recovery | | | | | S13(M) ^a | S5(M) S13(M) ^a | 2 |
| Time since last episode | | S14(W) | | | | | 1 |
| Treatment adherence/ compliance | | | | | S2(W) ^c S7(M) S13(M) | S2(W) ^c | 3 |
| Untreated episode history | | | | | S5(M) S13(M) | | 2 |
| Attention | | S4(M) ^b S14(W) | S4(M) ^b | | | S9(W) | 3 |
| Concentration | | S14(W) | | | | | 1 |
| Executive functions | | S4(M) ^{bg} S14(W) | S4(M) ^{bg} | | | | 2 |
| Ideation fluency | | | | | | S9(W) | 1 |
| IQ | | S4(M) S14(W) | | | | | 2 |
| Learning | | | | | S9(W) | | 1 |
| Mental tracking | | S14(W) | | | | | 1 |
| Non-verbal functions | | | | | S9(W) | | 1 |
| Processing speed | | S4(M) ^b | S4(M) ^b | | | | 1 |
| Psychoeducation | | | | | S6(M) | | 1 |
| Time between BL and FU assessments | | | | S6(M) | S9(W) | S11(W) | 3 |
| Stressful life events | | | | S15(W) ^{a, b} | S15(W) ^{a, b} | | 1 |

Psychosocial factors

| | Variables | Cross-sectional findings | | Longitudinal findings | | N | |
|------------------------------|--|--------------------------|---------------------|-----------------------|---------------------|---------------------|---|
| | | - | 0 | + | - | | 0 |
| ORR and other SFR components | Verbal knowledge | | | | S9(W) | | 1 |
| | Verbal learning | | S14(W) | | | | 1 |
| | Verbal memory | | S4(M) ^{bg} | S4(M) ^{bg} | | | 2 |
| | Visual learning and memory | | S14(W) | S4(M) ^b | | | 1 |
| | Working memory | | | S4(M) | | S9(W) | 2 |
| | ORR or employment status | | M1(W) ^c | M1(W) ^c | S3(W) | S13(M) ^a | 4 |
| | SFR: associations between different areas of functioning (role performance, recreational enjoyment, interpersonal relationship, sexual activity) | | S14(W) | | S13(M) ^a | | 2 |
| | SFR: Quality of life | | M1(W) | | | | |
| | SFR: previous level of functioning | | S14(W) | | 12(W) | S5(M) | 4 |
| | | | | | | S13(M) | |

Abbreviations: N: number of studies examined the predictors; PD: personality disorder; W: weak quality assessment; M: Moderate quality assessment; S: Strong quality assessment, alc.: alcohol use, can.: cannabis use For each factor the directions of identified effect are presented separately according to applied design (i.e. cross-sectional and/or longitudinal).

‘-’: significant negative association ($p < .05$); ‘0’: no association, ‘+’: significant positive association ($p < .05$); findings. In case of significant categorical variables the reference category is also presented

Detailed information on the statistical analyses is presented in Table A.2.

^a Results differ depending on the examined areas/domains of social-functional recovery –associations present with one or more domains of recovery, but not with other areas or domains.

^b Results differ depending on analyses used (correlation, regression or comparison of recovered vs non-recovered groups) within the same study.

^c Results differ depending on the recovery measures used

^d Interactional effect male and alcohol consumption, but non-significant interactional effect between gender and cannabis

^e There was no association in the first episode subgroup between personality disorder and social-functional recovery

^f Except alolia

^g Results vary depending on the operationalisation of the predictor variable (i.e. using different measures or subscales)

Demographic factors and ORR domains: Eight studies examined associations between SFR and demographic factors ($n = 7$), most were not associated. Similarly, most ($n = 5$) found that gender was not associated with SFR, while others reported worse outcomes for males- one reported that the SFR remitted group were predominantly females (S4), another found an interaction indicating that men with BD and alcohol use comorbidity were less likely to have better SFR compared to women with the same conditions (S1). With regards to age, the results were mixed: cross-sectional studies reported negative association with SFR (S4, S14). Prospectively, three studies reported no association (S1, S7, S13), while one found negative (S3) and one found positive association (S5). All the studies that found negative associations

operationalised SFR on the FAST questionnaire, which incorporates domains such as cognitive and financial functioning. Furthermore, having a higher SES in a prospective study was associated with better role performance recovery and with achieving ‘good outcome’(S13), operationalised as recovery in at least three out of four examined subdomains (see Table 4).

A cross-sectional study examined associations between ORR and SFR, in co-occurring bipolar and substance use disorder, and found a positive association when SFR was operationalised as the frequency of social contact with peers who do not abuse substances, but not when operationalised as overall life satisfaction (M1). This indicates that while ORR may not be associated with global SFR (S3, S7, S13, M1) they potentially impact on specific areas of functioning, including performance outcomes such as work (S13) and frequency of social contacts (M1).

Clinical factors: Clinical factors ($n = 31$) were the most widely studied predictors of SFR, some showed no associations whilst other findings were mixed, as explored by 15 studies (94%). For example focusing on **chronicity**- three studies found onset age did not impact on SFR (S3, S8, S14), whereas one indicated that later age of onset was associated with the role performance subdomain during follow-up (S13). Illness duration studies found that ‘recovered’ individuals (see Table 2 for definitions) had a shorter illness duration (S3, S4, S8, S14); it correlated negatively with SFR in longitudinal bivariate analysis, but did not remain significant in the longitudinal multivariate regression model (S3). Considering the number of episodes, two cross-sectional studies indicated that the number of total previous and total depressive episodes were negatively associated with SFR (S4, S11), while one found no association (S14). One study indicated that individuals with a higher number of total and depressive episodes had worse prospective SFR outcomes (S3), but one found that the number of previous affective episodes was not associated with improvement in SFR during a period of 48 months.

Three studies focused on **acute episodes**- operationalised as number of hospital admissions (S4), number of hospitalisation days during the follow-up period (S3) or the length of index episode (S13). One found that the number of days spent in hospital during the 6 months follow-up period correlated negatively with SFR (S3), but this association did not remain significant in the regression model. ‘Recovered’ and ‘not recovered’ participants (see definitions in Table 2) also did not differ significantly in the number of days they spent in hospital (S3). However, a different study found that the ‘impaired functioning’ group had higher number of previous hospital admissions (S4). Moreover, Strakowski et al. (S13) found

that individuals with a longer index episode (more than two months) were more likely to achieve recovery in the area of interpersonal relationships, but not in other areas (Table 2).

Studies examining **symptomatology** ($n = 6$) and symptomatic recovery ($n = 2$) in association with SFR showed varied results. Some found no association with manic (S4, S13, S14), depressive (S9, S13), or psychotic (S14) symptoms. Others reported mixed results; one studied SFR outcomes at 12 months and found that while baseline manic scores were not influential, follow-up manic symptoms (concurrent with SFR assessment) influenced SFR (S9). Another indicated that manic and depressive symptoms, generally, were not significant predictors of SFR subdomains, only lower depressive symptoms were significant predictors of SFR in the home duties subdomain (S15). However, individuals with delayed functional recovery and non-recovery presented higher depressive (S4, S14, S15) and manic symptoms (S15) compared to individuals who achieved symptomatic and functional recovery (S4, S14, S15; Table 2 presents definitions).

Similarly, studies focusing on psychotic symptoms showed varied results. No cross-sectional association was found by one (S14); however, another found that psychotic symptoms at the time of follow-up assessment were associated with worse concurrent SFR (S9). Recovered and non-recovered individuals did not differ in experiencing psychotic symptoms during their index episode or in lifetime history of psychotic episodes (S3, S4). However, the presence of psychotic symptoms during an index episode or history of psychotic symptoms was a significant predictor of SFR in cross-sectional and longitudinal regression models. Individuals who failed to achieve recovery at follow-up in the sexual activity (but not in others) subdomain exhibited psychotic symptoms at baseline (S13). Furthermore, achieving symptomatic recovery, or remission, was found to have a positive impact on SFR in prospective studies (S5, S13). However, Strakowski et al. (S13) only found this to be the case for recovery in the interpersonal relationship subdomain (but not in others) of SFR. In addition, higher levels of global and psychiatric symptoms were negatively correlated with SFR when measured as overall life satisfaction in a cross-sectional analysis, but did not correlate with SFR measured as the frequency of social contacts with peers who do not abuse alcohol (M1); and non-recovered individuals had higher rates of negative symptoms, except alogia (S5).

The most extensively examined clinical predictor was substance abuse **comorbidity**. Two cross-sectional and two prospective studies found no association (S3, S13, S14, M1) and two prospective studies found negative associations (S5, S9) between alcohol and drug use and SFR. Two studies reported mixed results: one found negative associations when recovery was

measured on the LIFE-RIFT scale, but not on the GAF scale (S2); another found that men with BD who use alcohol had worse SFR compared to female counterparts, but did not identify similar associations with cannabis use (S1). With regard to treatment adherence, two studies found no evidence of a longitudinal impact on SFR (S7, S13). Another prospective study examined the impact of both substance use and treatment adherence, finding that the former had a negative association, while the latter impacted positively on SFR (S2). This was the case when SFR was measured using the LIFE-RIFT scale but not the GAF scale. Furthermore, psychiatric or medical comorbidities, in general, did not have cross-sectional or prospective associations with SFR (S3, S14). However, one prospective study found that individuals with personality disorder comorbidity (except the first episode subgroup) were significantly less likely to achieve SFR (S7).

Finally, further associations were identified between clinical factors and SFR by single studies, including: BMI- negative prospective association (S3); the number of psychotropic medications- negative cross-sectional association (S14); and the use of aripiprazole as a maintenance treatment- at 52 weeks there were no significant differences in SFR or the proportion of individuals who achieved SFR (S10).

Psychosocial factors: Three studies (S4, S14- cross-sectional and S9 prospective designs) investigated associations between neurocognitive factors ($n = 14$) and SFR. Half of these factors were not associated with SFR, others showed mixed results. In cross-sectional analyses, attention, processing speed, verbal memory, visual learning and memory, verbal memory (except delay free recall test) and executive functions (except interference test) significantly differed between groups with impaired and remitted functioning. Some of these (including WCST number of categories test for executive functions, short cued recall test for verbal memory and working memory- S4) were significant in the multivariate analysis predicting SFR. In contrast, another found no differences in attention, verbal memory and executive functions between recovered and not-recovered groups (S14). Longitudinally attention and ideation fluency predicted SFR, but working memory did not (S9).

Other studies examined potential predictors, such as psychoeducation intervention and presence of stressful life events. These factors were only examined by a single study each. No association was found between psychoeducation intervention and SFR (S6). The occurrence of stressful life events was negatively associated with later SFR on the work/school, and friend and family subdomains, but not on the home duties subdomain. Furthermore, participants who

failed to achieve recovery in the family relations (but not in other) subdomains had significantly higher stress levels (S15).

More studies focused on the impact of previous levels of functioning ($n = 4$) on current SFR. Two studies found no association: premorbid functioning was not associated with achieving SFR (S8), and individuals who achieved SFR did not differ in previous levels of functioning compared to non-recovered individuals (S14). In contrast, others found that achieving SFR at 6 months was significantly associated with SFR at 12 months (S6) and baseline functioning impacted on follow-up levels of functioning (S13). Studies exploring associations between the different subdomains, including role performance, interpersonal relationships, sexual activity, quality of life and recreational enjoyment found that functioning in one area did not show associations with functioning in other areas (measured both cross-sectional and longitudinally); indicating that different subdomains of SFR seem to be independent from each other (M1, S13).

In summary, most studies used prospective designs and explored clinical factors to study SFR. The literature, in general, was inconsistent in terms of finding no associations versus associations in one direction. Results seem to vary depending on the recovery questionnaire/subscales used and on operational SFR definitions (i.e. categorical or continuous variable). Different factors were linked to different recovery subdomains indicating the complexity of social-functional improvements in BD. Compared to PR, there were more studies showing associations with clinical factors, which indicate that these factors may be more influential in SFR. Interestingly, there has been less focus on psychosocial factors in relation to SFR, compared to research in PR, and these studies predominantly focused on potential neurocognitive predictors.

Factors associated with ORR in BD

Out of the eight studies that investigated ORR, five used a longitudinal design (but one only reported relevant cross-sectional findings) and four had a weak quality rating. Demographic, clinical and psychosocial factors examined in association with ORR are itemised in Table 5.

Table 5 Factors examined in association with occupational and residential recovery

| | Variables | Cross-sectional findings | | | Longitudinal findings | | | N |
|--|---|--|--|------------------------------|-------------------------|--------------------------------------|------------------------------|---|
| | | - | 0 | + | - | 0 | + | |
| Demographic factors | Age | O1(M) ^b | O1(M) ^b O2(M) ^{ab} O6(W) | O2(M) ^{ab} | O1(M) | O3(M) O4(W) | O5(M) | 6 |
| | Education | | O1(M) O2(M) ^{ab} | O2(M) ^{ab} O6(W) | | | | 3 |
| | Ethnicity | | O1(M) O2(M) O6(W) ^b | O6(W) ^b - Cau. | | O3(M) O4(W) O5(M) ^b | O5(M) ^b - Cau. | 6 |
| | Gender | | O1(M) O2(M) O6(W) | | O4(W)- Men | O3(M) O5(M) | | 6 |
| | Marital status | | O1(M) O2(M) O6(W) ^b | O6(W) ^b - mar. | | O4(W) O5(M) ^b | O5(M) ^b - mar. | 5 |
| | Parental education | | O6(W) | | | | | 1 |
| | Age of onset | | O1(M) O2(M) O6(W) | | | | | 3 |
| | Being in therapy at the time of assessment | | O1(M) | | | | | 1 |
| | BD subtype | | O6(W) | | | | | 1 |
| | Comorbidities psychiatric or medical | O2(M)- PD ^{ab} | O2(M) ^{ab} O6(W) | | | O4(W) O5(M) | | 4 |
| Hospitalisation length (index episode) | | | | O5(M) | | | 1 | |
| Hospitalisation number | O2(M) ^a b | O2(M) ^{ab} O6(W) | | | | | 2 | |
| Illness duration | O6(W) ^b | O6(W) ^b | | | | | 1 | |
| Medication usage | | O1(M) O6(W) | | | O5(M) | | 3 | |
| Number of episodes: depressive | | O1(M) O6(W) | | | O5(M) | | 3 | |
| Number of episodes: manic | | O1(M) O6(W) | | | | | 2 | |
| Number of episodes: total | | O6(W) | | | | | 1 | |
| Rapid cycling | | O6(W) | | | | | 1 | |
| Substance abuse | | M1(W) O2(M) O6(W) | | | O5(M) | | 4 | |
| Suicide attempts | | O6(W) | | | | | 1 | |
| Symptoms depressive | O1(M) ^b O2(M) ^a b | O1(M) ^b O2(M) ^{ab} O6(W) | | | O1(M) O3(M) O5(M) | | 5 | |
| Symptoms global psychiatric | | M1(W) | | | | | 1 | |
| Symptoms manic | O2(M) ^a b | O1(M) O2(M) ^{ab} O6(W) | | | O3(M) O5(M) | | 5 | |

| | | | | | | |
|--------------------------------|--|------------------------------|---------------------|--------------------|--------------------|---|
| Psychosocial factors | Symptoms mixed | | | O5(M) | | 1 |
| | Symptoms psychotic | O6(W) | | O5(M) | | 2 |
| | Syndromic recurrence/recovery | | | O3(M) | | 1 |
| | Time since last episode | O6(W) | | | | 1 |
| | Episodic memory | | O1(M) | O1(M) ^c | O1(M) ^c | 1 |
| | Estimated premorbid IQ | O6(W) ^b | O6(W) ^b | | | 1 |
| | Executive function | O1(M) O6(W) ^{bc} | O6(W) ^{bc} | O1(M) ^c | O1(M) ^c | 2 |
| | Harm avoidance | | | O3(M) | | 1 |
| | Novelty seeking | | | O3(M) | | 1 |
| | Reward dependence | | | O3(M) | | 1 |
| | Speed of processing | | O1(M) | O1(M) | | 1 |
| | Verbal learning and memory | O6(W) | | | | 1 |
| | Visual scanning | | O1(M) | O1(M) ^c | O1(M) ^c | 1 |
| | Working memory/attention, concentration, mental tracking | O6(W) | O1(M) | O1(M) ^c | O1(M) ^c | 2 |
| | SFR, PR and other ORR components | ORR: employment status | | O6(W) | | |
| PR | | M2(W) | | | | 1 |
| SFR: global functioning | | | | O5(M) | | 1 |
| SFR: interpersonal functioning | | | M1(W) | | | 1 |
| SFR: quality of life | | M1(W) | | | | 1 |

Abbreviations: N: number of studies examined the predictors; W: weak quality assessment; M: Moderate quality assessment; S: Strong quality assessment, PD: Personality disorder; Cau: Caucasian; mar: married

For each factor the directions of identified effect are presented separately according to applied design (i.e. cross-sectional and/or longitudinal).

'-': significant negative association ($p < .05$); '0': no association, '+': significant positive association ($p < .05$); findings. In case of significant categorical variables the reference category is also presented

Detailed information on the statistical analyses is presented in Table A.2.

^a Results differ depending on the examined areas/domains of recovery (occupational vs residential) –associations present with one domain of recovery, but not with other.

^b Results vary depending on analyses used (correlation, regression or comparison of recovered vs non-recovered groups) within the same study.

^c Results vary depending on the operationalisation of the predictor variable (i.e. using different measures or using both the baseline score and change score between baseline and follow-up for a particular predictor).

Demographic factors: Six studies (75%) investigated and reported mixed associations between demographic factors and ORR. Two prospective and one cross-sectional study found no association with age (O3, O4, O6), whilst one found that an increase in age was associated

with reduced odds of achieving occupational recovery at both baseline and follow-up (O1). In contrast, another found that older participants were more likely to achieve residential role recovery (O2). Two studies did not find differences in highest educational between participants with better and worse recovery (O1, O2); while two studies identified positive associations between the duration of education and occupational recovery (O2, O6). The majority of cross-sectional and longitudinal studies focusing on ethnicity (Key: O1, O2, O3, O4) and marital status (O1, O2, O4) found no association with ORR. Two studies found that recovered participants were more likely to be Caucasian and married (O5, O6); however these factors did not remain significant predictors of recovery in multiple regression models. Similarly, gender showed no association with ORR in the majority of the studies (O1, O2, O3, O5, O6); with one study indicating that males were less likely to achieve ORR at the 6 month follow-up (O4).

Clinical factors: Seven eligible (87.5%) studies examined clinical factors ($n = 21$) in associations with ORR. Findings of cross-sectional and longitudinal studies were consistent, indicating no associations between ORR and age of onset (O1, O2, O6), medication use (O1, O5, O6), number of previous depressive and manic episodes (O1, O5, O6), substance abuse (Key: M1, O2, O5, O6) and psychotic symptoms (O5, O6). Single cross-sectional studies found no association between ORR and being in therapy at assessment (O1), BD subtype, number of total episodes, past suicide attempts, time since last episode (O6), global psychiatric symptomatology (M1) and mixed symptomatology by a longitudinal study (O5).

In terms of **chronicity**, a cross-sectional study found that illness duration predicted ORR in the multiple regression model, but individuals in the recovered and non-recovered groups did not differ in the length of their illness (O6). The number of previous hospitalisations were examined by two cross-sectional studies; while one found no association with ORR (O6), the other (O2) found that individuals in the poor work functioning group had higher numbers of previous hospitalisations. However, this factor did not predict ORR in multivariate regression models. Considering **acute episodes**, one study focused on the length of index hospitalisation and found negative associations with ORR in both bivariate and multivariate analyses (O5).

The majority of the studies did not find cross-sectional or longitudinal associations between depressive (O3, O5, O6) or manic symptomatology (O1, O3, O5, O6), psychiatric or medical **comorbidities** (O4, O5, O6) and ORR. With regard to **symptomatology**, one found that manic symptoms were negatively correlated with residential recovery and individuals in the poor work functioning group had significantly higher manic symptoms, but manic

symptomatology did not predict ORR in regression models (O2). In contrast, depressive symptoms correlated and predicted residential recovery in the regression model, but did not impact on occupational recovery (O2). Another found that depressive symptoms predicted baseline occupational recovery but not recovery at the 3 months follow-up, and individuals in the recovered and non-recovered groups did not differ significantly in their depressive symptoms (O1). Individuals with maladaptive personality disorder traits were more likely to be in the poor work functioning group; however, personality disorder did not remain a significant predictor of occupational recovery following multiple regression modelling and showed no association with residential recovery (O2).

Psychosocial factors and PR, SFR components: Two studies examined associations between neurocognitive factors (one cross-sectional and one longitudinal). One found that episodic memory, visual scanning, working memory/attention and speed of processing were associated with concurrent occupational recovery, while executive functioning was not. None of these baseline factors predicted occupational recovery at 3 months follow-up. However, improvements in episodic memory, visual scanning, working memory/attention, and executive functioning predicted occupational recovery at 3 months (O1). Similarly, another found that recovered individuals performed significantly better on executive functioning and premorbid IQ measures, but these differences disappeared in multiple regression models adjusting for symptomatology and education (O6). One study focused on personality characteristics and ORR and found that higher levels of novelty seeking (impulsiveness and disorderliness sub-dimensions) were associated with worse ORR, whilst harm avoidance and reward dependence were not (O3). Three studies investigated SFR (M1, O5) and PR (M2) domains in association with ORR. ORR was independent of both SFR (when assessed on global measures of quality of life or functioning) and PR; however, it was associated with a performance measure of SFR (assessed as frequency of social contacts; M1).

To sum up, the operationalisation and evaluation of ORR was similar to SFR, often using binary categorical variables assessed by clinicians. Prospective designs were frequently used to operationalise and evaluate ORR. Compared to PR and SFR, there were more studies showing associations between demographic factors and ORR, which indicate that these factors may be more influential in ORR. In contrast to SFR, fewer links were identified with clinical factors. Similarly, predominantly neurocognitive factors were considered as psychosocial factors with lack of research on other potential psychosocial predictors.

Discussion

The aims of the current review were: 1) to systematically investigate how recovery definitions (beyond clinical recovery) and measurements evolved over time in BD and 2) to inventory factors examined in association with the different recovery domains.

Definition and operationalisation of recovery in BD

Recovery concepts were categorised into three groups based upon similarities in the definitions and operationalisations: *PR* - this category included studies that explicitly focused on idiosyncratic experiences of service users. *SFR* comprised studies that conceptualised recovery as global functioning, including functioning in different social roles and environments; and *ORR* category included studies that either provided occupational and/or residential recovery definitions or used vocational and/or residential status indices as operational definition of recovery.

It is recognised that the above categories are not mutually exclusive and often overlap, especially the *SFR* and *ORR* concepts. For instance, *ORR* may be an important component of *SFR*; also, both social-functional and occupational and residential improvements may play a key role in *PR*. However, for the purpose of structuring and synthesising data, categorisation and interpreting the categories separately was necessary to allow a more specific exploration of potential factors underpinning the operationalised recovery domains. The difficulties encountered in reviewing the conceptual and operational recovery definitions were mainly caused by the complex nature of the recovery concept and potential circularity of the selected outcome and predictor variables. For instance, employment status was assessed as a potential influential factor in *SFR* by several studies, whilst in *ORR* studies, occupational status was an operational definition of recovery. Other reviews on the recovery concept in severe mental health problems also identified that the key barrier to studying recovery was the diversity in recovery concepts and definitions (Leonhardt et al., 2017; Silverstein and Bellack, 2008). Therefore, this categorisation was used as an attempt to organise the data coherently and reflect key differences in emphasis across studies.

Arbitrary definitions and operational approaches to recovery were especially present in the early literature. Earlier literature, until the 1990s specifically conceptualised recovery as functioning in occupational and residential domains. This later (in 2000s) extended to psychosocial domains of functioning and quality of life. Research explicitly operationalising personal recovery in bipolar disorder has started to emerge in the early 2010s, thirty years after

the origins of the recovery movement. In line with this change, the examined predictors also evolved, earlier research predominantly focused on sociodemographic and clinical factors and limited the exploration of psychosocial factors to neurocognitive predictors. Gradually, research has evolved and explored a broader range of psychosocial factors, which have been more predominantly examined in relation to PR over the past five years.

In terms of operationalisation, PR recovery was predominantly evaluated using continuous self-reported measures. This is in line with the nature of the PR concept, as individuals often report that it is an idiosyncratic and continuous process (Morrison et al., 2016; Slade and Wallace, 2017). In contrast, SFR and ORR were predominantly assessed by professionals as a binary outcome using threshold scores or returning to premorbid levels of functioning in the different areas. This highlights a qualitative difference in the conceptualisation of the different recovery domains.

Factors associated with the different recovery domains

The reviewed studies examined an extensive range of potential predictors. However, predictors were often examined by only one study, which made data synthesis impossible for some factors. Nevertheless, the findings indicate that the examined recovery concepts are relatively, but not completely, distinct from each other. ORR did not show associations with PR or with SFR as a global measure. However, it did show associations with some aspects of SFR, such as the frequency of social contacts, and recovery of the role performance domain. Furthermore, SFR and especially ORR showed some associations with demographic factors, while PR was less clearly associated with these. PR (with depressive symptoms only) and SFR showed more associations with clinical factors compared to ORR, and some studies indicated associations between global psychosocial functioning, quality of life (SFR components) and PR. This indicates that SFR and PR may be more strongly related. Interestingly, interpersonal subdomains of SFR seemed to be less strongly associated with PR. Some studies identified associations between SFR and chronicity, comorbidity and symptomatology, which suggests that clinical factors may be more influential in SFR than other recovery concepts.

Neurocognitive factors (especially improvement in performance across different cognitive domains) seem to have more impact on ORR compared to SFR; however, executive functioning and attention have been found to impact on both. Other psychosocial factors were rarely examined in ORR and SFR, with single studies indicating that novelty seeking impacted negatively on ORR, and stressful life events on SFR. In contrast, an emerging area of research

has focused on PR and psychosocial factors, resulting in an extensive range of psychosocial factors being investigated in PR. Specifically, positive prospective associations were found with resilience, and its components, such as self-care and self-confidence. Other factors were only examined in cross-sectional analysis, including positive illness models and psychological processes, which focus on control and personal agents, and religious coping. Similarly negative personal attributes and illness models showed negative associations with PR, for example, internalised stigma or negative self-dispositional appraisals. However, these results derived from single cross-sectional studies, and therefore future studies are required to confirm such associations.

Two potential interventions were examined by randomised clinical trials, investigating the effectiveness of group psychoeducation on SFR and of an individualised recovery-focused CBT on PR. Psychoeducation did not improve SFR in BD based on the trial's findings, while recovery-focused CBT was found to have a positive impact on PR. This suggests that more personalised interventions may be more effective in potentially improving recovery outcomes. However, further trials are required that focus on recovery outcomes to confirm these findings.

The discrepancies across the findings of the reviewed studies may be related to the wide range of study designs, recovery definitions, measures, and data analysis methods used. Furthermore, most of the studies were of weak or moderate quality. Due to the diversity across studies, there is limited consensus in identifying the best predictors.

Strengths and limitations of the review

This is the first review to synthesize different concepts of recovery experiences and their potential predictors in BD. The review did not restrict its focus to clinical trials and explored associations with naturally occurring predictors. In addition, the review focused on multiple facets of recovery, which were not previously reviewed in a systematic manner. This review fills an important gap highlighted by a recent review, by itemising all examined potential underpinning processes in PR in BD (van Weeghel et al., 2019). This review exhibits a degree of internal validity due to the use of two screeners to assess the inclusion status, thus reducing the potential impact of selection bias. The extracted data was 100% checked by a second rater (LH). Finally, the EPHPP used for quality assessment has satisfactory internal validity (Thomas et al., 2004) and inter-rater reliability (Armijo-Olivo et al., 2012), which was also assessed and ensured in the present study by continuous discussion and regular consensus meetings between the raters (BM & LH).

This study reviewed the existing operational definitions of recovery, and organised and examined the factors assessed in association with the different recovery concepts, depending on the recovery definition and operationalisation used, to work towards clarity in this area of research. For this reason, we used “recovery” as a search term and inclusion depended on researchers defining their outcomes in terms of “recovery”, which resulted in the inclusion of 33 research papers. It is acknowledged that by choosing this approach, studies examining functioning and/or occupational/residential status that did not explicitly operationalise recovery were excluded, which may have implications for the reviewed list of predictors. Studies not written in English were omitted due to resources not being available for translation.

Furthermore, it is recognised that some potentially interesting work- both quantitative and qualitative, may have been excluded, which is an inevitable result of applying strict inclusion criteria. However, this was necessary due to the focus of the review and state of the current literature, which is very heterogeneous and often of low or inconsistent quality. Due to the high heterogeneity and inconsistency in both conceptual and operational recovery definitions and factors assessed for association, only the direction (and not magnitude) of effects were reported, which is deemed suitable for similar datasets (McKenzie and Brennan, 2021). The directions of the effects presented in this review are based upon the reported findings of the eligible studies. It is acknowledged that this approach has limitations, due to the reliance upon the reported significance levels, which depend on sample size and power. This limitation was addressed by providing in-depth accounts of sample sizes and analysis strategies for each study in Table A.2., and by indicating the results of our quality assessment in Tables 3,4, and 5.

Future research

The review identified considerable inconsistency in both assessment of recovery and proposed predictors of recovery. This highlights the need for consensus research on identifying different recovery domains and core measures to assess each domain by conducting appropriately powered studies. Therefore, future primary research is recommended to focus on specific domains of recovery and use larger sample sizes to examine predictors of recovery that are more definitive. Particularly in respect to PR, there is a need for more prospective studies, since only two reviewed studies reported relevant prospective results. Future in-depth research is also needed to understand how the different concepts/domains of recovery are interrelated

and whether achieving improvements in one impacts upon improvements in other recovery categories.

Finally, there is increasing evidence that cognitive and behavioural psychological processes are important in relation to the risk of BD in at-risk groups and poorer outcomes in individuals diagnosed with BD. While more recently eligible studies paid a greater attention on psychological underpinnings of PR, research in this area is still in its infancy, consisting of predominantly cross-sectional findings. Therefore, future research is recommended to explore potential prospective psychological predictors for recovery outcomes.

Clinical implications

The majority of the examined clinical predictors were found to be independent of the reviewed recovery concepts. However, psychiatric history, comorbidities and symptomatology were indicated to some extent in ORR and more explicitly in SFR, and concurrent depressive symptoms were implicated in PR. Therefore, targeting depressive symptoms, and developing skills to cope with symptoms and negative life events may be beneficial for improving recovery outcomes. The current review did not focus on clinical recovery outcomes; however, a few reviewed studies focused on time spent in remission and found that it may impact positively on SFR, but had no association with PR. This indicates that interventions should not solely focus on achieving and maintaining remission, but also identifying and working towards individually meaningful recovery targets and outcomes.

The main findings of the present review suggest that there is a wide range of factors that may influence recovery outcomes in BD, and that there seem to be no consensus on robust predictors identified across the studies. In terms of clinical interventions, group psychoeducation seems to be ineffective while recovery-focused individual cognitive behaviour therapy was found to be effective. Personalised approaches are more likely to be beneficial than generalised approaches, especially since there is no current agreement on a potential list of predictors to be targeted in order to improve recovery.

In conclusion, the present study was the first to review personal and related recovery experiences in BD systematically over four decades. The main recovery concepts identified across studies and investigated in the review were ORR, SFR and PR. Earlier operational recovery definitions of ORR and SFR were often arbitrary and inconsistent, and examined predictors predominantly included clinical and demographic factors. There is an emerging area of research focusing on PR and psychosocial underpinning factors. Considering the majority

of demographic and clinical predictors, most studies converged on finding no association between recovery and an extensive range of these factors. ORR seemed to be more influenced by demographic while SFR by clinical factors compared to other recovery concepts. Some psychosocial factors were linked to PR by single studies. The only consistently identified factor in association with PR was current depressive symptoms; however, no prospective study has been conducted to verify the long-term impact of depressive symptoms on PR. Future research is recommended to clarify inconsistent research findings and to deepen our understanding of the different aspects and potential predictors of recovery experienc

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