Cognitive–behavioural therapy for personal recovery of patients with schizophrenia: A systematic review and meta-analysis

Weiliang Wang,¹ Yuquiu Zhou,¹ Nannan Chai,² Dongwei Liu¹

**ABSTRACT**

**Background** To date, cognitive–behavioural therapy (CBT) trials have primarily focused on clinical recovery; however, personal recovery is actually the fundamental aspect of the recovery process. The aim of this study was to summarise and synthesise the existing evidence regarding the effectiveness of CBT for personal recovery in patients with schizophrenia.

**Aim** This study aimed to determine the effectiveness of CBT for personal recovery in patients with schizophrenia.

**Methods** A systematic search of the literature in PsycINFO, PubMed, Cochrane (CENTRAL), Embase and Web of Science (SCI) was conducted to identify randomised controlled trials reporting the impact of CBT interventions on personal recovery in patients with schizophrenia. The estimated effect sizes of the main study outcomes were calculated to estimate the magnitude of treatment effects of CBT on personal recovery. We also evaluated the CBT’s effect size at the end-of-treatment and long-term (follow-up) changes in the assessment of personal recovery.

**Results** Twenty-nine studies were included in the analysis. The effect size on personal recovery was 2.27 (95% CI 0.62 to 3.91; p=0.04) at post-treatment and the long-term effect size was 2.62 (95% CI 0.51 to 4.73; p=0.02). During the post-treatment period, the pooled effect size of CBT was 0.01 (95% CI −0.12 to 0.15; p=0.33; I²=0%; p=0.05) for quality of life (QoL), −0.64 (95% CI −1.36 to 0.09; p=0.08; I²=30.8%; p=0.01) for psychological and health-related QoL, −1.77 (95% CI −3.29 to −0.25; p=0.02 for self-esteem. We also summarised the effects of CBT on QoL (subscale scores not included in the evaluation of the pooled effect size), self-confidence and connectedness, and all results corresponded to positive effects. However, there was insufficient evidence regarding the long-term effects of CBT on personal recovery.

**Conclusions** CBT is an effective therapy with meaningful clinical effect sizes on personal recovery and some aspects of personal recovery of schizophrenia after treatment. However, the effect is relatively immediate and rapidly decreases as time progresses. Therefore, in the future, more studies should focus on the mechanism of CBT for personal recovery and the factors that influence the long-term effects of CBT.

**Trial registration number** CRD42018085643.

**INTRODUCTION**

Schizophrenia, a severe mental illness, affects more than 11 million people worldwide.¹ The persistent negative symptoms and cognitive impairment associated with schizophrenia have led its classification among the top 25 leading causes of disability worldwide and the top 11 leading causes of reduced years lived with disability in 2013.² The WHO’s Mental Health Action Plan 2013–2020 highlights the steps required to provide appropriate services for people with schizophrenia.³

Cognitive–behavioural therapy (CBT) is the primarily recommended psychological treatment for schizophrenia according to major guidelines.⁴ ⁵ Abundant studies have proven that the effects of CBT on reducing positive symptoms,⁶ improving negative symptoms,⁷ conferring functional improvement,⁸ reducing the time of relapse⁹ and reducing suicidal ideation¹⁰ in patients with schizophrenia are significant. However, the remission of clinical symptoms does not meet the criterion for rehabilitation, and patient organisations have emphasised that recovery can occur even when psychotic symptoms are persistent.¹¹ Recovery is an ongoing, complex and multidimensional process. According to different perspectives, schizophrenia recovery can be classified as clinical and personal.¹² In the treatment of patients with schizophrenia, the primary goal traditionally is the clinical recovery. Clinical recovery includes remission of symptoms and functional improvement, which is the premise of other non-pharmacological treatments and rehabilitations. The relationship between the clinical and personal recovery is somewhat correlated, and both should be considered when monitoring the treatments and outcomes of patients with schizophrenia.¹³

The term ‘personal recovery’, which based...
experienced mental illness, has been widely used in the literature to describe the patient-based definition of recovery. The most frequently cited patient-based definition is ‘the development of new meaning and purpose in one’s life as one grows beyond the catastrophic effects of mental illness.’

Personal recovery varies from person to person, and it is difficult to define common characteristics. Different researchers also have their own definitions of personal recovery. Andresen et al concluded that personal recovery included four key points: finding hope; re-establishing identity; finding meaning in life; and taking responsibility for recovery. Leamy et al posited that the categories of personal recovery encompass connectedness, hope, identity, meaning and empowerment. Based on a cluster analysis of self-reported personal recovery-related variables, Rossi et al identified resilience, self-esteem, coping strategies, stigma and personal strength. Furthermore, quality of life (QoL), taking control of one’s life, personal confidence and reliance on others have been found to be important components of personal recovery.

According to a review of the abundant literature on personal recovery, which have most consistently identified connectedness, hope and empowerment as relevant categories, and discussions by our research team, we decided to use the CHIME personal recovery model defined by Leamy et al: Connectedness–Hope–Identity–Meaning–Empowerment. In addition, this model is consistent with the context of recovery defined by the WHO. Based on the progress of pharmacological treatment of acute psychiatric symptoms of schizophrenia, QoL measurement has become an important indicator for evaluating clinical outcomes in patients with schizophrenia. Furthermore, QoL is one of the most commonly used outcome assessments. To better address the concept of personal recovery, we have also considered QoL in the assessment of personal recovery.

The concept of recovery is multidimensional; why, then, should personal recovery be the primary focus? Personal recovery pertains to patients’ ability to live a favourable, dignified and meaningful life; it is the core element of recovery from the patient perspective, and it is the ultimate aim of mental illness treatment. Moreover, some components of personal recovery, such as hope, are the foundations and preconditions of treatment and other outcomes. In addition, Jahn et al finding suggests that personal recovery is a protective factor against suicidal ideation in individuals with schizophrenia. However, existing knowledge about the role of CBT in personal recovery is highly limited, and the current meta-analyses focused only on clinical outcomes; therefore, the aim of this study was to determine the effectiveness of CBT for personal recovery in patients with schizophrenia. This research has been registered at PROSPERO (CRD: 42018085643), and the study protocol can be obtained via the following website: https://www.crd.york.ac.uk/PROSPERO/#recordDetails.

**METHODS**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement were followed in all steps of this research.

**Search strategy**

Five electronic databases, PsycINFO, PubMed, the Cochrane Library (CENTRAL), Embase and Web of Science (SCI), were searched for relevant papers published before 31 December 2018 with the following search terms: (‘psychosis’ OR ‘psychotic’ OR ‘schizophrenia’ OR ‘schizo-affective disorder’) AND (‘cognitive therapy’ OR ‘cognitive behavior* therapy’ OR ‘cognitive behaviour* therapy’ OR ‘cognitive therapy’ OR ‘cognitive behavior therapy’ OR ‘cognitive behaviour therapy’ OR ‘cognitive behaviour therapy’ OR ‘cognitive therapy’ OR ‘cognitive behavior therapy’) AND (‘random’ OR ‘randomized control trial’ OR ‘clinical trial’ OR ‘trial’).

Manual searches were also performed by reviewing the reference lists of related papers. Two reviewers (WW and NC) independently screened the search results by reviewing titles and abstracts. The full texts of relevant articles screened in previous steps were downloaded for further screening. If the same data were reported in more than one publication, only the paper with the more complete data was included. Any disagreement was settled by discussion with the third author (ZY). (See the flow chart of the study, figure 1.)

**Inclusion and exclusion criteria**

The definition of personal recovery in our study included six components: connectedness, hope, identity, meaning, empowerment; and QoL. Studies that fulfilled the following criteria were included: (1) randomised controlled trials; (2) publications with full texts written in English; (3) participants diagnosed with schizophrenia or schizophrenia spectrum disorder based on the International Classification of Diseases-Tenth Revision or Diagnostic and Statistical Manual of Mental Disorders-Fourth/Fifth Edition; (4) the use of a valid measure or Diagnostic and Statistical Manual searches were also performed by reviewing the reference lists of related papers. Two reviewers (WW and NC) independently screened the search results by reviewing titles and abstracts. The full texts of relevant articles screened in previous steps were downloaded for further screening. If the same data were reported in more than one publication, only the paper with the more complete data was included. Any disagreement was settled by discussion with the third author (ZY). (See the flow chart of the study, figure 1.)

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**Data extraction**

Data extraction was performed by two independent reviewers (WW and NC) who used a specific worksheet designed before the literature search to minimise errors in data extraction. Data extraction was conducted using the full-text versions of the RCTs. The data regarding basic characteristics and outcome measures, including study identity (first author, publication year and country); study design (randomisation, concealment of allocation,
Records identified through database searching (N= 4146): PubMed (n=476), Embase (n=642), Cochrane (n=859), Web of Science (n=1046), PsycINFO(n=1123).

Duplicated records (n=1653)

Records screened by title or abstract (n=2493)

Not related to the topic (n=1810):
- not an experimental study;
- participants did not have schizophrenia or had other psychotic coexisting conditions;
- no CBT intervention or CBT with other interventions;
- the outcome assessment was not related to personal recovery (weight control, sleep, suicide ideation, smoking cessation, etc).

Not a RCT (n=687): cohort study, review, conference, comments, guideline, letters, etc.

Screened by full text (n=156)
(Reviewed the reference lists from full text articles: n=0)

Not in English: n=14
No full text: n=7
Study protocol and pilot study without data: n=20
The data were not available: n=12
Studies using duplicated data: n=12
No related outcome measure: n=66

Included in the study(n=25)

**Figure 1** The flowchart of search and study selection. CBT, cognitive–behavioural therapy; RCT, randomised controlled trial.

blinding); patient (number of study participants, mean age); intervention characteristics (treatment protocol, length of treatment, number of sessions and type of comparisons); and all relevant outcomes (types of outcome measures, instruments and follow-up periods) were extracted from all included studies.

**Quality assessment**
The quality of the RCTs enrolled in our study was assessed using the Cochrane Collaboration’s tool for determining the risk of bias in randomised trials. According to the Cochrane assessment tool, the relevant information was extracted from each study, and the study was rated as ‘high risk’, ‘low risk’ or ‘unclear risk’. Disagreements were resolved by consensus.

**Statistical analysis**
All the pooled effect size was performed by RevMan V.5.0. The I² statistic was used to evaluate the heterogeneity of the studies. Sensitivity analysis and subgroup analysis were performed to deal with heterogeneity. Forest plots were also drawn to visualise the extent of heterogeneity across studies. Publication bias was evaluated using Egger’s test by Stata (V.14.2). Hedge’s g was used to determine the effect size of continuous outcomes. Considering the heterogeneity of the personal recovery outcome measures, we summarised the pooled results narratively with descriptive statistics and textual descriptions. A two-tailed p<0.05 was considered statistically significant. A power analysis to examine the reliability of the pooled result was performed with GPower V.3.1.
The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach was performed to assess confidence of evidence (CoE) for each comparison. CoE of outcomes was rated based on study design, risk of bias, inconsistency of results, indirectness of evidence, imprecision and publication bias. We used the GRADEpro Guideline Development Tool to assess the CoE of the critical outcomes.

RESULTS
Study selection
A total of 4146 articles were retrieved from the electronic databases. After duplicates were discarded, 2493 remaining studies were screened. According to the inclusion and exclusion criteria, approximately 2337 records were removed after screening to determine whether the article titles and abstracts were relevant to the topic of the review. The full texts of the remaining 156 studies were reviewed. We manually searched by reviewing the reference lists from the full-text articles, and none of the references were related to the topic. Finally, 131 studies did not meet the inclusion criteria, leaving 25 studies for inclusion in this review. The details of the search process are shown in figure 1.

Study characteristics
All the participants included in the 25 studies were diagnosed with schizophrenia or schizoaffective disorders; the patients in seven studies were recruited from hospitals, and the patients in the other 18 studies were recruited from the community or mental health centres. The intervention treatment provided in most of the studies was CBT; 1 of the 25 studies used cognitive-behavioural-oriented services (CBOS) as the intervention group’s treatment, but CBOS is still considered as CBT on the basis of its core theory and implementation. All the comparison groups received treatment as usual, supported groups, standard care, standard treatment (STT), standard support, befriending, wait-listing or patient psychoeducation therapy, except in two studies. Three studies compared CBT versus CBT plus clozapine and CBT versus CBT plus thioridazine. Three studies reported directly the personal recovery using the Questionnaire about the Process of Recovery (QPR) scale, 11 studies reported QoL; 5 studies reported hope as an outcome of personal recovery; self-esteem, a core element of a better and more meaningful life for psychiatry patients, was measured in 11 studies; 3 studies reported relationships with others as an outcome; and 1 study reported self-confidence as an outcome of personal recovery. No studies reported empowerment as an outcome. Twelve of the studies reported sufficient follow-up data to evaluate the long-term effect of CBT in schizophrenia (table 1).

Quality of the studies
The risk of bias for each study is available in the online supplementary material 1. Eleven of the 25 studies were universally assessed as having a low risk of bias across all domains. Fifteen trials employed adequate methods of sequence generation, 10 trials were not clear. In addition, the risk of bias due to inadequate allocation concealment was unclear in seven trials, and four trials did not include allocation concealment. Lack of blinding of the assessors led to a high risk of bias for some outcomes in four studies, and an unclear risk in four studies. A high risk of bias due to lack of participants or staff blinding was found in two studies and was unclear in three studies. There was a high risk of bias due to incomplete outcome data for two of the included trials, one trial did not report all outcomes.

Main efficacy meta-analysis
Primary outcomes
Three studies reported the effect of CBT for personal recovery measured by QPR. The random effects meta-analysis yielded a summary effect size of 2.27 (95% CI 0.45 to 4.45; I²=0%; p=0.04, power=0.61). Egger’s test indicated that there was no publication bias (p=0.96, 95% CI −18.1 to 19.6). The long-term effect of CBT was measured in these three studies and the pooled effect size was 2.62 (95% CI 0.51 to 4.74; I²=0%; p=0.02, power=0.13) (figure 2).

Secondary outcomes
Effect size of QoL
Nine studies reported QoL total scores based on questionnaires. The random effects meta-analysis yielded a summary effect size of 0.01 (95% CI −0.12 to 0.15; I²=33.0%; p=0.04, power=0.61). Egger’s test yielded an indication of no publication bias (p=0.54, 95% CI −1.40 to 2.48). The participants in three studies were recruited from hospitals, and the participants in six studies were recruited from outside the hospital. Both the inpatient and outpatient subgroups yielded a small and non-significant effect of schizophrenia on QoL (online supplementary material 1). Seven studies reported CBT follow-up for QoL in schizophrenia, and the pooled effect size was 0.06 (95% CI −0.03 to 0.15; I²=15%; p=0.05) with a small power of 0.19. The follow-up times differed among the studies, and the pooled effect sizes were 0.36 (1 month), 0.08 (95% CI −0.31 to 0.47; I²=57.0%; p=0.05, power=0.87) (3 months) and 0.04 (95% CI −0.00 to 0.09; I²=0%; p=0.05, power=0.11) (6 months and above) respectively. After performing the sensitivity analyses, no substantial change in the new pooled effect size was observed.

Four studies reported the psychosocial well-being of the patients, as measured by the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), a subscale of the
| Study (year) | Place     | Mean age, years (I/C) | Inpatient or outpatient | Study conditions | Form and dose of intervention* | Personal recovery | Instrument | Follow-up† (month) |
|-------------|-----------|-----------------------|-------------------------|-----------------|--------------------------------|-------------------|------------|-------------------|
| Barretto et al, 33 | Brazil | 39.8/33.2 | Outpatient | 21/12/9 | CBT versus BF | Individual; 20 sessions (first 15 sessions weekly, last 5 sessions every other week); 45min per session | Quality of life | QoL | 1 |
| Barrowclough et al, 34 | UK | 32.8 | Outpatient | 113/57/56 | CBT versus TAU | Group; 18 sessions over 6 months; 2 hours per session | Hopelessness; self-esteem | BHS; RSE | 6 |
| Bechdolf et al, 35 | Germany | 32.2/31.4 | Inpatient | 88/40/48 | CBT versus PE | Group; 16 sessions in 8 weeks; 1–1.5 hours per session | Quality of life | MSQoL | 4 |
| Birchwood et al, 36 | UK | 37.4 | Outpatient | 15/9 | CBT versus TAU | Group; 25 sessions over 9 months; unclear | Hopelessness | BHS | 9 |
| Edwards et al, 37 | Australia | 22.0/22.5 | 20.8/20.5 | Outpatient | 48 | CBT versus TDZ CBT versus CLZ | Group; twice weekly for 12 weeks, at least 15 sessions (16 sessions; 19 sessions); unclear | Quality of life | QLS | 3 |
| Freeman et al, 38 | UK | 41.9/41.5 | Outpatient | 10/15/15 | CBT versus SC | Individual; 6 sessions over 8 weeks; unclear | Self-confidence; well-being; relationships; self-esteem. | BCSS; WEMWBS; SCS; RSQ | 1 |
| Freeman et al, 39 | UK | 40.9/42.1 | Outpatient | 150/73/77 | CBT versus SC | Individual; 6 sessions over 8 weeks; 1 hour per session | Well-being | WEMWBS | 4 |
| van der Gaag et al, 40 | Netherlands | 36.5/37.4 | Inpatient | 216/110/106 | CBT versus TAU | Group; 26 sessions weekly; unclear | Quality of life | WHO-QoL | – |
| Garety et al, 41 | UK | 39.6/37.6 | Inpatient | 20/13/7 | CBT versus WL | Individual; 8 sessions weekly over 6 months; unclear | Self-esteem | RSE | – |
| Gumley et al, 42 | UK | 35.8/36.7 | Outpatient | 144/72/72 | CBT versus TAU | Group; sessions between entry and 12 weeks 10–12 sessions per week delivered at the appearance of early signs of relapse; unclear | Self-esteem | RSE | – |
| Halperin et al, 43 | Australia | NR | Inpatient | 16/7/9 | CBT versus WL | Group; 8 sessions over 8 weeks, delivered weekly; 2 hours per session | Quality of life | Q-LES-Q | – |
| Klingberg et al, 44 | Germany | 33/33 | Inpatient | 169/84/85 | CBOS versus TAU | Group; 40 weekly sessions (fortnightly sessions), 2 hours per session; 6 weekly and 8 fortnightly sessions | Relationships | – | – |
| Kuipers et al, 45 | UK | 38.5/41.8 | Outpatient | 60/28/32 | CBT versus TAU | Individual; 18 sessions fortnightly; 1 hour per session | Hopelessness; self-esteem | BHS, SCQ | – |
| Study (year) | Place           | Mean age (I/C) | Inpatient or outpatient | Size (n): (I/C) | Study conditions | Form and dose of intervention* | Personal recovery | Instrument | Follow-up† (month) |
|-------------|----------------|----------------|-------------------------|----------------|------------------|-------------------------------|--------------------|------------|-------------------|
| Lysaker et al, 2005 USA | 46.4/49.7  | Outpatient | 50/25 | CBT versus SS | Group; 8 sessions fortnightly; 40 min per session | Hopelessness; self-esteem | BHS, RSE | – |
| Mortan et al, 2011 Manisa | 44.0/40.6  | Inpatient | 12/7  | CBT versus TAU | Group; 10 sessions fortnightly; 1.5 hours per session | Hopelessness; self-esteem | BHS; RSE | 7 |
| Penn et al, 2009 USA | 41.7/39.6  | Outpatient | 65/30 | CBT versus ST | Group; 12 weekly sessions; 1 hour per session | Self-esteem | RSE | 9 |
| Premkumar et al, 2011 UK | 36.1/39.7 | Outpatient | 43/25 | CBT versus SC | Group; 19 sessions, weekly/ fortnightly; unclear | Self-esteem | RSE | – |
| Shawyer et al, 2012 Australia | 40.0/39.6 | Outpatient | 44/21 | CBT versus BF | Group; 15 sessions, weekly; 50 min per session | Quality of life | Q-LES-Q | 3 |
| Steel et al, 2016 UK | 43.8/40.7  | Outpatient | 95/30 | CBT versus TAU | Group; 16 sessions over 6 months; unclear | Quality of life | QLS | 6 |
| Wykes et al, 2005 UK | 39.7/39.7  | Outpatient | 95/30 | CBT versus TAU | Group; 7 sessions over 10 weeks; unclear | Self-esteem | RSE | 4 |
| Tsiachristas et al, 2018 | 40.4/42.9  | Outpatient | 43/12 | CBT versus SC | Individual; 8 sessions over 12 weeks; unclear | Quality of life | EQ-5D-5L | 3 |
| Wood et al, 2018 UK | 32.07/35.58 | Inpatient | 30/15 | CBT versus PE | Group; 2 sessions over 2 weeks period; 120 min per session | Personal recovery; QPR; SERS | self-esteem | 1 |
| Morrison et al, 2018a UK | 23.2/24.4  | Outpatient | 49/24 | CBT versus SS | Group; 26 sessions over 6 months; unclear | Personal recovery; QPR; WHO-QoL | 12 |
| Morrison et al, 2018b UK | 42.8/42.2  | Inpatient | 475/230 | CBT versus TAU | Group; 36 sessions over 9 months; 60 min per session | Personal recovery; QPR; EQ-5D-5L | quality of life | 8 |
| Pot-Kolder et al, 2018 Netherlands | 36.5/39.5  | Outpatient | 116/58 | CBT versus WL | Individual; 16 sessions over 8-12 week; 60 min per session | Quality of life | MSAQoL | 3 |

*The information extracted from the primary study were group CBT/individual CBT; number and frequency of CBT sessions; and session length. The follow-up time was from the endpoint of CBT treatment.

AD, Antipsychotic drugs; BCSS, Brief Core Schema Scales; BF, befriending control group; BHS, Beck Hopelessness Scale; C, control group; CBOS, cognition-behavioural oriented services; CBT, cognitive-behavioural therapy; CLZ, clozapine; EQ-5D-5L, EuroQol 5 Dimensions 5 Levels; intervention group; MSAQoL, Manchester Short Assessment of Quality of Life; MSQoL, Modular System for Quality of Life; NR, Not Report; PE, patient psychoeducation; Q-LES-Q, Quality of Life Enjoyment and Satisfaction Questionnaire; QLS, Quality of Life Scale; QPR, Questionnaire about the Process of Recovery; QoL, quality of life scale; RSE, Rosenberg Self-Esteem Scale; RSQ, Robson Self-Concept Questionnaire; SC, standard care; SCQ, Self Concept Questionnaire; SCS, Social Comparison Scale; SERS, Self-Esteem Rating Scale; SG, support group; SS, standard support; ST, standard treatment; TAU, treatment as usual; TDZ, thioridazine; WEMWBS, Warwick-Edinburgh Mental Well-Being Scale; WL, waiting list group.
Table 2  Forest plot of the effect of cognitive–behavioural therapy (CBT) on personal recovery.

| Study or Subgroup | Control | CBT | Mean Difference | Mean Difference | Risk of Bias |
|-------------------|---------|-----|----------------|----------------|--------------|
|                   | Mean | SD  | Total Mean | SD  | Total Weight | IV, Random | 95% CI | A | B | C | D | E | F | G |
| 1.1.1 Post-treatment | Morrison, 2018 | 50.9 | 11.6 | 181 | 48.7 | 11.1 | 194 | 89.3% | 2.20 | [0.10, 4.50] | - | - | - | - | - | - | - |
|                   | Morrison, 2018b | 52 | 14.05 | 18 | 44.66 | 14.99 | 22 | 5.8% | 7.14 | [-1.08, 16.16] | - | - | - | - | - | - | - |
|                   | Wood, 2018 | 43.73 | 12.66 | 13 | 45.93 | 13.34 | 14 | 4.9% | -2.20 | [-12.01, 7.61] | - | - | - | - | - | - | - |
|                   | Subtotal (95% CI) | 212 | 236 | 100.0% | 2.27 | [0.10, 4.48] | - | - | - | - | - | - | - | - |
| Heterogeneity: Tau² | 0.00 | Ch² | 1.92 | df = 2 | P = 0.38 | P = 0% | - | - | - | - | - | - | - | - |
| Test for overall effect: Z = 2.05 | P = 0.04 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1.1.2 Follow up | Morrison, 2018 | 52 | 9.6 | 165 | 49.1 | 11.7 | 185 | 90.0% | 2.90 | [0.67, 5.13] | - | - | - | - | - | - | - |
|                   | Morrison, 2018b | 49.88 | 11.04 | 17 | 48.55 | 14.73 | 22 | 9.9% | 1.33 | [4.76, 9.42] | - | - | - | - | - | - | - |
|                   | Wood, 2018 | 40.87 | 16.63 | 10 | 43.27 | 13.39 | 12 | 3.2% | -2.40 | [-14.27, 9.47] | - | - | - | - | - | - | - |
|                   | Subtotal (95% CI) | 192 | 219 | 100.0% | 2.62 | [0.51, 4.74] | - | - | - | - | - | - | - | - |
| Heterogeneity: Tau² | 0.00 | Ch² | 0.85 | df = 2 | P = 0.66 | P = 0% | - | - | - | - | - | - | - | - |
| Test for overall effect: Z = 2.43 | P = 0.02 | - | - | - | - | - | - | - | - | - | - | - | - | - |

Figure 2  Forest plot of the effect of cognitive–behavioural therapy (CBT) on personal recovery.

Modular System for Quality of Life (MSQoL) scale and the WHO-QoL psychological well-being subscale. Because of the high heterogeneity (I²=91.0%, p<0.001), it was not appropriate to directly combine the effect sizes; thus, a descriptive analysis was performed. Two studies investigated psychological health with WEMWBS,38,39 the pooled effect size was 0.64 (95% CI 0.06 to 1.13; I²=30.8%; p<0.01) and the long-term effect size was 0.38 (95% CI 0.09 to 0.69; I²=0.00%; p<0.01). In a restrictive and high-quality RCT, Bechdolf et al35 investigated the effect of CBT on patients' psychosocial well-being using a subscale of the MSQoL. The results showed that the CBT programme improved the patients' psychological health-related QoL with a small effect size (Cohen's d=0.03). Moreover, the long-term effect of CBT was significant according to data collected 4 months after treatment and it had a moderate effect size (Cohen's d=0.37). van der Gaag et al40 used the WHO-QoL psychological well-being subscale to reflect the psychological health of patients with schizophrenia. The results showed that CBT significantly improved the patients' QoL, with a large effect size at the end of treatment (Cohen's d=1.41).

Shawyer et al50 investigated QoL using two subscales from the Quality of Life Enjoyment and Satisfaction Questionnaire: Subjective Feelings and General Activities. In addition, the endpoint effect sizes of the two subscales corresponded to Cohen's d values of 0.02 and 0.43, and the follow-up effect sizes were -0.48 and 0.14 respectively. The study also evaluated the life satisfaction and life enjoyment with special items, and the Cohen's d values were 0.37 and 0.08 with long-term effect sizes of 0.20 and -0.19 respectively. Bechdolf et al55 reported subjective QoL measured with the MSQoL seven subscale scores at post-treatment and at a 6-month follow-up. The effect sizes of the seven subscales (endpoint, follow-up) were as follows: Physical Health (0.11, 0.21), Vitality (0.01, 0.36), Psychosocial QoL (0.03, 0.37), Affective QoL (0.17, 0.27), Material QoL (0.03, 0.12), Spare Time QoL (0.30, 0.32) and General QoL (0.05, 0.20). All changes in the effect sizes over time were positive.

Effect size of hope
A total of five studies34,36,45–47 investigated the hopelessness levels of patients with schizophrenia using the Beck Hopelessness Scale (BHS), for which higher scores indicate lower hope levels. Egger's test showed that no publication bias existed (p=0.72, 95% CI −5.65 to 7.23). The endpoint pooled effect size of the five studies was positive, with an effect size of -1.77 (95% CI −3.29 to -0.25; I²=40%; p=0.02, power=0.89) (figure 3). Regarding the long-term effect of CBT, three studies34,36,47 reported follow-up data for over 6 months after the treatment. The results showed that the effect of CBT on improving hope among patients with schizophrenia was uncertain (-0.38, 95% CI −2.78 to 2.02; I²=56%; p>0.05), and the three studies only yielded a power of 0.42. Sensitivity analyses were conducted and after eliminating the studies, no substantial change in the new pooled effect size was observed (figure 4).

Effect size of identity (self-esteem and self-confidence)
A total of eleven studies34,39,41,42,45–49,52,57 reported self-esteem. The total sample size of these eleven studies was 584, and the pooled effect size was 1.85 (95% CI 0.69 to 3.01; I²=41%; p<0.01, power=0.98) (figure 5). The result of Egger's test showed that there was no publication bias (p=0.20, 95% CI −3.92 to 0.94). For the long-term effect size of CBT, six34,39,42,47,48,57 of the ten studies completed a follow-up evaluation and the effect size was −1.21 (95% CI −2.45 to 0.04; I²=12%; p>0.05, power=0.37). Two39,57 of those studies reported results 1 month after the end of treatment, which showed an uncertain effect of CBT (3.61, 95% CI −13.89 to 21.11; I²=28%; p<0.05, power=0.11) and the statistical power was 0.11. For the other four studies, the follow-up time was over 6 months. Therefore, we combined the follow-up data from these four studies and it revealed a negative long-term effect,
with an effect size of $-1.23$ ($95\%$ CI $-2.52$ to $0.06$; $I^2=22\%$; $p>0.05$) and a power of $0.49$.

One study\(^{39}\) assessed the patients’ self-confidence using the Brief Core Schema Scales (BCSS). The BCSS is designed to assess negative and positive beliefs about oneself and others. The endpoint effect size of positive beliefs corresponded to Cohen’s $d$ of 1.14, but the long-term effect size was only 0.20 at 1 month after treatment. The endpoint effect size of negative beliefs corresponded to $d$ of 0.40, and the long-term effect size was $d$ of 0.09.

**Connectedness**

The Social Comparison Scale is used to assess the patient’s relationship with others, and higher scores indicate a more positive view of oneself in relation to others.\(^{39}\) The effect sizes were 0.79 and 0.33 at the endpoint and follow-up respectively. Klingberg et al\(^{44}\) investigated the

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**Figure 3** Forest plot of the effect of cognitive–behavioural therapy (CBT) on quality of life (QoL).

**Figure 4** Forest plot of the effect of cognitive–behavioural therapy (CBT) on hopelessness.
Main findings

There has recently been growing attention surrounding the effects of CBT on personal recovery in patients with schizophrenia. The present review examined the efficacy of CBT across 25 randomised clinical trials that included multiple outcomes of personal recovery over different periods of follow-up. Both the post-treatment and the follow-up effect of CBT on personal recovery measured by QPR were positive and significant, which means that CBT can indeed change the patient’s recovery process to some extent. However, due to the limited number of studies, the small sample size and low statistical power, the evidence is not sufficient. We also tested the effect of CBT on the specific components of personal recovery. At post-treatment and during the follow-up period, the effect of CBT on QoL in patients with schizophrenia was uncertain for both pooled groups and subgroups, with p values >0.05 and powers <80%. Thus, a conclusion cannot be drawn as to whether CBT is beneficial for patients’ QoL due to the limited number of studies, the small sample sizes and the fair quality of the included controlled trials. Additional sufficient and conclusive evidence is needed in the future.
### Table 2  GRADE summary of evidence for the effects of CBT and personal recovery

| Certainty assessment | Patients, n | Effect | Relative (95% CI) | Absolute (95% CI) | Certainty | Importance |
|----------------------|-------------|--------|-------------------|-------------------|-----------|------------|
| **Personal recovery**|             |        |                   |                   |           |            |
|                       | 3           | CBT    | TAU               | MD 2.27 higher    | @@@@ High | Critical   |
|                       |             | (0.1 higher to 4.45 higher) |           |                    |           |            |
| *Follow-up (personal recovery)* |             |        |                   |                   |           |            |
|                       | 3           | CBT    | TAU               | MD 2.62 higher    | @@@@ High | Critical   |
|                       |             | (0.51 higher to 4.47 higher) |           |                    |           |            |
| **Quality of life**   |             |        |                   |                   |           |            |
|                       | 10          | CBT    | TAU               | MD 0.01 higher    | @@@@@ Low | Critical   |
|                       |             | (0.12 lower to 0.15 higher) |           |                    |           |            |
| *Follow-up (quality of life)* |             |        |                   |                   |           |            |
|                       | 8           | CBT    | TAU               | MD 0.06 higher    | @@@@@ Low | Critical   |
|                       |             | (0.03 lower to 0.15 higher) |           |                    |           |            |
| **Hope**              |             |        |                   |                   |           |            |
|                       | 5           | CBT    | TAU               | MD 1.77 lower     | @@@@@ Very low | Critical |
|                       |             | (3.29 lower to 0.25 lower) |           |                    |           |            |
| *Follow-up (hope)*    |             |        |                   |                   |           |            |
|                       | 3           | CBT    | TAU               | MD 0.38 lower     | @@@@@ Very low | Critical |
|                       |             | (2.78 lower to 2.02 lower) |           |                    |           |            |
| **Identity**          |             |        |                   |                   |           |            |
|                       | 10          | CBT    | TAU               | MD 1.85 higher    | @@@@@ Low | Critical   |
|                       |             | (0.69 higher to 3.01 higher) |           |                    |           |            |
| *Follow-up (identity)*|             |        |                   |                   |           |            |
|                       | 6           | CBT    | TAU               | MD 1.01 lower     | @@@@@ Low | Critical   |
|                       |             | (3.35 lower to 0.04 higher) |           |                    |           |            |

*Allocation concealment bias. Blinding of participants bias and incomplete outcome data bias were observed in some included studies.
†The study included patients who were relatively small and the CIs were wide.
‡Some studies included patients who were relatively small.
§Some included studies reported a positive effect of CBT for hope, whereas other studies failed to find such effect.
¶Some studies use hopeless levels to reflect hope levels.
**Selective reporting.
††Some included studies reported no effect of CBT for identity.
CBT, cognitive-behavioural therapy; GRADE, Grading of Recommendations Assessment, Development and Evaluation; MD, mean difference; TAU, treatment as usual.
However, for psychological well-being, which is an important component of QoL, the pooled endpoint effect size was significantly large (>0.6), although the long-term effect size decreased to a moderate level. The Subjective Feelings (how much of the time participants feel positive) and General Activities (degree of satisfaction with general activities of life) of patients also showed improvement at post-treatment but decreased at long-term follow-up times. Although this change in effect size with time is in contrary to the trend reported by Bechdolf et al., we still believe that CBT is a useful intervention for improving QoL other than psychological health-related QoL in patients with schizophrenia. However, the effect of CBT on QoL in schizophrenia and whether the long-term effect is better or worse than the endpoint should be explored in the future.

The effect of CBT on hope and self-esteem is obvious and positive at post-treatment; however, the long-term effect (over 6 months) is markedly decreased. The self-confidence and relationships of patients with schizophrenia improved little in the CBT group compared with the ST group, and the long-term effect of CBT was the same for hope and self-esteem. These data indicate that the effect of CBT on personal recovery is only sustained for a short time; as time progresses after treatment, the personal recovery of the patients reverts back to the original level. Most studies have only focused on the immediate effects of targeting cognitions about the self and have not tried to determine which specific intervention techniques may change the underlying mechanism. We believe that the personal recovery of patients should be a long-term effort, whether in or out of the hospital, and to maximise the effectiveness of CBT, more efforts should be dedicated to continuing CBT interventions at specific time points when its effects are decreased and to determining which factors influence its effect.

None of these studies reported the effect of CBT on meaning and empowerment in patients with schizophrenia. Empowerment, included participating in society in terms of access to employment, education and other valued resources, in terms of interpersonal characteristics, empowerment also means having control over one’s life and the recovery, and efforts to achieve greater control and self-efficacy. There are also some scales available for measuring empowerment, especially among patients with schizophrenia. Unfortunately, none of the studies included in our research used the empowerment scale as a measure of personal recovery. In the CHIME personal recovery model, meaning is not reported directly, and to the best of our knowledge, there is no specially designed scale for meaning measurement; however, the schizophrenia hope scale designed by Choe examines positive expectations for the future, confidence in life and the future, and meaning in life, which may help to reflect meaning as an aspect of personal recovery in patients with schizophrenia. Meaning and empowerment can reflect personal recovery to a large extent, and future studies should be designed to verify the effectiveness of CBT on these components of personal recovery. Moreover, such studies would support the implementation of instruments to measure personal recovery as an outcome.

In the present study, even when strict inclusion criteria were applied to minimise the heterogeneity of the meta-analysis, there was still moderate or even large heterogeneity in some of the outcome analyses. Because of the small number of studies in the high heterogeneity group, the sensitivity analyses and the subgroup analysis were unable to compensate for the heterogeneity; therefore, instead of reporting the results of the meta-analysis, we reported the data as descriptive statistics. Additionally, the outcomes in our study are the best defined main measures for personal recovery despite the moderate heterogeneity of some analyses. The uniformity among estimates of the effect was remarkable given the unavoidable differences in interventions associated with the different individual personnel delivering the behavioural interventions. In addition, we found no statistical evidence of publication bias, so these factors are unlikely to have affected our estimates.

Some of the results were not statistically significant, with p values >0.05. However, the absence of statistical significance should never be interpreted as evidence that an effect is absent. We performed a power analysis to test the reliability of the negative result, and the statistical power was low or very low. According to the significance test (Z = 0.55), the effect size (M) is the important factor that determines the p value, and the factors that control the power are the same as those that control the significance (Chapter 29). Therefore, additional higher power studies with restrictive designs and sufficient sample sizes are needed in the future to confirm the effectiveness of CBT on personal recovery in schizophrenia.

**Limitations**

There are several limitations of this review. First, some subgroup analyses were not performed due to the limited number of studies. We found that the frequency and number of CBT sessions varied among studies. We initially planned to perform a subgroup analysis according to session design to determine which CBT design corresponds to the best outcome; however, because of the limited number of studies, this subgroup analysis was inappropriate. Therefore, we did not perform this analysis, although this issue could be discussed in future studies aimed at other recovery outcomes. Second, we could not perform a meta-analysis of some outcomes, thus the findings of the effects of CBT are less conclusive and valid. Third, we could not consider all aspects of personal recovery due to the absence of various measures in primary studies. The hope level was represented by the BHS score, which may not be ideal as there is a special hope scale designed for patients with schizophrenia. Fourth, this review included randomised controlled trials but did not include other study methods/designs or studies that used mixed methods or qualitative exploratory approaches. This limits the comprehensiveness and depth of the understanding of the process.
the perceived benefits and different clinical outcomes of CBT on the personal recovery of patients with schizophrenia. Lastly, the review only included experimental studies published in peer-reviewed journals using English language. This could limit the generalisability and validity of the findings of this review.

Implications
There is insufficient evidence regarding the significant positive long-term effects of CBT on personal recovery outcomes among people with schizophrenia, and more experimental trials with high power are needed in the future. In our study, the QoL and CHIME recovery models were combined to represent personal recovery. However, there are numerous specialised scales designed to measure personal recovery among patients with schizophrenia, and future studies should take these scales into consideration as personal recovery measurement tools. Other important questions for both research and clinical applications that must be investigated include how long the effect of CBT can be sustained and how to ensure that patients with schizophrenia receive the greatest benefit from CBT intervention in the long term.

CONCLUSION
Our review showed that CBT is a reasonably effective treatment for some aspects of personal recovery among patients with schizophrenia. Our findings revealed improvements in QoL, hope, self-esteem, self-efficacy, and social connections after CBT interventions; however, the effect was relatively immediate and rapidly decreased over time. Therefore, in the future, more efforts should focus on the mechanism of CBT on personal recovery and the factors that influence the long-term effects of CBT.

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Contributors
WW and ZY designed the study and contributed substantially to the design of the search strategy, and NC searched the literature and extracted the data. DL performed the analysis and interpreted the data. WW wrote the first draft of the manuscript and ZZ critically revised the manuscript. All authors read and approved the final manuscript.

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Wenjie Wang graduated from Xinxiang Medical University of Henan province in 2016. Since 2016, he has been working on successive postgraduate and doctoral programs for Ph.D degree in Harbin Medical University, School of nursing. His research team is currently investigating how to slow down and prevent schizophrenia disability and maintain its social function. In recent years, attention has been paid to the treatment, clinical outcomes and rehabilitation of patients with schizophrenia. They are very interested in the personal recovery of mental illness, the development of clinical assessment tools, and the trajectories of disease development and its relationship with clinical outcomes, brain function and event-related potential studies. His research interest includes mental illness and psychotherapy.
Retraction: Cognitive–behavioural therapy for personal recovery of patients with schizophrenia: a systematic review and meta-analysis

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This paper has been retracted after errors were found in the original data of the study that affect the main result of the paper. The authors are going to check and renew all the processes of the screening and data collection. Therefore, we are in agreement with the author that this paper should be retracted pending further analysis.

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