

BMJ Open Occupational therapy interventions for adults with severe mental illness: a scoping review

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ABSTRACT

Objective To identify the occupational therapy (OT) interventions in adults with severe mental illness (SMI) most investigated in intervention studies and to describe their characteristics.

Design Scoping review.

Data sources On 17 January 2020, we searched the following electronic databases: MEDLINE, Scopus, Web of Science and EMBASE. We also performed a manual search of TESEO doctoral thesis database and of the journals indexed in the first quartile of OT according to the SCImago Journal Rank. We updated our search on 10 March 2021, performing a complementary search on ProQuest database and repeating the search in all sources. The terms included in the search strategy were: schizophrenia, schizotypal personality, delusional, schizoaffective, psychotic, bipolar, major depression, obsessive-compulsive, severe mental, OT and intervention.

Study selection The study screening was peer-reviewed. Inclusion criteria were: (1) OT intervention studies in SMI: experimental, randomised, non-randomised and pilot/exploratory studies; (2) adult population with SMI: schizophrenia, schizotypal personality disorder, delusional disorder, obsessive-compulsive disorder, schizoaffective disorder, psychotic disorder, bipolar disorder, major depressive disorder; (3) OT identified as a discipline involved in the intervention; (4) English or Spanish language and (5) studies with full text available.

Results Thirty-five studies met the inclusion criteria. OT interventions were classified in psychosocial, psychoeducational, cognitive and exercise interventions. The most used OT intervention was psychosocial intervention.

Conclusion Psychosocial intervention was the most investigated OT intervention in SMI, followed by psychoeducational, cognitive and exercise interventions. These interventions are usually group interventions in patients with schizophrenia, performed by a multidisciplinary team (in which an occupational therapist collaborates), with 2–3 weekly 60 min sessions and a duration of 3–6 months.

INTRODUCTION

Mental disorders represent a major issue, constituting the most frequent cause of disease burden in Europe.¹ In Spain, it is estimated that at least 9% of the population is

Strengths and limitations of this study

- There is little evidence regarding occupational therapy intervention in severe mental illness.
- We gave a detailed description of four types of occupational therapy intervention in severe mental illness.
- We conducted a peer-reviewed database search to ensure comprehensiveness.
- We did not assess the quality of the studies included.
- We did not include studies on addiction, anxiety or eating disorders.

affected by a mental disorder, apart from those caused by substance abuse; and slightly more than 15% will suffer from one throughout their lives.² Severe mental illnesses (SMIs) are the most limiting mental disorders, and those with these conditions, according to the National Institute of Mental Health of the USA, are defined as 'a group of heterogeneous people, who suffer from serious psychiatric disorders that present with long-lasting mental disorders, which carry a variable degree of disability and social dysfunction, and which must be cared for through various social and health resources of the psychiatric and social care network'.³

The disorders that are included in SMI are schizophrenia, schizotypal personality disorder, delusional disorder, schizoaffective disorder, psychotic disorder, bipolar disorder, major depressive disorder and obsessive-compulsive disorder.⁴ Among the most frequent limitations that people with SMI experience is a lower participation in healthy activity patterns, including active and significant participation in the community, unemployment, self-care and sleep disturbances.^{5 6}

Treatment for people with SMI requires, therefore, the integration of different levels of care and different interventions that include, in addition to pharmacological treatment, rehabilitation and social support

programmes that allow them to participate in the community in a more independent and integrated way.⁷ One of these non-pharmacological interventions is occupational therapy (OT), which can support recovery as a significant treatment component of these patients through meaningful activities, influencing aspects such as autonomy in activities of daily living (ADL), quality of life and personal well-being.^{8–10} In fact, a recent scoping review showed that different factors such as employment, may influence the recovery process of people with SMI.¹¹ OT through vocational rehabilitation such as supported employment intervention could improve SMI patients' social functioning and hospitalisation, although not all SMI patients are motivated to work.¹²

Although scientific evidence regarding the OT interventions in patients with SMI is scarce, some studies suggest that these interventions have a beneficial effect. Arbesman and Logsdon¹³ carried out a systematic review in which they described a greater involvement in education and employment of people with SMI who were intervened with OT focused on social participation. Similarly, Conn *et al*¹⁴ showed OT to be a key intervention for weight loss in people with SMI, improving their motivation and helping them to acquire healthy lifestyles.

Currently, SMI constitute a significant health problem that imposes daily limitations on those who suffer from them. In the field of OT, although there are various interventions to increase the autonomy of people with SMI and decrease their everyday restrictions, these interventions are very diverse and supported by little scientific evidence. In this sense, this scoping review is necessary to provide a detailed summary of the different OT interventions in SMI to facilitate the elaboration of evidence-based intervention programmes. Thus, we seek to answer the following research question: Which OT interventions in adults with SMI have been most investigated in intervention studies and how they are? The objective of this review was to identify the OT interventions in adults with SMI most investigated in intervention studies and to describe their characteristics.

METHODOLOGY

We performed a peer scoping review whose content was reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines for Scoping Reviews.¹⁵ In addition, it was conducted following the indications of the Cochrane Manual¹⁶ and previously developed guidelines.^{17 18} Specifically, we used the Cochrane Manual to elaborate the results section and the main tables of this scoping review. We consulted the '3.4.1 Description of studies' section of chapter 3 to know how to present the main characteristics of the included studies, and the '3.4.3 Effects of interventions' section of chapter 3 to know how to present the characteristics of the OT interventions in SMI described in the included studies, adequately. As the Cochrane Manual recommendations are specific to systematic reviews, we contrasted

these recommendations with those indicated in other specific scoping reviews guidelines/frameworks.^{17 18} We did not prepare a draft or publish a protocol for this scoping review.

Search strategy and review criteria

On 17 January 2020, we consulted the databases MEDLINE (PubMed), Scopus, Web of Science and EMBASE. These databases are widely used in review studies and the majority of them are included in the optimal database combination search¹⁹ which guarantee an adequate and efficient coverage of the scientific literature. This was supplemented by manual searching of journals indexed in the first quartile of OT according to the SCImago Journal Rank in 2018: *American Journal of Occupational Therapy*, *Journal of Occupational Rehabilitation* and *Occupational Therapy Journal of Research*. We excluded the *Journal of Physical and Occupational Therapy in Pediatrics* (POTP) as it belongs to the paediatric community, a criterion for exclusion from this review. In addition, grey literature was hand searched in TESEO which is a Spanish doctoral thesis database. We used the same search strategy in all databases and journals consulted, using all the disorders included in SMI, 'OT', and 'intervention' as search terms, with Boolean operators 'OR' and 'AND' (table 1).

In order to update and complement our search process, we consulted the Psychology Database from ProQuest on 10 March 2021. This database provides abstracts and articles from key Psychology journals, many of which are indexed in PsycINFO. In addition, we reran our search strategy in all databases and journals to identify articles published from January 2020 to March 2021.

The inclusion criteria in this review were: (1) OT intervention studies in SMI: experimental, randomised, non-randomised and pilot/exploratory studies; (2) adult population with SMI: schizophrenia, schizotypal personality disorder, delusional disorder, obsessive-compulsive disorder, schizoaffective disorder, psychotic disorder, bipolar disorder, major depressive disorder; (3) OT identified as a discipline involved in the intervention; (4) English or Spanish language and (5) studies with full text available. Those studies that did not meet the established inclusion criteria were excluded.

Study selection, data extraction and synthesis

We downloaded all titles and abstracts retrieved from all searches using Microsoft Excel. Two reviewers screened and selected the articles independently. One of them (MR-M) identified and removed duplicate records, and then two review authors (L-MC-G and MR-M) independently examined titles and abstracts and removed any irrelevant papers. Finally, L-MC-G and MR-M examined the full texts for study compliance with review eligibility criteria. A third review author (MGdIH) resolved discrepancies between these authors regarding study inclusion. We did not critically assess the quality of the included studies because it is not required in scoping review.^{15 17 18}

Table 1 Database and search strategies

Database	Search strategy (17-01-2020)
PubMed	("schizophrenia"[MeSH Terms] OR "schizophrenia"[All Fields] OR "schizophrenias"[All Fields] OR "schizophrenia s"[All Fields] OR "schizotypal personality"[All Fields] OR ("delusional"[All Fields] OR "delusionality"[All Fields] OR "delusionally"[All Fields] OR "delusionals"[All Fields]) OR ("schizoaffective"[All Fields] OR "schizoaffectives"[All Fields]) OR ("psychotic"[All Fields] OR "psychotically"[All Fields] OR "psychotics"[All Fields]) OR ("bipolar"[All Fields] OR "bipolarity"[All Fields] OR "bipolarization"[All Fields] OR "bipolars"[All Fields]) OR "major depressive"[All Fields] OR "obsessive-compulsive"[All Fields] OR "severe mental"[All Fields]) AND "occupational therapy"[All Fields] AND ("intervention s"[All Fields] OR "interventions"[All Fields] OR "interventive"[All Fields] OR "methods"[MeSH Terms] OR "methods"[All Fields] OR "intervention"[All Fields] OR "interventional"[All Fields])
Scopus	TITLE-ABS-KEY ((schizophrenia OR "schizotypal personality" OR delusional OR schizoaffective OR psychotic OR bipolar OR "major depressive" OR "obsessive-compulsive" OR "severe mental") AND "occupational therapy" AND intervention)
Web of Science	((schizophrenia OR "schizotypal personality" OR delusional OR schizoaffective OR psychotic OR bipolar OR "major depressive" OR "obsessive-compulsive" OR "severe mental") AND "occupational therapy" AND intervention)
EMBASE	('schizophrenia'/exp OR schizophrenia OR 'schizotypal personality'/exp OR 'schizotypal personality' OR delusional OR schizoaffective OR 'psychotic'/exp OR psychotic OR bipolar OR 'major depressive' OR 'obsessive-compulsive' OR 'severe mental') AND ('occupational therapy'/exp OR 'occupational therapy') AND ('intervention'/exp OR intervention)
Teseo	Esquizofrenia OR "personalidad esquizotípica" OR delirante OR esquizoafectivo OR psicótico OR bipolar OR "depresión mayor" OR "obsesivo-compulsivo" OR "mental severo") AND "terapia ocupacional" AND intervención
AJOT	(schizophrenia OR "schizotypal personality" OR delusional OR schizoaffective OR psychotic OR bipolar OR "major depressive" OR "obsessive-compulsive" OR "severe mental") AND "occupational therapy" AND intervention
JOR	'(schizophrenia OR "schizotypal personality" OR delusional OR schizoaffective OR psychotic OR bipolar OR "major depressive" OR "obsessive-compulsive" OR "severe mental") AND "occupational therapy" AND intervention'
OTJR	[[All schizophrenia] OR[All "schizotypal personality"]OR [All delusional] OR [All schizoaffective] OR [All psychotic] OR [All bipolar] OR[All "major depressive"]OR[All "obsessive-compulsive"]OR[All "severe mental"]] AND[All "occupational therapy"]AND [All intervention]
ProQuest	Search strategy (10-03-2021)
Psychology Database	((schizophrenia OR "schizotypal personality" OR delusional OR schizoaffective OR psychotic OR bipolar OR "major depressive" OR "obsessive-compulsive" OR "severe mental") AND "occupational therapy" AND intervention) AND (bdl(1007106))

AJOT, American Journal of Occupational Therapy; JOR, Journal of Occupational Rehabilitation; OTJR, Occupational Therapy Journal of Research.

and also because our objective was not to evaluate the efficacy or effectiveness of the OT interventions in SMI. However, the main limitations found in each included study are described in online supplemental table 1 and discussed in the results section.

A data charting model and item definitions were drafted a priori by all authors. We used Microsoft Excel to create an 'Excel data form'. We conducted data extraction independently using the Excel data form and presented the characteristics of included studies following the Cochrane Manual,¹⁶ detailing author/s and year of publication, type of study, sample, OT interventions carried out, results and limitations.

We carried out a descriptive synthesis of the results. Tables and figures were used (where possible) to present the flow of study selection process and the characteristics

of the included studies. In addition, as a multidisciplinary research team, we discussed the categories to classify the different types of OT interventions in SMI that are used in the included studies.

Patient and public involvement

No patients or public were involved in this review.

RESULTS

The initial search retrieved 1217 published articles on OT intervention in SMI, which resulted in 790 after removing duplicate articles. Fifty-four studies met the inclusion criteria in abstract peer review and went on to full-text review. In this initial search, we extracted data from 12 articles which fulfilled the inclusion criteria for this

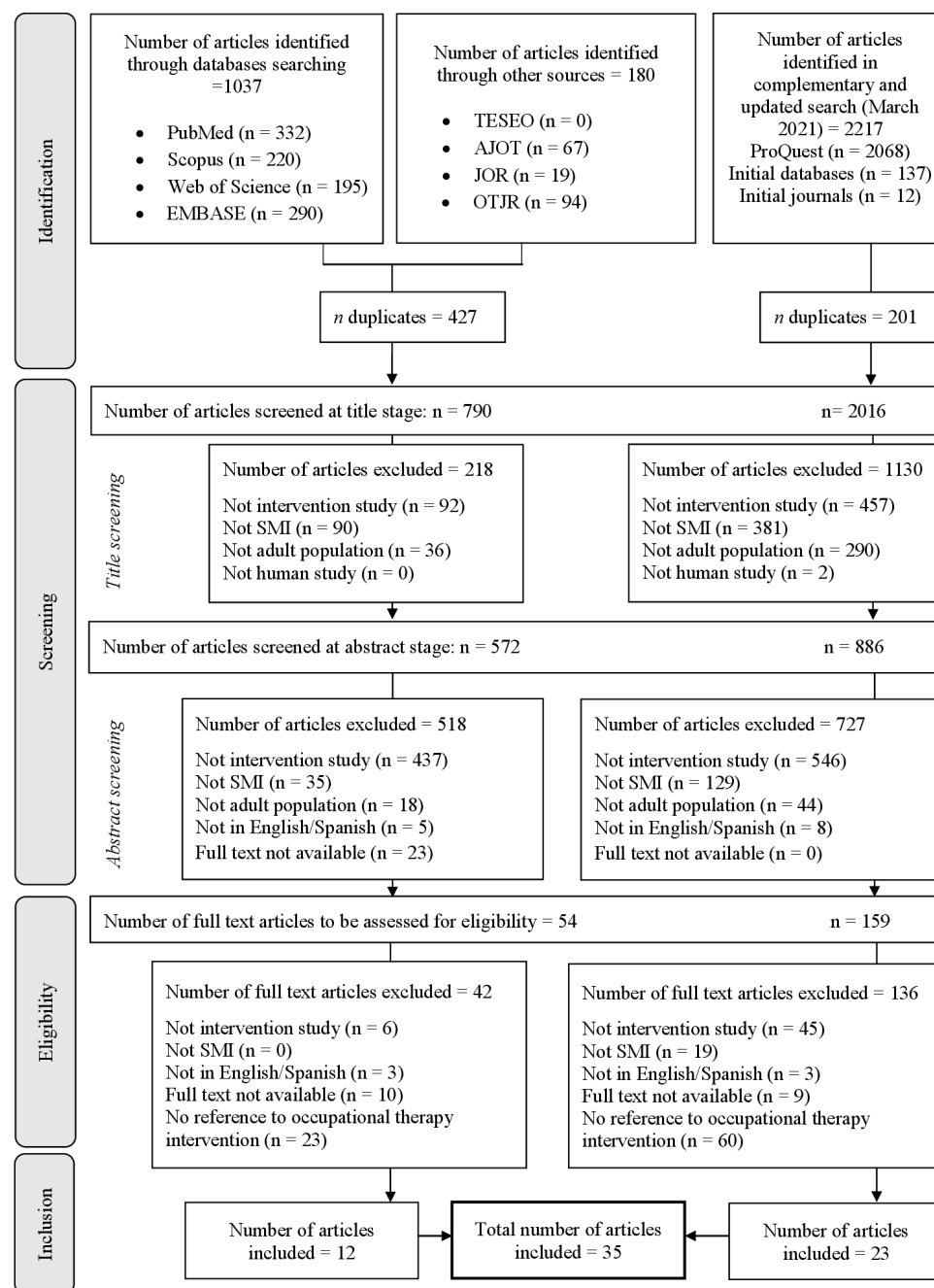


Figure 1 Flowchart of the study selection process. AJOT, American Journal of Occupational Therapy; JOR, Journal of Occupational Rehabilitation; OTJR, Occupational Therapy Journal of Research.

scoping review. The complementary search on ProQuest retrieved 2068 published articles and the updated search on initial databases and journals retrieved 149 published articles, 23 of which fulfilled the inclusion criteria. In total, we extracted data from 35 published articles on OT intervention in SMI. The study selection flowchart is shown in [figure 1](#).

Below we present the results regarding the characteristics of the studies included in this scoping review (online supplemental table 1) in addition to the characteristics of the OT interventions in SMI studied in the included articles (online supplemental table 2).

Main characteristics of included studies

The main characteristics of included studies are summarised in online supplemental table 1. Fifteen of the studies were carried out in Asia, 11 in Europe, 6 in North America, 1 in South America, 1 in Oceania and 1 in South Africa. Fifteen of the articles included are randomised controlled trials,^{20–34} 10 are quasi-experimental studies,^{35–44} 5 are a non-randomised experimental study^{45–49} and 5 are pilot studies.^{50–54}

OT interventions in SMI

We present below the specific characteristics of the OT interventions in SMI to answer our research question in

detail. The specific characteristics of included studies, such as the type of intervention, the duration of the intervention, the number of sessions performed or the measurement instruments used, are shown in online supplemental table 2.

First, we explored if the investigators used the same type of intervention in both the control and intervention groups (online supplemental table 2). In most studies (n=18), standard OT intervention or pharmacological treatment was performed in both the control and intervention groups.^{20 23 24 26–28 30 32 33 40 42 44 47 48 50–53} However, in the intervention group, treatment was reinforced by specific OT interventions in SMI, including: a home-based rehabilitation programme,²⁰ a social cognition enhancement programme,²³ an OT programme focused on work reintegration,²⁴ a collaborative journal,²⁶ a computerised cognitive programme,²⁷ an emotion regulation skills programme,²⁸ a group programme for balance in ADL,³⁰ individualised OT,³² dance therapy,³³ training in shopping skills,⁴⁰ activity-based OT,⁴² OT narrative medicine,⁴⁴ weight loss psychiatric rehabilitation,⁴⁷ metacognitive training,⁴⁸ a prevocational programme,⁵⁰ a programme to reconnect patients with a significant activity,⁵¹ an OT programme focused on expressive activities⁵² and an early OT intervention.⁵³

In the remaining studies, both the control and intervention groups participated in a different programme (n=10),^{21 25 29 31 34 36 38 41 46 54} all participants received the same intervention (n=4)^{37 39 40 43} or participants were divided in three different study groups (n=3) (online supplemental table 2).^{22 45 49} In studies with both the control and intervention groups we found interventions such as an instrumental enrichment programme versus standard OT,²¹ a programme focused on the management of the disease versus traditional OT,²⁵ a physical exercise programme versus traditional OT,²⁹ a metacognitive programme versus traditional OT,³¹ a home-visit OT programme versus a management tool for daily life performance programme,³⁴ a recovery education programme versus traditional mental health treatment,³⁶ an aerobic dance programme versus a manual activities programme,³⁸ a balancing everyday life programme versus traditional OT,⁴¹ a motivational intervention versus traditional OT⁴⁶ and a programme focused on executive functions versus a programme based on handmade activities.⁵⁴ In the included studies with a unique study group in which all participants were treated, we found interventions such as indoor and outdoor exercise programme,³⁷ a 'therapeutic package',³⁹ care as usual and cognitive-behavioural therapy⁴⁰ and a psychoeducation for schizophrenia programme.⁴³ Finally, three studies included three study groups to compare two different interventions with a control group: cognitive remediation therapy versus intensive OT versus healthy patients,²² project activity group versus discussion group versus no treatment,⁴⁵ and OT at the community mental health centre (CMHC) versus OT at

CMHC+psychosocial skill training versus outpatient follow-up.⁴⁹

Second, we analysed what type of SMI was treated in each study and which was the role of the occupational therapist in the intervention team (online supplemental table 2). Schizophrenia was the most frequent object of study among the selected studies (n=25),^{20–23 25 27 31–36 38 40 43 46 48–54} followed by schizoaffective disorder (n=10),^{23 25 27 31 32 34 45 50 51 53} major depression (n=6),^{24 28 29 34 36 42} a broad spectrum of disorders or non-specific SMI (n=5)^{30 37 41 44 47} and bipolar disorder (n=3).^{26 36 49} In all the articles included, an occupational therapist formed part of the professional team, mainly as part of a multidisciplinary team composed of psychologists, nurses, dieticians, physicians, sports therapists, psychiatrists, physiotherapists, informal caregivers, pharmacists or social workers (n=18),^{20 23 24 26–33 36 37 43 47 50 54} and secondarily alone (n=17).^{21 22 25 34 38–42 44–46 48 49 51–53}

Third, as we have shown in online supplemental table 2 and as described below, the articles analysed were classified into four clearly differentiated interventions, except one study.⁵³ In this study the intervention used was conventional OT in schizophrenia and schizoaffective disorder. This intervention was led exclusively by an occupational therapist, the programme lasted 12 weeks with 2–5 weekly 30-min sessions and it included exercise, craft and daily life skills activities.

We classified the included studies in the following four interventions:

Psychosocial intervention

Psychosocial intervention was the most used OT intervention in the included studies (n=14).^{20 26 30 32 34 40–42 45 46 49 50 52 54} In general, these interventions are performed exclusively by occupational therapists, but in five studies this intervention was performed by a multidisciplinary team made up of occupational therapists, psychologists, social workers, informal caregivers, psychiatrists or nurses.^{20 26 30 50 54} The main objectives of psychosocial intervention were to improve the symptoms of the disorders and occupational balance, as well as the social and work reintegration of patients with SMI. Among the different SMI treated with this intervention, psychosocial intervention was applied mainly in schizophrenia (n=8),^{20 34 40 45 46 49 52 55} schizoaffective disorder (n=4),^{32 34 45 50} bipolar disorder (n=2),^{26 49} in a broad spectrum of disorders (n=2)^{30 41} and major depressive disorder (n=2).^{25 34}

The intervention programmes lasted between 3 and 9 months, and the sessions were mainly between 60 and 90 min long, although in three articles^{40 42 45} the duration of the programme was notably shorter, lasting only 2 and 4 weeks. In turn, it should be noted that in three of the studies^{26 30 41} only 1 weekly session was applied, while the rest^{32 34 40 42 45 46 49 50 52 54} varied between 2 and 5 sessions per week. In one of the studies the number of session was not specify.²⁰ This intervention was generally

carried out in a group (n=8),^{26 30 40–42 45 50 55} only in six studies was it carried out individually.^{20 32 34 46 49 52}

Psychoeducational intervention

Psychoeducational intervention was the second most used intervention in the studies included in this review (n=9).^{24 25 27 35 36 39 43 44 51} Only in four studies, the intervention was performed exclusively by an occupational therapist.^{25 39 44 51} The main objectives of this intervention were to improve disease management, to increase social abilities such as non-verbal techniques, and for the patient to acquire a significant activity, such as reading. The principal disorder treated in these interventions was schizophrenia, although in three studies were schizoaffective disorder,^{25 51} in one major depression²⁴ and in one a broad spectrum of disorders.⁴⁴

The intervention programmes lasted between 3 and 9 months, and the sessions were mainly between 50 and 90 min long, although in one article the duration of the session was 120 min²⁴ and in other two articles the duration of the sessions was not specify.^{43 51} In two articles the duration of the programme was notably shorter, lasting only 2²⁵ and 4 weeks,⁴³ while in one article the duration of the programme was notably longer, lasting 12 months.³⁶ In four of the studies^{33 43 44 51} only 1 weekly session was applied, while the rest^{24 25 27 36 39} varied between 2 and 5 sessions per week. This intervention was generally carried out in a group (n=7),^{24 27 35 36 39 43 44} only in two studies was it carried out individually.^{25 51}

Cognitive intervention

Cognitive intervention was the third most used intervention in the studies included in this review (n=7).^{21–23 28 31 38 48} In four articles the intervention was carried out exclusively by an occupational therapist.^{21 22 38 48} The main objective of cognitive intervention was to improve cognitive functions and processing strategies. The principal disorder treated with these interventions was schizophrenia, although in one study was it major depression.²⁸

The duration of the intervention programmes was from 1 to 3 months, although in one of the studies the duration was 6 months.²³ The sessions lasted between 45–60 min, but in one study²⁶ they lasted for up to 2 hours, in other they lasted ninety minutes,²³ and in other the duration of the intervention programme was not specify.³¹ In general, in all the interventions, the sessions were carried out 2–5 times a week, except in one study³¹ where only 1 weekly session was applied. This intervention was generally carried out in a group (n=5),^{23 28 31 38 48} only in two studies was it carried out individually.^{21 22}

Exercise intervention

Less frequently, an exercise intervention was used (n=4).^{29 33 37 47} In all of these studies the intervention was carried out exclusively by a multidisciplinary team made up of occupational therapists, sport therapists, physicians, sport psychologists, psychiatrics or dieticians. The main objectives of exercise interventions were to compensate

cognitive impairment common in psychiatric disabilities, to increase the knowledge and understanding of rules and to strengthen participants' ability to work as part of a team. In two studies the SMI treated was not specify,^{37 47} in one schizophrenia was treated,³³ and in one major depression was treated.²⁹

The duration of the intervention programmes was 3 months,^{37 47} although in one of the studies the duration was 2 months,³³ and in another the duration was only 1 month.²⁹ The sessions lasted 30,²⁹ 40–50,³³ 60³⁷ and 120 min.⁴⁷ In general, the sessions were carried out 2–3 times a week, except in one study⁴⁷ where only 1 weekly session was applied. This intervention was carried out in a group in all four studies.^{29 33 37 47}

Finally, we explored the measurement instruments used to assess the effect of the interventions performed in each study to facilitate the elaboration of evidence-based intervention programmes. As we have shown in online supplemental table 2, different questionnaires and scales were used. Among the included studies, the use of measuring instruments on the symptoms of the disease, mood and executive functions stands out.

Symptoms of the disease

Ten studies used Positive and Negative Symptoms Scale (PANSS) to assess the symptoms of the disease,^{27 28 31–33 43 48–50 54} one used Andreasen's scale for assessment of negative symptoms and Andreasen's scale for assessment of positive symptoms,⁵² and one used The Young Mania Rating Scale to assess maniac symptoms.²⁶

Mood

To assess mood, that is, depression, authors used several measurement instruments and scales, such as the Montgomery Asberg Depression rating scale, the Calgary Depression Scale for Schizophrenia, the Brief Psychiatric Rating Scale, the Beck Depression Inventory or the Hamilton Depression Rating Scale.^{24 26–29 31 36 53}

Executive function

In addition, investigators used a variety of measurement instruments to assess executive functions, including the Trail Making Test Parts A and B, the Brief Assessment of Cognition in Schizophrenia, the Behavioural Assessment of the Dysexecutive Syndrome, the N-Back Task and the Executive Function Performance Test.^{20 22 32 38 40 50 54}

Other outcomes

To a lesser extent, other questionnaires were used to evaluate memory^{20–22 27 29 38 45 50} such as Wechsler Adult Intelligence Scale, the General Aptitude Test Battery, Rey Auditory Verbal Learning Test, the Rey's Complex Figure or Mini-mental state examination; psychosocial functioning^{21 30 32 34 39 49} such as the Global Assessment of Functioning, the Personal and Social Performance or the Social Functioning Scale and quality of life^{25 27 30 34 39 41 42} such as the 36-Item Short-Form Health Survey (SF-36) questionnaire, the General Health Questionnaire and the Manchester Short Assessment of Quality of Life.

Main results of included studies

We summarised the main results of OT interventions in SMI in online supplemental table 1. In general, intervention groups obtained better results than control groups in all the studies, although in five of the studies included both intervention and control groups presented better results after intervention.^{24 27 34 35 37 40 43} Authors showed that the interventions carried out in their studies resulted in significant improvements in aspects such as participation and social functioning (n=19),^{20 21 23–25 30 32–34 39 40 42 44–46 48 49 51 54} cognitive functioning (n=11),^{21 22 29 31 32 35 36 40 47 50 53} that is, executive function and memory; general symptoms (n=8)^{27–30 33 49 50 52} and well-being (n=5),^{28 36 37 43 47} although, in three studies, these improvements were no longer presented during follow-up.^{24 30 36} In fact, it should be noted that in only three of the included studies,^{26 38 41} the improvements found were not statistically significant.

Main limitations reported in included studies

All the studies reported limitations (online supplemental table 1). Most of the studies included in this review have a small sample size (n=22),^{20 22–25 29 31 33 37–40 44 45 47 49–54} have not evaluated the long-term effects of the intervention (n=11),^{20 24 32 33 35 39 42 45 49 51 53} are non-blinding studies (n=10),^{26 27 30 32 34 38 40 42 49 53} have results which are not generalisable (n=7),^{22 33 37 40 42 47 53} have a lack of randomisation (n=5)^{36 38 47 48 50} or they do not have a comparison group (n=6).^{33 35 37 39 43 50}

DISCUSSION

The present scoping review aimed to identify the most investigated OT interventions in adults with SMI in intervention studies and to describe their characteristics. We explored the scientific evidence available in this regard in several databases and journals, in which we found 35 articles with different types of interventions in which occupational therapists collaborated. We found four clear types of OT intervention in SMI: psychosocial, psychoeducational, cognitive and exercise interventions. The articles included in this review provide insight into the current characteristics of OT interventions in people with SMI and could provide occupational therapists with new ideas and perspectives for the implementation, development and evaluation of their interventions.

In this review, more than half (60%) of the selected articles were published in the last decade. These results may show that although recent evidence regarding OT interventions in a mental health setting is limited, there has been an increasing number of publications related to SMI over recent years. Moreover, the oldest articles included in this review are from the year 1999^{20 45} which appears to show that OT is not a relatively new healthcare discipline, but that scientific research in the field of OT has been carried out for several years. This research started very early, in fact The World Federation of Occupational Therapists meetings began in 1951,⁵⁵ and in some countries,

like Spain, the first health department including an OT service was set up in 1969.⁵⁶

In general, the included articles showed that OT intervention had beneficial results in several SMI patients' health outcomes such as cognition, social skills or mood. These positive results could be the consequence of publication bias or the consequence of the study limitations such as small sample size, lack of randomisation or non-blinded researchers, which could compromise their validity. However, the significance of the associations found in the included articles should not be influenced by these limitations. In fact, some reviews have pointed out the effectiveness of OT interventions in SMI aimed at facilitating work,¹³ community integration⁵⁷ or weight loss.⁵⁸ Moreover, OT has been identified as a non-pharmacological approach that can be an important adjunct to other psychiatric treatments.⁸

In this review, the most widely described OT intervention in SMI among the included studies was the psychosocial intervention followed by psychoeducational, cognitive and exercise intervention. One reason could be that psychosocial impairments should rather be seen as a consequence of chronic mental illness.⁵⁹ Their improvement and a patient's greater ability to participate socially are the central treatment goals. How well this can be achieved and through which intervention must be investigated in scientific studies. Another reason could be the fact that we only included those articles where occupational therapists were one of the professionals who performed the interventions in SMI. In this sense, OT is a discipline that rehabilitates the patient through the use of occupation and meaningful activities so that they can acquire the greatest level of autonomy and daily life functioning.⁶⁰ Thus, it is possible that occupational therapists use psychosocial and psychoeducational interventions more frequently than other professionals, since social limitations are not only one of the most relevant symptoms of SMI but are also closely related to an impairment in daily life functioning.⁶¹ Cognitive or exercise interventions, on the other hand, are probably performed more frequently by other professionals such as psychologist or physicians. In fact, in this review, the intervention was led exclusively by an occupational therapist in seventeen articles, nine of which were psychosocial interventions,^{32 34 40–42 45 46 49 52} and four psychoeducational interventions.^{25 39 44 51}

Psychosocial, psychoeducational, cognitive and exercise interventions were the main interventions that we found based on our search strategy and inclusion criteria. However, there are other interventions that can be used in SMI from OT such as vocational, individual placement and support (IPS) and place first then train interventions.^{62 63} These interventions are usually aimed at helping people with SMI to find and maintain competitive employment as well as promote recovery and overcome barriers to participation in their jobs.^{62 64} An explanation for the non-inclusion of these types of interventions may be the fact that we only included those articles in which the occupational therapist was involved in the intervention

and this was clearly specified. It would be interesting to conduct more review studies that specifically address this type of interventions.

Based on the synthesis of information on the characteristics of the interventions carried out in the articles included, we could say that a 'typical' OT programme intervention in SMI can include the following characteristics: group intervention in patients with schizophrenia, performed by a multidisciplinary team (in which an occupational therapist collaborates), with 2–3 weekly 60 min sessions, and a duration of between 3 and 6 months. None of the articles contained an explanation as to why they chose these characteristics for their intervention programmes, but most of the articles mentioned that the interventions were carried out in private mental health centres, so these characteristics may be influenced by the regulations/policy of each centre. SMI symptomatology, that is, social difficulties, represents another possible factor that may influence the characteristics of the interventions; carrying out a group intervention could favour the patient's opportunities for peer contact and emotional, practical and peer support, within a safe environment for them.⁶⁵

In general, regardless of the type of intervention performed in each study, the results of the articles included in this review showed positive effects of OT interventions. Psychosocial interventions resulted in improvements in the symptoms, occupational balance and sociooccupational reintegration of the patients. Other studies supported these improvements, especially of psychosocial interventions based on activity and lifestyle, and those focused on vocational and occupational rehabilitation.^{66–68} Psychoeducational intervention showed favourable results in these people's self-perceived health and social participation. Similarly showed Doroud *et al*⁶⁹ and Petersen *et al*,⁷⁰ who pointed out that participating in meaningful activities is experienced as a break from the discomfort caused by symptoms and as a means to rediscover forgotten resources and reconnect with daily life. Cognitive interventions led to improvements in memory and executive functions and consequently in SMI patients' functionality and participation. These results are in line with those found by Wykes *et al*⁷¹ which showed that an intervention based on cognitive remediation could reduce cognitive deficits, achieving a short-term impact on social functioning. Exercise interventions improved well-being, alertness and depression symptoms. Similar results were found in recent published studies^{72–74} and additionally, was found a relationship between exercise interventions and healthy lifestyles acquisition.⁷⁴

The measurement instruments used in the included articles to assess these outcomes varied widely between studies. Therefore, providing a synthesis of the information regarding this characteristic of the OT intervention in SMI was practically impossible for us. In general terms, PANSS was the most widely used scale among the included studies. This is consistent with the rest of the results of this scoping review if we consider that it is a

specific instrument widely used to assess the presence of symptoms in schizophrenia,⁷⁵ which is this the most studied type of SMI in this scoping review. Moreover, this was not the only test used to assess the illness symptoms, which were the main health outcome assessed among the included studies. Considering that psychosocial intervention was the most used intervention, we expected to find social skills as the second main health result assessed in the included studies but, instead, it was mood, that is to say, depression, followed by executive. Interestingly, mood assessment was generally performed on articles retrieved from the ProQuest psychology database (information not shown). We found that mood was one of the most studied outcomes in the included studies, and it may be partly explained by the fact that people with SMI often experience stigma which can produce consequences that can be related to low mood, such as burden, feelings of embarrassment or shame and poor quality of life.⁷⁶ In addition, people with SMI often present other chronic conditions that coexist with the SMI,⁷⁷ which can also be related to mood impairment.

We highlight the implications of this review for the practice of OT and similar professionals. This scoping review provides occupational therapists with tools that facilitate the development of OT intervention sessions in SMI by knowing in advance some characteristics of these four types of intervention: psychosocial, psychoeducational, cognitive and exercise. Somehow, this updated summary of the scientific evidence that exists on SMI interventions could be useful for occupational therapists to perform evidence-based OT, although the information presented in this review should be interpreted with caution because we did not assess the quality of the included studies.

Strengths and limitations

This scoping review presents some limitations that may influence the results obtained. Although a systematic peer review was used to ensure scientific rigour, the lack of completeness of the information reported, the publication bias limiting null results intervention and selection bias are limitations for the majority of reviews. Regarding the inclusion criteria, we only included those studies published in Spanish or English and with full text available, we may, therefore, not have included significant articles because they were published in another language, this may be a potential source of bias. In addition, it was difficult to establish the search strategy because the disorders included in SMI spectrum were not clearly defined in published articles. Thus, we decided to use the WHO definition of SMI, which includes schizophrenia and related conditions, bipolar disorder and moderate and severe depression.⁷⁸ This could lead to the non-inclusion of other relevant articles whose study population was other mental illnesses that could also be serious such as anxiety, addiction, personality disorders or eating disorders. Moreover, we only included in this review those articles where occupational therapists were one of the professionals who performed the interventions in SMI. Thus,

we may not have included some articles in which occupational therapist was involved in the intervention but this was not clearly specified in the study, which favoured the selection bias. In this sense, we have not included studies in which IPS, vocational or first place then train interventions were used, which may lead to an incomplete overview of current OT interventions in SMI. Regarding the studies included in this review, it is possible that they contained biases associated with the experimental study design, which was the only type of study included in this review. In addition, we did not assess the quality of the final selected articles, so we could have included some articles with low methodological quality. However, we collected and presented the main limitations reported in included studies in an attempt to provide readers with information closely related the quality of the studies. Furthermore, not all the articles included measure the same variables or use the same measurement instruments. Although our objective was not to statistically analyse the numerical results, the great variety of measurement instruments used made difficult to compare the results between studies and to draw conclusions. Thus, the results of this scoping review must be interpreted with caution.

However, this review also has several strengths. This is a necessary and original review, because to our knowledge, there is no other review whose aim was to describe the OT interventions which are most often used in intervention studies. In addition, scoping reviews stands out for their ability to identify knowledge gaps on the subject of study, which provides opportunity for future research. This review highlights the following knowledge gaps: (1) to our knowledge, there are no OT intervention studies in SMI in Spain; (2) most of the studies had limitations that could compromise the validity of their results, such as: small sample size and lack of randomisation, (3) most of the included studies are supported by little evidence of the effects of long-term interventions; (4) there is a wide variety of measurement instruments that differ between studies and (5) there is a low representation of IPS, vocational and place first then train interventions studies in which the role of the occupational therapist was clearly specified. The results of this scoping review may provide a useful theoretical basis on which to develop new OT interventions in SMI. Especially for researchers developing interventions based on The Medical Research Council (MRC) Framework,⁷⁹ who can use the results presented in this review to complete the first stage of this framework: 'Developing complex intervention', specifically the stage 1.1 'Identifying evidence base by reviewing published literature and existing systematic reviews'. However, it would be necessary to supplement this information with the results of some systematic reviews, as indicated by the recommendations of the MRC framework.

In conclusion, the most investigated OT interventions in SMI were psychosocial, psychoeducational, cognitive and exercise interventions. These interventions are usually group interventions in patients with schizophrenia, performed by a multidisciplinary team (in which

an occupational therapist collaborates), with 2–3 weekly 60 min sessions, and a duration of between 3 and 6 months. Moreover, although there are different interventions and each one covers different aspects, they all have a common objective: to reduce, through occupation, the limitations that SMI cause in patients, thus improving their quality of life. Although previous studies have shown beneficial effects of the interventions described in this review, further research is required to clearly define parameters such as optimal dose and frequency of sessions, and to understand the long-term effects of the interventions. In the case of the MRC framework, further studies are needed to continue with the stage 2 'Assessing feasibility and piloting methods'.

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Supplementary table 1. Characteristics of the studies included in this scoping review.

Author., year	Design	Sample (n), country	Intervention/ Evaluation	Main results ^a	Limitations
Schindler et al. [45], 1999	nRCT	36, United States Loss to follow up (n=11)	Psychosocial intervention/ Pre- and post- evaluation	Significant improvement in scores of patients in the activity IG (p=0.002) vs the discussion IG and CG. Participants in CG showed a non-significant decline in social interaction.	Small sample size, short duration of the study, differing numbers of participants within the groups.
Shellwood et al. [20], 1999	RCT	75, UK Loss to follow up (n=10)	Psychosocial intervention/ Pre- and post- evaluation	Decrease in socially embarrassing behavior in IG vs CG (p=0.03) Improve in interpersonal functioning and recreational activities in IG vs CG (p<0.01) Decrease in suspiciousness in IG vs CG (p=0.016)	Small sample size, short follow-up period, patients without family support suffered persistent symptoms that made intervention difficult.
Hadas-Lidor et al. [21], 2001	RCT	72, Israel Loss to follow up (n=14)	Cognitive intervention/ Pre-, post- and 6-month evaluation	Higher memory indices (p<0.001), thought indices (p<0.001), work status (p<0.001), and residence status (p<0.05) in IG vs CG.	Self-reported questionnaires for instrumental ADLs and self-concept.
Wu et al. [46], 2001	nRCT	116, Taiwan Loss to follow up (n=17)	Psychosocial intervention/ Pre- and post- evaluation	There was a marginal significant improvement in the main effect of the IG (p=0.056) vs CG, as well as in the interaction between the IG and the motivation types (p=0.081).	Limitations in the psychometric properties of the instruments used, decreased internal validity of the study due to participant dropouts.
Wykes et al. [22], 2002	RCT	18, UK Loss to follow up (n=0)	Cognitive intervention/ Pre- and post- evaluation	Functional magnetic resonance indicates that cognitive remediation therapy in IG had significantly increased brain activation in regions associated with working memory (p=0.026) vs CG.	Small sample size, only male participants, highly disabled participants, study results are not generalizable.
Brown et al. [47], 2006	nRCT	59, United States	Exercise intervention/ Pre- and post- evaluation	Improve on behavioral measures in IG vs CG (p=0.05). Increase in weight loss (2.7 kg/6 lbs) in IG vs increase in weight gain (0.5 kg/lb) in CG.	Small sample size, non-randomized study, study results not generalizable.

		Loss to follow up (n=23)			
Choi et al. [23], 2006	RCT	34, Korea Loss to follow up (n=16)	Cognitive intervention/ Pre- and post- evaluation	Increase in social behavior in IG vs CG (p<0.05).	Small sample size, high dropout rate in initial participants, heterogeneous sample
McInnis et al. [35], 2006	Quasi	15, UK Loss to follow up (n=1)	Psychoeducational intervention/ Pre- and post- evaluation	Increase in insight in all participants after the intervention (p=0.048).	Small sample size, no follow-up data was collected, no comparison with a control group.
Schene et al. [24], 2006	RCT	62, Netherlands Loss to follow up (n=14)	Psychoeducational intervention/ Pre-, post-, 3- 6- and 12-month evaluation and 42-month follow up	The intervention did not improve depression outcome. Significant increase for work resumption in both groups in months 0–18 (p=0.001) but non-significant for months 19–42 (p=0.387).	Small sample size, limited amount of follow-up data, limited contact between TAU and OT staff.
Chan et al. [25], 2007	RCT	81, China Loss to follow up (n=0)	Psychoeducational intervention/ Pre-, post- and 12-month evaluation	Increase in perceived health in IG vs CG: perception (p=0.033), physical health component (p=0.004) and mental health component (p<0.0001). Lower hospital readmission rate in IG vs CG, it was approximately 1.75 times greater for the CG.	Small sample size, sample was only composed of men.
Dunn et al. [36], 2008	Quasi	178, United States Loss to follow up (n=29)	Psychoeducational intervention/ Pre-, post- and 6-12-month evaluation	Significant improvement in the educational programs' engagement in IG (p=0.35) vs in CG at the 6-month assessment point, although it did not reach statistical significance (p=0.13) at the 12-month assessment point.	Lack of randomization, loss of individuals to follow-up, low course attendance.
Tetlie et al. [37], 2008	Quasi	15, Norway Loss to follow up (n=2)	Exercise intervention/ Pre- and post- evaluation	Increase in well-being and safety in all participants after the intervention (p value not shown)	Small sample size, heterogeneous sample, no comparison with a control group, study results not generalizable.

				Improve in resting heart rate and systolic blood pressure in all participants after the intervention (p value not shown)	
Rouleau et al. [50], 2009	Pilot-Q	26, Canada Loss to follow up (n=0)	Psychosocial intervention/ Pre-, post- and 3-month evaluation	Higher scores on visual attention (p=0.02), verbal learning (p=0.02) and integration to work (p=0.003) in IG vs CG. Lower negative (p=0.017) and general symptoms (p=0.018) in IG vs CG. Increase in the ability to store information (p=0.034) in CG vs IG.	Small sample size, absence of a comparison group at week 30, lack of randomization.
Castle et al. [26], 2010	RCT	84, Australia Loss to follow up (n=12)	Psychoeducational intervention/ Pre-, post-, 3- and 12-month evaluation	There were no significant between-group differences in depressive or maniac symptoms.	Non-blinding study, the questioned suitability of the MADRS for assessing bipolar depression.
Edgelow et al. [51], 2011	Pilot	24, Canada Loss to follow up (n=6)	Psychoeducational intervention/ Pre- and post- evaluation	Increase in the occupational balance in IG vs CG (p=0.05) by spending an average of 47 min more per day in activity.	Small sample size, decreased internal validity of the study due to differential dropout rates of the groups, inability to complete the follow-up measures.
Jahn et al. [27], 2011	RCT	122, Germany Loss to follow up (n=26)	Psychoeducational intervention/ Pre-, post-, 1- and 9-month evaluation	No significant differences were found between IG and CG. Symptom improvement in both groups after the intervention (p<0.001). Increase in mean knowledge of the illness in both groups after the intervention (p<0.001).	Non-blinding study, high dropout rate in initial participants.
Berking et al. [28], 2012	RCT	432, Germany Loss to follow up (n=57)	Cognitive intervention/ Pre- and post- evaluation	Significant time-group interaction in IG (p=0.03) vs CG. Significant time effects in all subscales' scores of the ERSQ (p<0.001) in IG vs CG, decreasing	Self-reported questionnaires, non-evaluation of quantitative data on the integrity and compliance with treatment protocols.

				depression symptoms and increasing well-being and emotion regulation skills.	
Foruzandeh et al. [52], 2012	Pilot	76, Iran Loss to follow up (n=16)	Psychosocial intervention/ Pre- and post- evaluation	Lower positive (p<0.001) and negative symptoms (p<0.001) in IG vs CG.	Small sample size.
Tanaka et al. [53], 2014	Pilot-Q	46, Japan Loss to follow up (n=7)	OT intervention/ Pre-, post- and 1-month evaluation	Increase in FIM cognitive (p=0.012) and total (p=0.016) scores in IG vs CG.	Small sample size, non-blinding study, short follow-up period, study conducted in a single hospital, study results not generalizable.
Ming-De et al. [38], 2016	Quasi	45, China Loss to follow up (n=9)	Cognitive intervention/ Pre- and post- evaluation	There were no significant between-group differences but the data showed medium effect sizes that favored the IG in regard to processing speed, memory and the executive function.	Small sample size, lack of randomization, non-blinding study.
Vizzotto et al. [54], 2016	Pilot	30, Brazil Loss to follow up (n=5)	Psychosocial intervention/ Pre- and post- evaluation	Higher scores on food preparation (p=0.002) and general autonomy (p=0.008) in IG vs CG.	Small sample size, low IQ levels of the subjects in the sample.
Buschert et al. [29], 2017	RCT	38, Germany Loss to follow up (n=8)	Exercise intervention/ Pre- and post- evaluation	Significant improvements of short-term memory (p=0.01) and alertness (p=0.02) in IG vs CG. Decrease of depressive symptoms in both groups (p=0.001)	Small sample size, low duration and intensity of both treatments, different group sizes.
Eklund et al. [30], 2017	RCT	226, Sweden Loss to follow up (n=46)	Psychosocial intervention/ Pre-, post- and 6-month follow-up evaluation	Increase in participation (p<0.001), activity level (p=0.03), activity balance (p<0.04), severity of symptoms (p<0.02) and the level of functioning (p<0.05) in IG vs CG.	Exact participation rate not calculated, non-blinding study, higher dropout rate in the IG.
Pos et al. [31], 2017	RCT	50, Netherlands Loss to follow up (n=7)	Cognitive intervention/ Pre-, post- evaluation	No significant differences were found between IG and CG. Negative affect showed a weaker association with paranoid ideation post-treatment in IG (p<0.001) vs CG.	Small sample size, results partly confined by baseline differences.

Kaizerman-Dinerman et al. [48], 2018	nRCT	94, Israel Loss to follow up (n=10)	Cognitive intervention/ Pre-, post- and 6-week follow-up evaluation	Increase in performance, participation and daily functions (p<0.001) in IG vs CG.	Non-randomized study, the IG received more therapy time, which may influence the validity of the study.
Shimada et al. [32], 2018	RCT	136, Japan Loss to follow up (n=7)	Psychosocial intervention/ Pre- and post- or 3 months following hospitalization evaluation	Increase in verbal memory (p<0.01), working memory (p=0.02), verbal fluency (p<0.01), attention (p<0.01), cognition (p<0.02), enjoyment (p<0.01), usefulness (p<0.01), perceived choice (p<0.01), intrinsic motivation (p<0.01), medication adherence (p<0.01) and in client satisfaction (p<0.01) in IG vs CG.	Non-blinding study, there was no evaluation of long-term effects during hospitalization and the number of OT sessions was not measured.
Singh et al. [39], 2018	Quasi	20, India Loss to follow up (n=0)	Psychoeducational intervention/ Pre- and post- evaluation	Increase in all subscales' scores of the self-prepared social skills checklist in all participants after intervention (p<0.0001) Increase in all subscales scores of Social-occupational functioning scale in all participants after intervention (p<0.0001)	Small sample size, short follow-up period, no comparison with a control group, only male participants.
Kim et al. [40], 2019	Quasi	20, Korea Loss to follow up (n=0)	Psychosocial intervention/ Pre- and post- evaluation	Higher scores on the executive functions test (p<0.001) and the instrumental ADL test (p<0.05) in IG vs CG.	Small sample size, non-blinding study, the study results are not generalizable.
Argentzell et al. [41], 2020	Quasi	226, Sweden Loss to follow up (n=46)	Psychosocial intervention/ Pre-, and post- evaluation	No significant improvement on recovery main effect and interaction was found between both groups.	Exact participation rate not calculated, decreased external validity, no clear cause and effect.
Gökcen et al. [33], 2020	RCT	36, Turkey Loss to follow up (n=4)	Exercise intervention/ Pre- and post- evaluation	Improve in negative symptoms and general psychopathology in IG vs CG (p<0.001) Increase in social functioning in IG vs CG (p=0.021)	Small sample size, no follow-up data was collected, absence of an active comparison group, the study results are not generalizable
Mashimo et al. [34], 2020	RCT	60, Japan Loss to follow up (n=0)	Psychosocial intervention/ Pre-, and post- evaluation	Increase in social functioning in both groups (p<0.001). Increase in social functioning in IG vs CG (p=0.019).	Non-blinding study, no psychiatric symptoms collected, short duration of the intervention.

Ramano et al. [42], 2020	Quasi	100, South Africa Loss to follow up (n=0)	Psychosocial intervention/ Pre- and post- evaluation	Increase in social interaction in both groups, being significant for the IG (p<0.004). 88% of the IG participants reported improvements in social functioning vs to 78% of the CG participants.	Non-blinding study, short duration of the program, no follow-up data was collected, the study results are not generalizable.
Shinozaki et al. [43], 2020	Quasi	117, Japan Loss to follow up (n=0)	Psychoeducational intervention/ Pre- and post- evaluation	Increase in subjective well-being in all participants after the intervention (p<0.001) Improvement in the attitude of patients towards the drugs used in their treatment (p = 0.002)	Absence of a comparison group, short duration of the program.
Yilmaz et al. [49], 2020	nRCT	100, Turkey Loss to follow up (n=36)	Psychosocial intervention/ Pre- and post- evaluation	Lower clinical symptoms in PSST IG vs CMHC IG (p=0.01) Increase in social functioning in IGs vs CG (p =0.01).	Small sample size, non-blinding study, short follow-up period.
Wasmuth et al. [44], 2021	Quasi	27, United States Loss to follow up (n=0)	Psychoeducational intervention/ Pre-, 6-week and post- evaluation	Increase in IG total OCAIRS scores (p<0.001). No significant differences between IG and CG were found.	Small sample size, OCAIRS only used in IG.

ADL: activities of daily living; CG: control group; IG: intervention group; IQ: Intellectual Quotient; nRCT: non-randomized controlled trial; Pilot: Pilot study of a RCT; Pilot-Q: Pilot study of a Quasi; Quasi: Quasi-experimental study; RCT: randomized controlled trial; vs: versus. ^aWe indicate results where there were statistically significant differences between IG vs CG at significance level of p<0.05.

Supplementary table 2. Characteristics of the interventions performed in the studies included in this scoping review.

Authors., year	SMI ^a	Intervention	Control Group (CG)/ Intervention Group (IG)	Duration (w)	Sessions ^b	Measurment instruments	Intervention manager
Schindler [45], 1999	Schizophrenia and major affective disorder	Psychosocial group intervention	CG: No treatment (board games and free time) GI1: Activity group, consisted of a project-level group (individuals working together on a shared task) GI2: Structured discussion group focused on eliciting social interaction (e.g., meaningful ways to spend time alone)	2	Three-weekly one-hour sessions	Halstead-Reitan, Rey Figure, PASAT, Selective Reminding Test, MSE	OT
Shellwood et al. [20], 1999	Schizophrenia	Psychosocial individual intervention	CG: Outpatient-based rehabilitation (care as usual). IG: Care as usual and home-based rehabilitation (problems of everyday living and symptom management)	36	Not stated	BPRS, MMSE, SBS, GHQ, The Lancashire Quality of Life	OT, psychologist, informal caregivers
Hadas-Lidor et al. [21], 2001	Schizophrenia	Cognitive individual intervention	CG: Traditional occupational therapy treatment individually and in groups: functional tasks and expressive activities. IG: Cognitive intervention by means of instrumental enrichment program.	52	Two- to three-weekly one-hour sessions	LPAD, RCF, IADL, RPM, TCSC-2, GATB	OT
Wu et al. [46], 2001	Schizophrenia and psychosis	Psychosocial individual intervention	CG: Standard occupational therapy treatment IG: Motivational intervention	12	Two-weekly one-hour sessions	GCOS, COTE	OT
Wykes et al. [22], 2002	Schizophrenia	Cognitive individual intervention	CG: healthy control participants IG1: Cognitive Remediation Therapy (CRT) based on cognitive flexibility, working memory and planning. IG2: Control therapy involving intensive OT activities (role play, making a life diary and relaxation)	12	Three- to four-weekly one-hour sessions	HSCT, COWFT, SNS, Visual, sentence, digit and dual span, n-back task, MRI	OT

Brown et al. [47], 2006	Non-specific SMI	Exercise group intervention	CG: weight loss program IG: weight loss program incorporating psychiatric rehabilitation (goal setting, social support and skills training)	12	One-weekly two-hour sessions	Digital scale, portable stadiometer, tape measurer, HPLP-II, multiple-pass 24-hour recall	OT, dietician, exercise psychologist
Choi et al. [23], 2006	Schizophrenia and schizoaffective disorder	Cognitive group intervention	CG: standard psychiatric rehabilitation IG: standard psychiatric rehabilitation and Social Cognition Enhancement Training (e.g. explain coherently the social situation depicted in a cartoon)	24	Two-weekly ninety-minute sessions	PA, SBST, ERT	OT, psychologist, nurse, social worker
McInnis et al. [33], 2006	Schizophrenia	Psychoeducational group intervention	All participants: usual care and cognitive behavioural therapy group program	16	One-weekly fifty-minute session	Insight scale, CFSE-II, medication compliance scale	OT, psychologist
Schene et al. [24], 2006	Major depression disorder	Psychoeducational group intervention	CG: Out-patient psychiatric treatment IG: Out-patient psychiatric treatment and occupational therapy	24	One- to two-weekly two-hour sessions	BDI, QOS, Study-specific work questionnaire	OT, psychiatrist
Chan et al. [25], 2007	Schizophrenia and schizoaffective disorder	Psychoeducational individual intervention	CG: Traditional ward occupational therapy program. IG: Transforming Relapse and Instilling Prosperity program.	52	Two-weekly fifty-minute sessions	SUMD, MOS SF-36	OT
Dunn et al. [36], 2008	Schizophrenia, major depression and bipolar disorder	Psychoeducational group intervention	CG: Standard mental health treatment IG: Recovery education program	48	Two- to three-weekly ninety-minute sessions	SCL-90, SF-36, Basis-32, Tennessee self-concept, PVRQ, RAQ	OT, physician, psychologist social worker

Tetlie et al. [37], 2008	Non-specific SMI	Exercise group intervention	All participants: two indoor and one outdoor weekly session including aquatics and swimming, conditioning activities, gymnastics, yoga and dance.	12	Three-weekly one-hour sessions	Visual analogue scales, Borg's Scale	OT, physician
Rouleau et al. [50], 2009	Schizophrenia and schizoaffective disorder	Psychosocial group intervention	CG: Pharmacological treatment. IG: Pharmacological treatment and pre-vocational rehabilitation program.	30	Six hours of session per week	PANSS, CPT, TMT A-B, WAIS, RAVLT, NCCEA, WCST	OT, nurse, psychologist
Castle et al. [26], 2010	Bipolar disorder	Psychosocial group intervention	CG: treatment as usual IG: treatment as usual and a knowledge and skills to everyday life situations program (collaborative therapy journal)	12	One-weekly ninety-minute sessions	MADRS, YMRS	OT, psychologist, psychiatrist, social worker
Edgelow et al. [51], 2011	Schizophrenia and schizoaffective disorder	Psychoeducational individual intervention	CG: Standard care, Assertive Community Treatment (ACT). IG: ACT and AOI (Action Over Inertia) Occupation-based intervention.	12	One-weekly sessions	24-hour daily time use recall, POES	OT
Jahn et al. [27], 2011	Schizophrenia	Psychoeducational group intervention	CG: routine occupational therapy and psychoeducation IG: CG intervention and computerized cognitive training (CCT)	36	Two-to four-weekly one-hour sessions	CGI-SCH, CDSS-G PANSS, WFB, GAF TMT A-B, WMS-R, MWCST	OT, psychologist
Berking et al. [28], 2012	Major depression disorder	Cognitive group intervention	GC: Routine cognitive behavioural therapy (CBT) IG: Cognitive behavioural therapy and emotion regulation skills training (CBT-ERT)	8	Five-weekly forty-five-minute sessions	BDI, HEALTH-49, PANSS, ERSQ	OT, physician, psychologist

Foruzandeh et al. [52], 2012	Schizophrenia	Psychosocial individual intervention	CG: Routine nursing care such as therapeutic communication and medication such as risperidone and biperiden. IG: Routine medication such as risperidone and biperiden and expressive, artistic, and recreational activities from OT.	26	Six-weekly three-hour sessions	SANS, SAPS	OT
Tanaka et al. [53], 2014	Schizophrenia or schizoaffective disorder	OT group intervention	CG: Group conventional OT IG: individual early OT intervention and conventional OT	12	Two- to five-weekly thirty-minute sessions	FIM, BPRS	OT
Ming-De et al. [38], 2016	Schizophrenia	Cognitive group intervention	CG: Coloring and handwriting activities. IG: Aerobic group dance program.	13	Three-weekly fifty- to sixty-minute sessions	SDMT, RAVLT, TMT A-B, VF, MMSE	OT
Vizzotto et al. [54], 2016	Schizophrenia	Psychosocial group intervention	CG: Craft activities. IG: Occupational Goal Intervention (OGI method).	15	Two-weekly ninety-minute sessions	PANSS, BADS, DAFS-BR, ILSS-BR, WAIS	OT, psychologists
Buschert et al. [29], 2017	Major depression disorder	Exercise group intervention	CG: Occupational therapy active treatment IG: Physical exercise program	4	Two- to three-weekly thirty-minute sessions	BDI, HAMD-7, WMS-R, physical fitness measures	OT, sports therapist
Eklund et al. [30], 2017	A broad spectrum of disorders ^c	Psychosocial group intervention	CG: Standard psychiatric treatment, active support, mainly standard occupational therapy (daily living skills, social skills or creative activities).	16	One-weekly sessions	POES, SDO-OB, Oval-pd, MANSA,	OT, nurse, social worker

			IG: Standard psychiatric treatment and a group activity-based lifestyle intervention (Balancing Everyday Life program). CG: Standard occupational therapy treatment IG: Metacognitive training program	8	(duration not stated)	MOS SF-36, GAF, RSE	
Pos et al. [31], 2017	Schizophrenia and schizoaffective disorder	Cognitive group intervention			One-weekly session (duration not stated)	PANSS, ESM, GPTS, BCIS	OT, psychiatric nurse
Kaizerman-Dinerman et al. [48], 2018	Schizophrenia	Cognitive group intervention	CG: Usual psychiatric rehabilitation services. IG: Usual psychiatric rehabilitation services and metacognitive group intervention based on processing strategies and self-monitoring skills	4	One-weekly two-hour sessions	BRIEF-A, WCPA, ACS, COPM, PANSS	OT
Shimada et al. [32], 2018	Schizophrenia and schizoaffective disorder	Psychosocial individual intervention	CG: An activity-oriented group treatment (GOT). program. It consists of physical fitness program, handicraft activities, cooking program; a group music program, a recreation program; and a group psychoeducation program. IG: Individualized occupational therapy (IOT) program. It consists of motivational interviewing, self-monitoring, individualized visits, handicraft activities, individualized psychoeducation, and discharge planning.	13	Three- to five-weekly one- to two-hour sessions	BACS-J, SCoRS-J, SFS-J, GAF, IMI-J, MMAS-8, PANSS, CSQ-8J.	OT, hospital staff
Singh et al. [39], 2018	Schizophrenia	Psychoeducational group intervention	All participants: "Therapeutic package" (psychoeducation, therapeutic alliance, social skills and life balance)	12	One- to two-weekly ninety-minute session	Self-prepared Motivational Analysis Checklist, SOFS, Self-prepared Social skills Checklist.	TO

Kim et al. [40], 2019	Schizophrenia	Psychosocial group intervention	CG: Conventional rehabilitation programs consisted of physical exercise, social skill training, and social-adaptation training. IG: Conventional rehabilitation and Grocery Shopping Improvement (GSSE) program.	4	Two-weekly fifty-minute sessions	EFPT-K, K-IADL, MoCA-K, GAF	OT
Argentzell et al. [41], 2020	A broad spectrum of disorders ^c	Psychosocial group intervention	CG: Standard occupational therapy IG: Balancing Everyday Life program (BEL)	16	One-weekly session (duration not stated)	POES, SDO-OB, QPR, GAF	OT
Gökçen et al. [33], 2020	Schizophrenia	Exercise group intervention	CG: Traditional outpatient care IG: Traditional outpatient care and Dance/movement therapy (DMT). The sessions included five phases: greeting/warm-up, mirroring, theme building, cool down and closing. Turkish folk/traditional instrumental music was preferred in the sessions.	8	Two-weekly forty- to fifty-minute sessions	PANSS, FROGS	OT, physiotherapists, psychiatrist.
Mashimo et al. [34], 2020	Schizophrenia, schizoaffective disorder and major depression	Psychosocial individual intervention	CG: Home-visit OT (craft work, exercise therapy, medication management, money management) IG: Management Tool for Daily Life Performance (MTDLP). This is a three-step program to achieve the collaborative goal for participants' desired daily life activity.	16	One- to two-weekly thirty- to sixty-minute sessions	GAF, SFS	OT
Ramano et al. [42], 2020	Major depressive disorder	Psychosocial group intervention	CG: A combination of activity-based groups (creativity and leisure activity groups) and discussion-based groups (stress management, social skills and interpersonal support). IG: CG activity program and a new activity-based occupational therapy intervention group program.	2	One-daily ninety-minute sessions	SIS, BaPFE-R, TOA	OT

Shinozaki et al. [43], 2020	Schizophrenia	Psychoeducational group intervention	All participants: Psychoeducation for Schizophrenia Program (4 session course: schizophrenia, drugs, stress, social resources)	4	One-weekly session (duration not stated)	SWNS-J, DAI-10, PANSS	OT, pharmacist, psychiatric social worker
Yilmaz et al. [49], 2020	Schizophrenia and bipolar disorder	Psychosocial individual intervention	CG: outpatient clinic follow-up. IG1: routine case management and occupational therapy at the Community Mental Health Center (CMHC) IG2: Psychosocial Skill Training (PSST) in addition to CMHC service.	18	One- to two-weekly one-hour sessions	PANSS, PSP, SFS	OT
Wasmuth et al. [44], 2021	A broad spectrum of disorders ^d	Psychoeducational group intervention	CG: Treatment as usual (TAU) without OT (medication management, group and individual psychotherapies, case management and skills interventions to assist with housing) IG: TAU and OT narrative medicine (performance of a personally meaningful occupation)	12	One-weekly one-hour session	OCAIRS, RAS	OT

ACS: Activity Card Sort; BACS-J: Brief Assessment of Cognition in Schizophrenia Japanese version; BADS: Behavioral Assessment of the Dysexecutive Syndrome; BaPFE-R: Bay Area Functional Performance Evaluation-Revised; BPRS: Brief Psychiatric Rating Scale; BRIEF-A: Behavior Rating Inventory of Executive Function; CG int: Control Group intervention; CGI-SCH: Clinical Global Impression Scale – Schizophrenia Version; CFSE-II: Culture free self-esteem inventory; CDSS-G: Calgary Depression Rating Scale for Schizophrenia; COPM: Canadian Occupational Performance Measure; COTE: Chinese Comprehensive Occupational Therapy Evaluation Scale; COWFT: Controlled Oral Word Fluency Test; CSQ-8J: Client Satisfaction Questionnaire-8 Japanese version; CPT: Continuous Performance Test; DAFS-BR: Direct Assessment of Functional Status-Revised Portuguese version; DAI-10: Drug Attitude Inventory-10; EFPT-K: Executive Function Performance Test Korean version; ERT: Emotion Recognition Test; FROGS: Functional Remission of General Schizophrenia; GAF: Global Assessment of Functioning scale; GAS: Global Assessment Scale; GATB: General Aptitude Test Battery; GCOS: Chinese General Causality Orientations Scale; GHQ: General Health Questionnaire; HPLP-II: Health-Promoting Lifestyle Profile II; HSCT: Hayling Sentence Completion Task; IADL: Instrumental activities of daily living questionnaire; IG int: Intervention Group intervention; ILSS-BR: Independent Living Skills Survey Portuguese version; IMI-J: Intrinsic Motivation Inventory Japanese version; K-IADL: Korean Instrumental Activities of Daily Living; LPAD: Learning Potential Assessment Device; MADRS: Montgomery–Asberg Depression Rating Scale; MANSA: Manchester Short Assessment of Quality of Life; MMAS-8: Morisky Medication Adherence Scale; MMSE: Mini-Mental State Examination; MSE: Mental Status Exam; MoCA-K: Montreal Cognitive Assessment Korean version; MOS SF-36: Medical Outcomes Study Short Form-36; MWCST: Modified Wisconsin Card Sorting Test; NCCEA: Neurosensory Center Comprehensive Examination for Aphasia; OCAIRS: Occupational

Circumstances Assessment Interview and Rating Scale; OT: Occupational Therapist; Oval-pd: Occupational Value with predefined items Swedish version; PA: Picture Arrangement; PANSS: Positive and Negative Syndrome Scale; POES: Profiles of Occupational Engagement among people with Severe mental illness; RAVLT: Rey Auditory Verbal Learning Test; RAS: Recovery Assessment Scale; RCF: Rey's Complex Figure; RPM: Raven Progressive Matrices; RSE: Rosenberg self-esteem scale; SANS: Andreasen's scale for assessment of negative symptoms; SAPS: Andreasen's scale for assessment of positive symptoms; SBS: Social Behaviour Scale; SBST: Social Behavior Sequencing Task; SCoRS-J: Schizophrenia Cognition Rating Scale Japanese version; SDMT: Symbol Digit Modalities Test Chinese version; SDO-OB: Satisfaction with daily occupations and occupational balance; SFS: Social Functioning Scale; SFS-J: Social Functioning Scale Japanese version; SIS: Social Interaction Scale; SNS: Stroop Neuropsychological Screening Test; SOFS: Social-occupational functioning scale; SUMD: Scale of Unawareness of Mental Disorder; SWNS-J :Subjective Well-Being Under Neuroleptic Drug Treatment Scale Short Form; TCSC-2: Fitts Self-Concept Scale, TMT A-B: Trail Making Test, Parts A and B; TOA: Task Oriented Assessment; VF: Verbal Fluency Test; w: weeks; WAIS: Wechsler Adult Intelligence Scale; WCPA: Weekly Calendar Planning Activity; WCST: Wisconsin Card Sorting Test; WFB: Knowledge of Illness Questionnaire; WMS-R: Wechsler Memory Scale – Revised; YMRS: Young Mania Rating Scale. ^aType of SMI intervened. ^bSession duration is reported where available. ^cAnxiety, bipolar disorder, depressive disorder, psychosis, attention deficit hyperactivity disorder. ^dSchizoaffective disorder, schizophrenia, bipolar II disorder, borderline personality disorder, major depressive disorder, traumatic brain injury, generalized anxiety disorder, cannabis use disorder, unspecified psychosis, narcissistic personality disorder, delusional disorder, attention deficit hyperactive disorder.