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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. In Spain, it is estimated that at least 9% of the population is affected by a mental disorder, apart from those caused by substance abuse; and slightly more than 15% will suffer from one throughout their lives. 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’.

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. 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.

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.

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.
programmes that allow them to participate in the community in a more independent and integrated way. 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. In fact, a recent scoping review showed that different factors such as employment, may influence the recovery process of people with SMI. 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.

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 Logsdon 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 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. In addition, it was conducted following the indications of the Cochrane Manual and previously developed guidelines. 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. 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 search 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 ran 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 reviews.
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, 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
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

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**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.
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. However, in the intervention group, treatment was reinforced by specific OT interventions in SMI, including: a home-based rehabilitation programme, a social cognition enhancement programme, an OT programme focused on work reintegration, a collaborative journal, a computerised cognitive programme, an emotion regulation skills programme, a group programme for balance in ADL, individualised OT, dance therapy, training in shopping skills, activity-based OT, OT narrative medicine, weight loss psychiatric rehabilitation, metacognitive training, a prevocational programme, a programme to reconnect patients with a significant activity, an OT programme focused on expressive activities, and an early OT intervention.

In the remaining studies, both the control and intervention groups participated in a different programme (n=10), all participants received the same intervention (n=4) or participants were divided in three different study groups (n=3) (online supplemental table 2). In studies with both the control and intervention groups, we found interventions such as an instrumental enrichment programme versus standard OT, a programme focused on the management of the disease versus traditional OT, a physical exercise programme versus traditional OT, a metacognitive programme versus traditional OT, a home-visit OT programme versus a management tool for daily life performance programme, a recovery education programme versus traditional mental health treatment, an aerobic dance programme versus a manual activities programme, a balancing everyday life programme versus traditional OT, a motivational intervention versus traditional OT, and a programme focused on executive functions versus a programme based on handmade activities. 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, a ‘therapeutic package’, care as usual and cognitive–behavioural therapy, and a psychoeducation for schizophrenia programme. 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, project activity group versus discussion group versus no treatment, and OT at the community mental health centre (CMHC) versus OT at CMHC+psychosocial skill training versus outpatient follow-up.

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 31–36 40 45 46 48–54 followed by schizoaffective disorder (n=10), 23 25 27 41 43 45 46 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). 20 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. 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 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 45 44 51 Only in four studies, the intervention was performed exclusively by an occupational therapist.23 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 4 weeks, while in one article the duration of the programme was notably longer, lasting 12 months.36 In four of the studies,23 43 44 51 only 1 weekly session was applied, while in the rest 24 25 27 35 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 it was 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,38 and in one major depression was treated.29

The duration of the intervention programmes was 3 months,37 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 manic 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 functioning21 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. Authors showed that the interventions carried out in their studies resulted in significant improvements in aspects such as participation and daily life functioning (n=19), cognitive functioning (n=11), that is, executive function memory; general symptoms (n=8) and well-being (n=5), although, in three studies, these improvements were no longer presented during follow-up. In fact, it should be noted that in only three of the included studies, 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), have not evaluated the long-term effects of the intervention (n=11), are non-blinding studies (n=10), have results which are not generalisable (n=7), and lack a randomisation (n=5) or they do not have a comparison group (n=6). 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, community integration or weight loss. Moreover, OT has been identified as a non-pharmaceutical approach that can be an important adjunct to other psychiatric treatments.

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, 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, and in some countries, like Spain, the first health department including an OT service was set up in 1969.

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, community integration or weight loss. Moreover, OT has been identified as a non-pharmaceutical approach that can be an important adjunct to other psychiatric treatments.

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. 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.

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. 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, and four psychoeducational interventions.

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. 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. 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.  

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. Psychoeducational intervention showed favourable results in these people’s self-perceived health and social participation. Similarly showed Doroud et al. and Petersen et al., 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., 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 and additionally, was found a relationship between exercise interventions and healthy lifestyles acquisition.  

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, 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. In addition, people with SMI often present other chronic conditions that coexist with the SMI, 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. 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 compromises 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, 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* | Limitations |
|---------------|--------|---------------------|--------------------------|---------------|-------------|
| Schindler et al. [45], 1999 | nRCT | 36, United States | 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 | 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 | 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 | 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 | 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. |
| Study                | Design | Location | Follow-up  | Intervention                  | Outcome                                                                                           | Limitations                                                                                   |
|---------------------|--------|----------|------------|-------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Choi et al. [23], 2006 | RCT    | Korea    | n=23       | Cognitive intervention/Pre- and post- evaluation | Increase in social behavior in IG vs CG (p<0.05).                                                | Loss to follow up, high dropout rate in initial participants, heterogeneous sample          |
| McInnis et al. [35], 2006 | Quasi  | UK       | n=16       | 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    | Netherlands | 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    | China    | 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  | United States | 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  | Norway   | 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. |
| Study Authors          | Study Type | Participants | Intervention | Outcome Measures                                                                 | Limitations                                                                                       |
|-----------------------|------------|--------------|--------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Rouleau et al.        | Pilot-Q    | 26, Canada   | Psychosocial intervention/ Pre-, post- and 3-month evaluation | Improve in resting heart rate and systolic blood pressure in all participants after the intervention (p value not shown) | Small sample size, absence of a comparison group at week 30, lack of randomization.                |
| Castle et al.         | RCT        | 84, Australia| Psychoeducational intervention/ Pre-, post-, 3- and 12-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. | Non-blinding study, the questioned suitability of the MADRS for assessing bipolar depression.      |
| Edgelow et al.        | Pilot      | 24, Canada   | Psychoeducational intervention/ Pre- and post- evaluation       | There were no significant between-group differences in depressive or maniac symptoms.               | Small sample size, decreased internal validity of the study due to differential dropout rates of the groups, inability to complete the follow-up measures. Non-blinding study, high dropout rate in initial participants. |
| Jahn et al.           | RCT        | 122, Germany | Psychoeducational intervention/ Pre-, post-, 1- and 9-month 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. | Non-blinding study, high dropout rate in initial participants.                                    |
| Berking et al.        | RCT        | 432, Germany | Cognitive intervention/ Pre- and post- 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). | Self-reported questionnaires, non-evaluation of quantitative data on the integrity and compliance with treatment protocols. |
| Study                        | Design | Country | Sample Size | Loss to follow up (n) | Intervention | Evaluation | Outcome Measures                                                                 | Limitations                                                                 |
|------------------------------|--------|---------|-------------|-----------------------|--------------|------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Foruzandeh et al. [52], 2012| Pilot  | Iran    | 76          | 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 | Japan   | 46          | 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  | China   | 45          | 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  | Brazil  | 30          | 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    | Germany | 38          | 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    | Sweden  | 226         | 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. Small sample size, results partly confined by baseline differences. |
| Pos et al. [31], 2017        | RCT    | Netherlands | 50           | 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.          |
| Study                     | Design | Sample Size | Location | Loss to follow up | Intervention Type | Follow-up Evaluation | Results                                                                 | Notes                                                                 |
|--------------------------|--------|-------------|----------|-------------------|-------------------|---------------------|------------------------------------------------------------------------|----------------------------------------------------------------------|
| Kaizerman-Dinerman et al. [48], 2018 | nRCT   | 94, Israel  | 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. Non-blinding study, there was no evaluation of long-term effects during hospitalization and the number of OT sessions was not measured. |
| Shimada et al. [32], 2018 | RCT    | 136, Japan  | 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. | Small sample size, short follow-up period, no comparison with a control group, only male participants. |
| Singh et al. [39], 2018 | Quasi  | 20, India   | 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, non-blinding study, the study results are not generalizable. |
| Kim et al. [40], 2019   | Quasi  | 20, Korea   | 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. Exact participation rate not calculated, decreased external validity, no clear cause and effect. |
| Argentzell et al. [41], 2020 | Quasi  | 226, Sweden | Pre-, and post- evaluation | No significant improvement on recovery main effect and interaction was found between both groups. | Small sample size, no follow-up data was collected, absence of an active comparison group, the study results are not generalizable. |
| Gökcen et al. [33], 2020 | RCT    | 36, Turkey  | 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) | Non-blinding study, no psychiatric symptoms collected, short duration of the intervention. |
| Mashimo et al. [34], 2020 | RCT    | 60, Japan   | 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. |
| Study  | Design | Country | Sample Size | Intervention | Evaluation | Outcomes | Study Limitations |
|--------|--------|---------|-------------|--------------|------------|----------|------------------|
| Ramano et al. [42], 2020 | Quasi | South Africa | 100 | 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 | Japan | 117 | 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 | Turkey | 100 | 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). Increase in IG total OCAIRS scores (p<0.001). No significant differences between IG and CG were found. | Small sample size, non-blinding study, short follow-up period. |
| Wasmuth et al. [44], 2021 | Quasi | United States | 27 | Psychoeducational intervention/Pre-, 6-week and post-evaluation | | 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. *We 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* | Intervention | Control Group (CG)/ Intervention Group (IG) | Duration (w) | Sessionsb | Measurement 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 |
| Authors          | Diagnosis                      | Type of Intervention                                | CG: Weight Loss Program                                                                 | IG: Weight Loss Program Incorporating Psychiatric Rehabilitation (Goal Setting, Social Support and Skills Training) | Duration | Tools/Session Details                                                                 | Facilitators                                                                 |
|------------------|--------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 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                                                          | 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                                                    | 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 sessions                                                     | 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                                                  | 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                                                     | 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                                            | OT, physician, psychologist social worker                                  |
| Study Authors | Diagnosis | Intervention Type | Group 1 Details | Group 2 Details | Duration | Outcome Measures | Therapists |
|---------------|-----------|-------------------|-----------------|-----------------|----------|-----------------|------------|
| 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 | 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, CDSSS-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 |
| Study Reference      | Diagnosis                  | Intervention Type                  | CG:                                                                 | IG:                                                                 |
|----------------------|----------------------------|------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
| Foruzandeh et al. [52], 2012 | Schizophrenia             | Psychosocial individual intervention | Routine nursing care such as therapeutic communication and medication such as risperidone and biperiden. | Routine medication such as risperidone and biperiden and expressive, artistic, and recreational activities from OT. |
| Tanaka et al. [53], 2014 | Schizophrenia or schizoaffective disorder | OT group intervention             | Group conventional OT                                                | Individual early OT intervention and conventional OT                |
| Ming-De et al. [38], 2016 | Schizophrenia             | Cognitive group intervention       | Coloring and handwriting activities.                                 | Aerobic group dance program.                                        |
| Vizzotto et al. [54], 2016 | Schizophrenia             | Psychosocial group intervention    | Craft activities.                                                    | Occupational Goal Intervention (OGI method).                        |
| Buschert et al. [29], 2017 | Major depression disorder | Exercise group intervention        | Occupational therapy active treatment                               | Physical exercise program                                           |
| Eklund et al. [30], 2017 | A broad spectrum of disorders* | Psychosocial group intervention    | Standard psychiatric treatment, active support, mainly standard occupational therapy (daily living skills, social skills or creative activities). |                                                                 |

| Sessions       | Measures                        | Therapists                          |
|----------------|---------------------------------|-------------------------------------|
| 26            | SANS, SAPS                      | OT                                  |
| 12            | FIM, BPRS                       | OT                                  |
| 13            | Three-weekly fifty-to sixty-minute sessions | SDMT, RAVLT, TMT A-B, VF, MMSE OT psychologists |
| 15            | Two-weekly ninety-minute sessions | PANSS, BADS, DAFS-BR, ILSS-BR, WAIS OT, psychologists |
| 4             | Two-to three-weekly thirty-minute sessions | BDI, HAMD-7, WMS-R, physical fitness measures OT, sports therapist |
| 16            | One-weekly sessions             | POES, SDO-OB, Oval-pd, MANSA, OT nurse, social worker |
| Study                | Diagnosis                         | Intervention Type                  | IG Description                                                                                     | CG Description                                                                                       | Duration | Outcome Measures                                                                 |
|---------------------|-----------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------|
| Pos et al. [31], 2017 | Schizophrenia and schizoaffective disorder | Cognitive group intervention | 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 One-weekly session (duration not stated)  
One-weekly two-hour sessions | MOS SF-36, GAF, RSE | 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 | PANSS, ESM, GPTS, BCIS | 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 |
| Study       | Disorder                          | Intervention Type                  | CG Intervention                                                                 | IG Intervention                                                                 | Duration | Outcome Measures          |
|------------|-----------------------------------|------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------|---------------------------|
| 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        | EFPT-K, K-IADL, MoCA-K, GAF |
| Argentzell et al. [41], 2020 | A broad spectrum of disorders    | Psychosocial group intervention    | CG: Standard occupational therapy                                                | IG: Balancing Everyday Life program (BEL)                                     | 16       | POES, SDO-OB, QPR, GAF    |
| Gökcen 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        | PANSS, FROGS, OT, physiotherapist, 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       | 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        | SIS, BaPFE-R, TOA, OT     |
| Authors | Diagnoses | Intervention Type | Control Group Intervention | Intervention Group Intervention |
|---------|-----------|------------------|-----------------------------|---------------------------------|
| 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, OT, PANSS, 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, OT |
| Wasmuth et al. [44], 2021 | A broad spectrum of disorders | 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; BalPFE-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; EFFT-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; MANS: Manchester Short Assessment of Quality of Life; MMAS-8: Morisky Medication Adherence Scale; 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. a Type of SMI intervened. b Session duration is reported where available. c Anxiety, bipolar disorder, depressive disorder, psychosis, attention deficit hyperactivity disorder. d Schizoaffective 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.