



Prevention and Rehabilitation

Effects of body-oriented therapies on the negative symptoms in people with schizophrenia: A systematic review

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ABSTRACT

In a stabilized phase of schizophrenia, negative symptoms are evident, on which body-oriented therapies can act. This systematic review examines the scientific evidence of the effects of all body-oriented therapies on the negative symptoms in people with schizophrenia and the effects of each type of body-oriented therapies on the negative symptoms in people with schizophrenia. To carry out this systematic review, the PRISMA guidelines were followed. The research was carried out through Pubmed, Cochrane, Web of Science, APAPsycNet, Science Direct, Scopus and the VHL Regional Portal. The methodological quality of the studies was assessed using the PEDro scale and data synthesis was performed. There were included 18 studies with the following interventions: creative arts, mind-body interventions, and body psychotherapy. Negative symptoms (total value), affective blunting, anhedonia, avolition, alogia, asociality, and psychomotor slowing were studied. In conclusion, there is strong scientific evidence that: body-oriented therapies do not promote positive effects on avolition, when it is assessed using the SANS scale; and creative arts reduce the total value of negative symptoms, when assessed by PANSS.

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1. Introduction

Schizophrenia is a psychotic disorder that tends to emerge between early adulthood and the middle of the fourth decade of life. The earlier the onset of the disorder, the worse its prognosis (American Psychiatric Association APA, 2013). This disorder is characterized by positive, negative (Nadesalingam et al., 2022; Bervoets et al., 2013), and cognitive symptoms (Bervoets et al., 2013). When the outbreaks are more stabilized and the positive symptoms controlled, the negative symptoms become evident, and these last are the ones that we will focus on decreased emotional expression, avolition, alogia, anhedonia, and asociality (American Psychiatric Association APA, 2013). Abboud et al. (2017) also refer to “motor symptoms”, which include psychomotor slowing and

action planning. Thus, schizophrenia involves impairments in basic motor processing and control (Abboud et al., 2017). Psychomotor slowing is found in the literature associated with negative symptomatology (Nadesalingam et al., 2022; Huang et al., 2020; Bervoets et al., 2013; Walther and Strik 2012), namely with avolition and planning deficits (Walther, 2015). Action planning, on the other hand, is only associated with avolition (Liemburg et al., 2015).

For some years, these motor symptoms were attributed to medication side effects (Nadesalingam et al., 2022), however, more recently it has been realized that these symptoms are present in all stages of the disorder (Nadesalingam et al., 2022), including in people who have never taken medication (Nadesalingam et al., 2022; Huang et al., 2020; Walther and Strik, 2012). These results suggest that movement disorders in schizophrenia may be related to the pathophysiology of psychotic disorders and are not entirely attributable to adverse effects of medication (Huang et al., 2020).

Schizophrenia is a chronic condition that can persist over a person's lifetime (Bryl et al., 2020). There is no cure for this disorder, and recommended treatment for the first-episode psychosis, acute exacerbations, and prevention of relapse of psychosis is an approach based on pharmacologic medication and psychological

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interventions. However, the negative symptoms fall short of these treatments (Maroney 2020) and tend to persist longer (Bryl et al., 2020).

It was the lack of treatment for negative symptoms that opened new paths to more comprehensive and interdisciplinary approaches, like the embodiment (Martin et al., 2016), which is the reciprocal body-mind relationship (Ciompi and Tschacher 2021; Martin et al., 2016; Tschacher et al., 2017). The body and mind should not be considered and treated as separate entities, as these structures influence each other. The body is intimately connected with emotions and thoughts (Ciompi and Tschacher 2021; Ottoboni et al., 2016). Embodiment implies motor and cognitive-emotional processes, and it is precisely the close connection between mind and body that opens opportunities for possible therapies (Tschacher et al., 2017).

The embodiment therapies are framed in a dynamic system approach, to account for the complexity of motor processes and their link with brain functions, sociocultural, and environmental factors (Fuchs and Koch 2014). One of the challenges in researching and practicing this concept is that there is no single nomination to describe this type of interventions, so we have names such as “body-oriented interventions” (Weineck and Messner 2018). As embodiment is a comprehensive concept, the following interventions are included: creative arts (Malchiodi 2019; Koch 2006); mind-body interventions (Freedman and Mehling 2021); and body psychotherapy (Payne et al., 2016).

In body-oriented therapies, the main objective is to modify psychological states, without neglecting the physiological, postural, and motor aspects that characterize each psychological state (Ottoboni et al., 2016). The basic idea is to improve emotions using the body as an instrument (Weineck and Messner 2018), where body movement is action-oriented, in order to shape cognitive processes (Gallagher and Payne 2014), allowing for therapeutic change (Weineck and Messner 2018). Thus, this type of intervention acts to improve body awareness, promote emotional expression, and intrapersonal responsiveness (Tschacher et al., 2017).

According to the embodiment approach, affect and cognition are not only reflected in posture and body movement but they are also influenced by them (Martin et al., 2016). In schizophrenia there is a disembodiment (Ciompi and Tschacher 2021; Martin et al., 2016), that is, a weak sense of self (Martin et al., 2016), which gives rise to a distorted perception of reality and the self (Ciompi and Tschacher 2021). It becomes necessary to promote bodily experiences that promote changes in terms of emotions and behavior (Martin et al., 2016). It is known that therapies that act to improve body awareness, promote emotional expression, and intrapersonal responsiveness (Tschacher et al., 2017) can have benefits in terms of alleviating negative symptoms (Bryl et al., 2020; Tschacher et al., 2017). Once negative symptoms are reduced, predictors of future recovery such as functional outcomes, may come to improve (Bryl et al., 2020).

There are several scientific studies that investigated the effects of body-oriented therapies on the negative symptoms in people with schizophrenia (Gökçen et al., 2020; Lee 2019; Bryl et al., 2020; Pedersen et al., 2019). However, to our knowledge, there are only two systematic reviews with meta-analysis. One approached the effects of mind-body therapies based on meditation on negative symptoms in schizophrenia (Sabe et al., 2019), and the other the effect of mind-body therapies and aerobic exercise on negative symptoms in schizophrenia (Vogel et al., 2019). These reviews are restricted to a single type of intervention of body-oriented therapies (mind-body interventions). Our review is pertinent as no other has integrated all body-oriented therapies.

Therefore, this systematic review has two objectives: to know the strength of the scientific evidence of the effects of all body-oriented therapies on the negative symptoms in people with

schizophrenia; and to know the strength of the scientific evidence of the effects of each type of intervention of the body-oriented therapies on the negative symptoms in people with schizophrenia.

2. Methods

A systematic review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher et al., 2009). Study protocol was registered in PROSPERO with the ID: CRD42020201795.

2.1. Search strategy

We searched in the following databases on August 11, 2020: Pubmed, Cochrane, Web of Science, APA PsycNet, Science Direct, Scopus, and VHL Regional Portal.

The search employed the following combination of terms: ((Schizophrenia* OR Psychosis*) AND (Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*) AND (Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*)) (see Table 1).

2.2. Eligibility criteria

For inclusion, studies had the following criteria: written in English or Portuguese; published between 2000 and 2020; peer-reviewed scientific studies; sample of individuals with a diagnosis of Schizophrenia aged between 18 and 65 years; individuals had experienced their first psychotic break more than 6 months ago; the positive symptoms are in remission and the negative symptoms are in evidence; sample with both or just one gender; Randomized Controlled Trial (RCT), quasi-RCT studies, and Pilot Randomized Controlled Trial; at least one group with study arm intervention of body-oriented therapies; an inactive control group and/or other therapy groups; investigate the effects of body-oriented therapies on the negative symptoms.

2.3. Data collection and extraction

To ensure the risk of bias two reviewers (BI and GA) independently examined the titles and abstracts of the studies, excluding all studies that did not meet the defined criteria. Subsequently, they read in full the potential studies to be included, considering the inclusion criteria. In addition, was used the snowballing technique of the included studies. From the studies that met the inclusion criteria, the following information was extracted by two reviewers (BI and ACF): study, type of study/study design, participants, intervention, variables and assessment instruments, and results. A third reviewer was requested in data selection (ACF) and extraction (GA), whenever there was no agreement between the first two reviewers.

The scales of negative symptoms had a set of common sub variables (affective blunting, anhedonia, avolition, alogia, asociality, psychomotor slowing), which, according to the literature, are the main negative symptoms. We decided to focus only on these sub variables. However, the total value of the negative symptoms was included, regardless of the scale used.

In addition, Lee (2019) used two scales – Positive and Negative Syndrome Scale (PANSS) and Scale for the Assessment of Negative

Table 1
Research strategies.

Data Base	Search Terms (String)	Applied filters	Number of articles
Pubmed	((Schizophrenia* OR Psychosis*) AND (Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*) AND (Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*))	<ul style="list-style-type: none"> Language: English, Portuguese Year: 2000–2020 Randomized controlled trial Adult: +19 years Year: 2000–2020 Article type: <i>Trials</i> Search by: Title, abstract and keywords 	65
Cochrane	(Schizophrenia* OR Psychosis*) in Title Abstract Keyword AND (Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*) in Title Abstract Keyword AND (Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*) in Title Abstract Keyword - (Word variations have been searched)	<ul style="list-style-type: none"> Year: 2000–2020 Search by: Topic 	160
Web of Science	TOPIC: ((Schizophrenia* OR Psychosis*)) AND TOPIC: ((Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*)) AND TÓPICO: ((Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*))	<ul style="list-style-type: none"> Year: 2000–2020 Search by: Topic 	174
Science Direct	1st combination: (Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND ("Mind-body therapies" OR "Body Psychotherapy" OR "Body-oriented therapies" OR "Dance Movement Therapy") 2nd combination: (Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND ("Body awareness therapy" OR "Music Therapy" OR "Drama Therapy" OR "Art therapy") 3rd combination: (Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND (Mindfulness OR Physiotherapy OR "Psychomotor Therapy" OR "Embodied therapy") 4th combination: (Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND ("Progressive Muscular Relaxation" OR Pilates OR "tai chi" OR yoga) 5th combination: (Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND ("Mind-body therapies" OR "Body Psychotherapy" OR "Body-oriented therapies" OR "Dance Movement Therapy") 6th combination: (Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND ("Body awareness therapy" OR "Music Therapy" OR "Drama Therapy" OR "Art therapy") 7th combination: (Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND (Mindfulness OR Physiotherapy OR "Psychomotor Therapy" OR "Embodied therapy") 8th combination: (Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND ("Progressive Muscular Relaxation" OR Pilates OR "tai chi" OR yoga) 9th combination: (Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND ("Mind-body therapies" OR "Body Psychotherapy" OR "Body-oriented therapies" OR "Dance Movement Therapy") 10th combination: (Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND ("Body awareness therapy" OR "Music Therapy" OR "Drama Therapy" OR "Art therapy") 11th combination: (Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND (Mindfulness OR Physiotherapy OR "Psychomotor Therapy" OR "Embodied therapy") 12th combination: (Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND ("Progressive Muscular Relaxation" OR Pilates OR "tai chi" OR yoga)	<ul style="list-style-type: none"> Year: 2000–2020 Type of document: Research articles 	868
Scopus	TITLE-ABS-KEY ((schizophrenia OR psychosis)) AND TITLE-ABS-KEY (((Negative Symptoms) OR avolition OR alogia OR anhedonia OR isolation OR [Affective Blunting] OR [Psychomotor slowing] OR [Motor retardation] OR [Movement planning])) AND TITLE-ABS-KEY ((Body Psychotherapy) OR yoga OR [Tai chi] OR [Dance Movement Therapy] OR [Embodied Therapies] OR [Drama Therapy] OR pilates OR [Progressive Muscular Relaxation] OR [Art Therapy] OR [Music Therapy] OR [Mindfulness] OR [Mind-body Therapy] OR physiotherapy OR [Psychomotor Therapy] OR [Body Awareness Therapy] OR [Body oriented Therapies]) AND DOCTYPE (ar) AND PUBYEAR > 1999 AND (LIMIT-TO (LANGUAGE, "English"))	<ul style="list-style-type: none"> Language: English Year: 2000–2020 Type of document: Article Search by: Title, abstract and keywords 	65
VHL Regional Portal	(tw:(Schizophrenia* OR Psychosis*)) AND (tw:(Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*)) AND (tw:(Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*))	<ul style="list-style-type: none"> Search by: Title, abstract and keywords 	0
APAPsycNet	((Any Field: Schizophrenia* OR Any Field: Psychosis*) AND (Any Field: Negative Symptoms* OR Any Field: Avolition* OR Any Field: Alogia* OR Any Field: Anhedonia* OR Any Field: Isolation* OR Any Field: Affective Blunting* OR Any Field: Psychomotor slowing* OR Any Field: Motor retardation* OR Any Field: Movement planning*) AND (Any Field: Body Psychotherapy* OR Any Field: Yoga* OR Any Field: Tai-chi* OR Any Field: Dance Movement Therapy* OR Any Field: Embodied Therapies* OR Any Field: Drama Therapy* OR Any Field: Pilates* OR Any Field: Progressive Muscular Relaxation* OR Any Field: Art Therapy* OR Any Field: Music Therapy* OR Any Field: Mindfulness* OR Any Field: Mind-body Therapy* OR Any Field: Physiotherapy* OR Any Field: Psychomotor Therapy* OR Any Field: Body Awareness Therapy* OR Any Field: Body-oriented Therapies*))	<ul style="list-style-type: none"> Search by: Any field 	6

Symptoms (SANS) – to assessed negative symptoms, obtaining different results and the SANS scale places anhedonia and asociality on the same subscale, unlike the other scales for negative symptoms included in this systematic review. These facts led us to choose to know the effects of body-oriented therapies on the negative symptoms and analyzed the sub variables when assessed by each of the scales.

2.4. Methodological quality assessment

The methodological quality of the studies was carried out to reduce the risk of bias. It was assessed using the Physiotherapy Evidence Database (PEDro) scale, except for those that are already analyzed on the PEDro website. All studies that were rated were independently assessed by two reviewers (BI and ACF). A third reviewer (GA) assessed them, whenever there was no consensus between the first two.

This scale comprised 11 items: specified eligibility criteria; random allocation; concealed allocation; baseline comparability; subjects blinding; therapists blinding; assessors blinding; less than 15% dropouts; intention-to-treat analysis; between-group statistical comparisons; point measures and variability data. Only 10 items are scored, since the specified eligibility criteria are related to external validity and do not enter the scale calculation (Maher et al., 2003). PEDro scale scores range from 1 to 10 and higher PEDro scores correspond to higher method quality. As there are no published validated cutoff scores for this scale, we used the following criteria: a score below five points means low quality, while a score equal to or greater than five points represents a high quality (Shiwa et al., 2011; Armijo-Olivo et al., 2015). The reliability of the total PEDro score was considered “fair” to “good” (Maher et al., 2003).

2.5. Data synthesis

Included studies were divided into four groups: Creative Arts (included music therapy, art therapy, dance/movement therapy and drama therapy); Mind-Body Interventions (included yoga, tai-chi, and mindfulness); Body Psychotherapy; and a combination of interventions (yoga, drama, dance therapy, and music therapy).

To measure the strength of scientific evidence and reduce the risk of bias, the Best Evidence Synthesis (BES) method was used. The strength of evidence is classified into: strong evidence - when there are several high-quality RCT's; moderate evidence - when there is a high-quality RCT and one or more low-quality RCT's; limited evidence - when there is a high-quality RCT or several low-quality RCT's; no evidence - when there is a low-quality RCT or contradictory results (Tulder et al., 1997).

3. Results

3.1. Study selection

Of the 71 studies found as potentially included, 18 meet the inclusion criteria: Web of Science (n = 10), Pubmed (n = 4), Science Direct (n = 1), and snowballing technique (n = 3) (Fig. 1).

Fifty three studies were excluded for the following reasons: no access (n = 3); written in a language that is not Portuguese or English (n = 4); patients without a diagnosis of schizophrenia (n = 1); sample covers more diagnoses (n = 1); ages under 18 or over 65 years old (n = 2); no age limit information (n = 8); intervention includes body-oriented therapy + another type of intervention (n = 1); does not investigate the effect of body-oriented therapies on negative symptoms (n = 14); total mean of the scale, does not specify the negative symptoms (n = 2); not RCT or quasi-RCT (n = 12); compares between genders (n = 1); control and

experimental in the same group (n = 3); lack of posttest information (n = 1).

3.2. Study characteristics

The oldest study is from the year 2006 (Rohricht and Priebe 2006) and the most recent from 2020 (Gökçen et al., 2020). Thirteen studies belong to the Asian continent (Ho et al., 2012; Ho et al., 2016; Qiu et al., 2017; Tan et al., 2016; Wang et al., 2016; Behere et al., 2010; Duraiswamy et al., 2007; Gangadhar et al., 2013; Paikkatt et al., 2015; Lee 2019; Lu et al., 2013; Cho and Lee 2018; Isuru and Dahanayake 2015), three to the European continent (Rohricht and Priebe 2006; Priebe et al., 2016; Ulrich et al., 2007), one is from north America (Visciglia and Lewis 2011), and another (Gökçen et al., 2020) is from Turkey (European and Asian continents).

Regarding the study design, they all had a pre and posttest. Although three of these studies (Qiu et al., 2017; Ho et al., 2012; Behere et al., 2010) had an intermediate assessment. Eight studies (Qiu et al., 2017; Priebe et al., 2016; Lee 2019; Cho and Lee 2018; Lu et al., 2013; Rohricht and Priebe 2006; Ho et al., 2016; Wang et al., 2016) had a follow-up, however, their results had not been included because is not the aim of this review.

All studies worked with the adult population with schizophrenia with an average age between 23.8 and 55 years. The number of participants varies between 18 (Visciglia and Lewis 2011) and 275 (Priebe et al., 2016).

3.3. Characteristics of the intervention

The interventions were carried out with a duration between three weeks (Isuru and Dahanayake 2015) and 48 weeks (Qiu et al., 2017).

Intervention programs were the following: Music Therapy (n = 2), Art Therapy (n = 2), Dance/Movement Therapy (n = 1), Body Psychotherapy (n = 2), Mindfulness (n = 2), Yoga (n = 5), Tai-Chi (n = 2), and a combination of therapies - music and dance therapy (n = 1) and the other drama, yoga, dance, and music workshops (n = 1).

Most body-oriented therapies were compared to an inactive control group and/or another therapy program: physical exercise group (Duraiswamy et al., 2007; Ho et al., 2016; Behere et al., 2010); cognitive remediation group (Tan et al., 2016); psychoeducation group (Wang et al., 2016) (see Table 2).

3.4. Methodological quality of studies

PEDro scale scores ranged from three and eight points (mean = 5.5, mode = 5, and median = 5.5). The highest score (eight) was obtained by the study by Priebe et al. (2016). Thirteen studies had high quality, a score equal or higher than five (Tan et al., 2016; Qiu et al., 2017; Lee 2019; Visciglia and Lewis 2011; Lu et al., 2013; Ho et al. 2012, 2016; Behere et al., 2010; Ulrich et al., 2007; Rohricht and Priebe 2006; Gökçen et al., 2020; Duraiswamy et al., 2007; Wang et al., 2016). The remaining four studies had low quality, scored less than five (Cho and Lee 2018; Paikkatt et al., 2015; Gangadhar et al., 2013; Isuru and Dahanayake 2015).

All studies satisfied the items of external validity and statistical analysis (“results of between-group statistical comparisons” and “study provides both point measures and measures of variability for at least 1 key outcome”). No study met the criterion of the blind therapist. Only one study met the criterion of the blind subjects and another that do not met the criterion of random allocation (see Table 3).

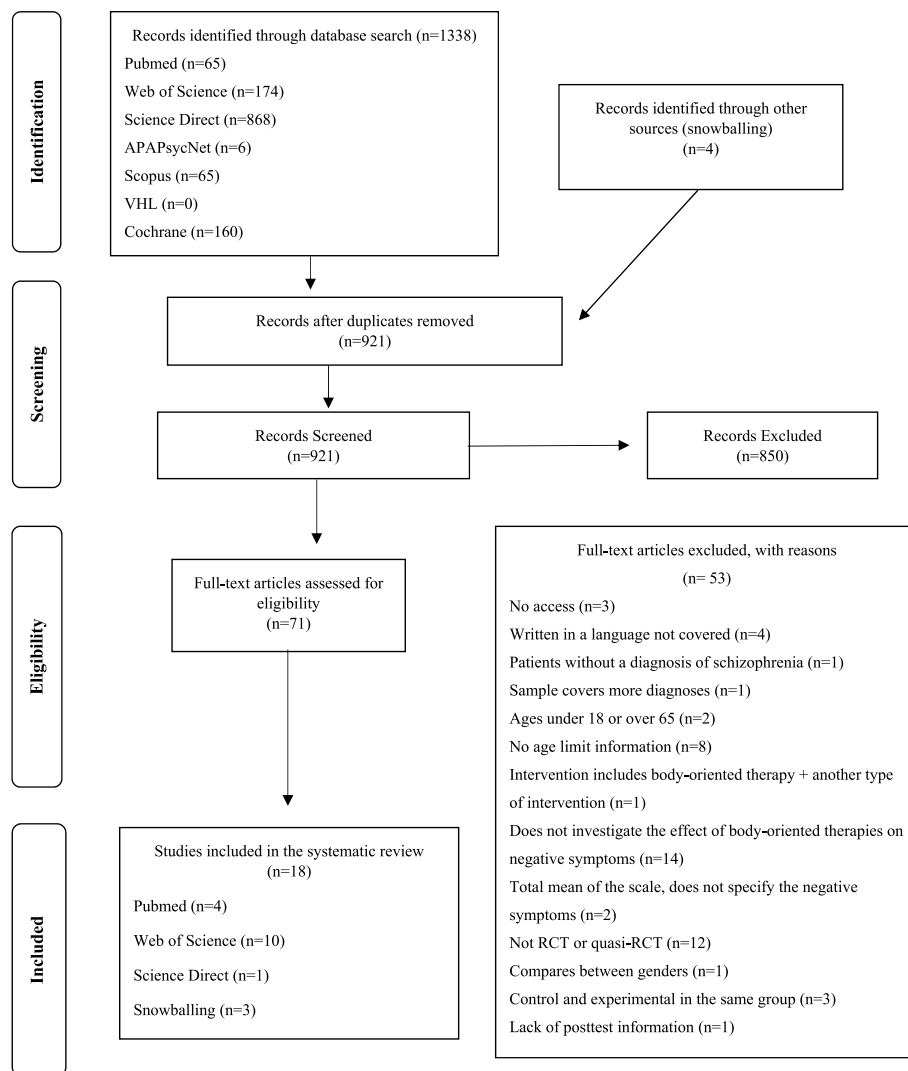


Fig. 1. PRISMA flow diagram.

3.5. Effects of body-oriented therapies on the negative symptoms

3.5.1. Effects of all body-oriented therapies on the negative symptoms

When the effects on the negative symptoms (total value) are evaluated with the PANSS scale, we found contradictory results. Nine studies found improvements (Tan et al., 2016; Qiu et al., 2017; Visceglia and Lewis 2011; Lu et al., 2013; Behere et al., 2010; Rohricht and Priebe 2006; Gökçen et al., 2020; Duraiswamy et al., 2007; Wang et al., 2016), while four found no significant differences (Priebe et al., 2016; Lee 2019; Ho et al., 2016; Isuru and Dahanayake 2015). The four studies that used the SANS scale (Lee 2019; Cho and Lee 2018; Gangadhar et al., 2013; Ulrich et al., 2007) founded improvements.

Regarding the negative symptom sub variables, two studies (Paikkatt et al., 2015; Rohricht and Priebe 2006) used the PANSS scale to assess affective blunting and psychomotor slowing, and both founded improvements. Paikkatt and collaborators (2015) also evaluated avolition, revealing improvements. Two studies (Ulrich et al., 2007; Ho et al., 2012) used the SANS scale to evaluated affective blunting, anhedonia/asociality, alogia, and avolition. In the first three sub variables, contradictory results were found. However, both considered that avolition does not present significant

differences. The CAINS scale was only used by Priebe et al. (2016), which evaluated anhedonia, avolition, and asociality, finding improvements in all of them.

3.5.2. Effects of each type of intervention of body-oriented therapy on the negative symptoms

In **creative arts**, both in PANSS and SANS, studies revealed improvements in negative symptoms (total value). At the level of sub variables, Ulrich and collaborators (2007) evaluated them with the SANS scale and found improvements in affective blunting, anhedonia/asociality, and alogia. There were no differences in terms of avolition.

Studies by the **mind-body interventions group** reveal that negative symptoms (total value) at PANSS level had contradictory results. The studies Visceglia and Lewis (2011), Behere et al. (2010) and Duraiswamy et al. (2007) report improvements, while Lee (2019) and Ho et al. (2016) reveal that there were no significant improvements. Regarding the SANS scale, the included studies report improvements. As for the sub variables, Ho et al. (2012) found no significant differences for affective blunting, anhedonia/asociality, avolition, and alogia, when evaluated with the SANS scale. However, Paikkatt et al. (2015) used PANSS to assess affective blunting, avolition, and psychomotor slowing, with improvements.

Table 2

Description of scientific studies.

Study/Country	Study type/Study design	Participants	Intervention	Variables and assessment tools	Results
Tan et al. (2016) China	RCT Pre-posttest	Schizophrenia patients; n = 90 Music and Dance Therapy Group n = 46; Mean age = 46,09 years Cognitive Remediation Group n = 44; Mean age = 46,77 years	Duration: 10 weeks. Frequency: 4 × 60' per week. Music and Dance Therapy Group and e Cognitive Remediation Group: sessions of 3–4 participants. Art Therapy Group: Groups of 3–4 participants. Total duration: 48 weeks.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Music and Dance Therapy Group: improved negative symptoms (total value). Cognitive Remediation Group: improved negative symptoms (total value).
Qiu et al. (2017) China	RCT Phase I: pre, intermediate (8 weeks) and posttest (16 weeks) Phase II: pre (16 weeks) and post (48 weeks) Phase III: follow-up; 8, 16 and 32 weeks, 12 months	Schizophrenia patients; n = 105; Mean age = 37,8 years Phase I: Art Therapy Group n = 54 Control Group n = 51 Phase II and III: Art Therapy Group n = 105	Art Therapy Group: Groups of 3–4 participants. Total duration: 48 weeks. Phase I: Duration: 16 weeks. Frequency: 1 × 120' per week. Phase II: Duration: 32 weeks. Frequency: 1 × 120' per week.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Phase I: Art Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Priebe et al. (2016) United Kingdom	RCT Pre-posttest Follow-up: 6 months	Schizophrenia patients; n = 275; Mean age = 42,2 years Body Psychotherapy Group n = 140 Active Control Group n = 135	Duration: 10 weeks. Frequency: 2 × 90' per week. Body Psychotherapy Group and Active Control Group (Pilates): sessions of 7–10 participants.	Negative symptoms (total value): PANSS negative subscale; Anhedonia, Avolition and Asociality: Clinical Assessment Interview for Negative Symptoms (CAINS) – expression and experience subscales.	Body Psychotherapy Group: Improved anhedonia, avolition and asociality. There were no significant differences in negative symptoms (total value). Active Control Group: there were no significant differences in negative symptoms (total value), anhedonia, avolition and asociality.
Lee (2019) Taiwan	RCT Pre-posttest Follow-up: 3 months	Schizophrenia patients; n = 50; Mindfulness Group n = 20; Mean age = 54,43 years Control Group n = 30; Mean age = 51,15 years	Duration: 8 weeks. Frequency: 1 × 90' per week. Control Group: usual treatment.	Negative symptoms (total value): Chinese Mandarin version of the positive and negative syndrome scale (CMV-PANSS); Scale for assessment of negative symptoms (SANS).	Mindfulness Group: improved negative symptoms (total value), on the SANS scale. There were no significant differences in negative symptoms (total value), on the PANSS scale. Control Group: there were no significant differences in negative symptoms (total value), on both scales.
Cho and Lee (2018) South Korea	Quasi-RCT Pre-posttest Follow-up: 2 weeks	Schizophrenia patients; n = 35; Art Therapy Group n = 17 Control Group n = 18	Duration: 6 weeks. Frequency: 2 × 50' per week. Control Group: usual treatment.	Negative symptoms (total value): Scale for the Assessment of Negative Symptoms (SANS).	Art Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Visciglia and Lewis (2011) United States	RCT Pre-posttest	Schizophrenia patients; n = 18; Mean age = 42 years Yoga Group n = 10 Control Group n = 8	Duration: 8 weeks. Frequency: 2 × 45' per week. Yoga Group: sessions of 5 participants. Control Group: on waiting list.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Yoga Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Paikkatt et al. (2015) India	RCT Pre-posttest	Schizophrenia patients; n = 30 Yoga Group n = 15 Control Group n = 15	Duration: 1 month. Frequency: 7 × 90' per week (except holidays). Control Group: usual treatment.	Affective Blunting, Avolition and Psychomotor Slowing: Positive and Negative Syndrome Scale (PANSS).	Yoga Group: improved affective blunting, avolition and psychomotor slowing. Control Group: improved affective blunting, avolition There were no significant

Lu et al. (2013) Taiwan	RCT Pre-posttest Follow-up: 3 months	Schizophrenia patients; n = 75; Mean age = 52,02 years Music Therapy Group n = 35 Control Group n = 40	Duration: 5 weeks. Frequency: 2 × 60' per week. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	differences in psychomotor slowing. Music Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Gangadhar et al. (2013) India	RCT Pre-posttest	Schizophrenia patients; n = 27; Yoga Group n = 15; Mean age = 28,3 years Control Group n = 12; Mean age = 29,5 years	Duration: 1 month. Frequency: 60' per session Control Group: usual treatment.	Negative symptoms (total value): Scale for assessment of negative symptoms (SANS).	Yoga Group: improved negative symptoms (total value). Control Group: improved negative symptoms (total value).
Ho et al. (2012) Hong Kong	RCT Pre, intermediate (6 weeks) and posttest	Schizophrenia patients; n = 30; Tai-Chi Group n = 15; Mean age = 51,87 years Control Group n = 15; Mean age = 53,47 years	Total duration: 12 weeks. Phase I: Duration: 6 weeks. Frequency: 2 × 60' per week + 1 × 30' per week. Phase II: Duration: 6 weeks. Frequency: 1 × 30' per week. Tai-chi Group: sessions of 15 participants; Control Group: usual treatment.	Affective Blunting, Anhedonia, Avolition and Alogia: Scale for the Assessment of Negative Symptoms (SANS).	Tai-Chi Group: there were no significant differences in affective blunting, anhedonia, avolition and alogia. Control Group: there were no significant differences in affective blunting, anhedonia, avolition and alogia.
Behere et al. (2010) India	RCT Pre, intermediate (2 months) and posttest.	Schizophrenia patients; n = 66; Yoga Group n = 27; Mean age = 31,3 years Exercise Group n = 17; Mean age = 30,2 years Control Group n = 22; Mean age = 33,6 years	Total duration: 4 months. Frequency: 60' per session Phase I: Duration: 1 month. Yoga Group and Exercise Group: in group, presential supervision. Phase II: Duration: 2 months. Yoga Group and Exercise Group: individual, without presential supervision. Exercise Group: meditation exercises excluded. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Yoga Group: improved negative symptoms (total value). Exercise Group: there were no significant differences in negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Ulrich et al. (2007) Netherlands	RCT Pre-posttest	Patients diagnosed with schizophrenia spectrum (ICD-10, code F20-29); n = 27; Music Therapy Group n = 16; Mean age = 36,33 years Control Group n = 11; Mean age = 39,81 years	Duration: 8 months. Frequency: 1.6 × 45' per week.	Negative symptoms (total value), Affective Blunting, Anhedonia, Avolition and Alogia: Scale for the Assessment of Negative Symptoms (SANS).	Music Therapy Group: improved negative symptoms (total value), affective blunting, anhedonia and alogia. There were no significant differences in avolition. Control Group: there were no significant differences in negative symptoms (total value), affective blunting, anhedonia, avolition and alogia.
Rohricht and Priebe (2006) United Kingdom	RCT Pre-posttest Follow-up: 4 months	Schizophrenia patients; n = 43; Body Psychotherapy Group n = 24; Mean age = 38,8 years Control Group n = 19; Mean age = 37,7 years	Duration: 10 weeks. Frequency: 2 × 60–90' per week. Body Psychotherapy Group and Control Group: sessions with a maximum of 8 participants. Control Group: support advice.	Negative symptoms (total value), Affective Blunting and Psychomotor Slowing: Positive and Negative Syndrome Scale (PANSS).	Body Psychotherapy Group: improved negative symptoms (total value), affective blunting and psychomotor slowing. Control Group: there were no significant differences in negative symptoms (total

(continued on next page)

Table 2 (continued)

Study/Country	Study type/Study design	Participants	Intervention	Variables and assessment tools	Results
Ho et al. (2016) Hong Kong	RCT Pre-posttest Follow-up: 6 months	Schizophrenia patients; n = 151; Tai-Chi Group n = 51; Mean age = 52,4 years Exercise Group n = 51; Mean age = 55 years Control Group n = 49; Mean age = 54,7 years	Duration: 12 weeks. Frequency: 1 × 60' per week + 2 × 45' per week. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	value), affective blunting and psychomotor slowing. Tai-Chi Group: there were no significant differences in negative symptoms (total value). Exercise Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Gökçen et al. (2020) Turkey	RCT Pre-posttest	Schizophrenia patients; n = 32; Dance and Movement Therapy Group n = 16; Mean age = 40,25 years Control Group n = 16; Mean age = 46,87 years	Duration: 8 weeks. Frequency: 2 × 40–50' per week. Dance and Movement Therapy Group: sessions of 8 participants. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Dance and Movement Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Duraiswamy et al. (2007) India	RCT Pre-posttest	Schizophrenia patients; n = 41; Mean age = 30,41 years Yoga Group n = 21 Exercise Group n = 20	Duration: 4 months. Frequency: 5 × 60' per week. Exercise Group and Yoga Group: 3 weeks of intervention with presential supervision + remaining weeks without presential supervision, with monthly distance supervision.	Negative symptoms (total value): Positive And Negative Syndrome Scale (PANSS).	Yoga Group: improved negative symptoms (total value). Exercise Group: improved negative symptoms (total value).
Isuru and Dahanayake (2015) Sri Lanka	RCT Pre-posttest	Schizophrenia patients; n = 73; Group of Workshops n = 33; Mean age = 38,79 years Control Group n = 40; Mean age = 41,92 years	Duration: 3 weeks. Frequency: 2–3 x 90' per week, each workshop. Group of Workshops: Drama, Dance, Yoga and Music Therapy.	Negative symptoms (total value): Positive And Negative Syndrome Scale (PANSS).	Group of Workshops: there were no significant differences in negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Wang et al. (2016) Hong Kong	RCT Pre-posttest Follow-up: 6 months	Patients diagnosed with schizophrenia spectrum; n = 131 Mindfulness-based Group n = 44; Mean age = 23,8 years Psychoeducation Group n = 44; Mean age = 24,1 years Control Group n = 43; Mean age = 25 years	Duration: 24 weeks. Frequency: 120' biweekly (with presential supervision) + 2 × 20' per day (without presential supervision). Mindfulness-based Group and Psychoeducation Group: sessions of 12–15 participants. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Mindfulness-based Group: improved negative symptoms (total value). Psychoeducation Group: there were no significant differences in negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).

Table 3
Methodological quality of experimental studies according to the PEDro scale.

Study	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Total (0/10) ^a
Visciglia and Lewis (2011)	1	1	0	1	0	0	1	0	0	1	1	5
Priebe et al. (2016)	1	1	1	1	0	0	1	1	1	1	1	8
Paikkatt et al. (2015)	1	1	0	1	0	0	0	0	0	1	1	4
Gangadhar et al. (2013)	1	1	0	1	0	0	0	0	0	1	1	4
Ho et al. (2012)	1	1	0	1	0	0	1	0	1	1	1	6
Behere et al. (2010)	1	1	0	1	0	0	1	0	0	1	1	5
Rohrlich and Priebe (2006)	1	1	1	1	0	0	1	0	1	1	1	7
Ho et al. (2016)	1	1	0	1	0	0	0	1	1	1	1	6
Duraiswamy et al. (2007)	1	1	0	1	0	0	1	0	0	1	1	5
Isuru and Dahanayake (2015)	1	1	0	0	0	0	1	0	0	1	1	4
Tan et al. (2016)	1	1	1	1	0	0	1	1	0	1	1	7
Qiu et al. (2017)	1	1	0	1	0	0	0	1	0	1	1	5
Lee (2019)	1	1	0	1	0	0	0	0	1	1	1	5
Cho and Lee (2018)	1	0	0	1	0	0	0	0	0	1	1	3
Wang et al. (2016)	1	1	0	1	0	0	1	1	1	1	1	7
Lu et al. (2013)	1	1	0	1	0	0	1	1	1	1	1	7
Ulrich et al. (2007)	1	1	0	1	1	0	1	0	0	1	1	6
Gökçen et al. (2020)	1	1	0	1	0	0	1	1	0	1	1	6
Total	18	17	3	17	1	0	12	7	7	18	18	-

^a Item 1 does not enter into the calculation of the PEDro scale value, since it is an external evaluation criterion.

The studies of the **body psychotherapy group** only used the PANSS scale as an assessment of negative symptoms (total value). One of the studies (Rohrlich and Priebe 2006) showed improvements, contrary to Priebe et al. (2016). As for the sub variables, Priebe et al. (2016) evaluated anhedonia, avolition, and asociality, revealing improvements, with the use of the CAINS scale.

In the case of the study of combined interventions (**creative arts + mind-body**) it was evaluated with the PANSS scale at the level of negative symptoms (total value), revealing that there are no significant differences.

It should be noted that none of the studies referred to action planning.

3.6. Strength of scientific evidence

3.6.1. Strength of scientific evidence of the effects of all body-oriented therapies

When negative symptoms (total value) were assessed using the SANS scale, there were moderate evidence that points to improvement. With the PANSS scale there was found contradictory results and no evidence (see Table 4).

Regarding sub variables, when assessed with the SANS scale, there is strong evidence that avolition has no significant differences. However, affective blunting, anhedonia/asociality, and the alogia had no evidence due to conflicting results. With the PANSS scale, there is moderate evidence for the improvement of affective blunting and psychomotor slowing. There is no evidence for avolition. When evaluated with CAINS, there is limited evidence for the improvement of anhedonia, avolition, and asociality (see Table 5).

3.6.2. Strength of the scientific evidence of the effects of each type of intervention of body-oriented therapies

In the **creative arts** there is strong evidence with the PANSS scale and moderate evidence with the SANS scale, with both reporting improvements for negative symptoms (total value). In the case of sub variables, Ulrich et al. (2007) evaluated the effective blunting, anhedonia/asociality, avolition, and the alogia, using the SANS scale. The evidence was considered limited for these four sub variables.

Regarding the negative symptoms (total value) of **mind-body interventions**, there is moderate evidence with results pointing to

improvement, with the SANS scale. With PANSS scale there is no evidence since the results are contradictory. As for the sub variables, with the SANS scale, there is limited evidence for affective blunting, anhedonia/asociality, avolition, and alogia, as there are no significant differences. However, when evaluated with the PANSS scale there is no evidence for affective blunting, avolition, and psychomotor slowing.

As for the **body psychotherapy group**, negative symptoms (total value) were assessed with PANSS, with no evidence, since the results are contrasting. The anhedonia, avolition, and asociality sub variables were evaluated using the CAINS scale, which revealed limited evidence, pointing to improvement.

Finally, the **creative arts + mind-body group** was assessed only at the level of negative symptoms (total value), with the PANSS scale, being classified without evidence (see Tables 6 and 7).

4. Discussion

The oldest study is 15 years old (Rohrlich and Priebe 2006) and the most current is about one year old (Gökçen et al., 2020). In this period the studies are evenly distributed over the years.

Although the age groups included range from 20 to 50 years, it was in the age group between 20 and 30 years that there was always an improvement in negative symptoms. This could mean that the earlier intervention is performed in people with schizophrenia, the greater the likelihood of a reduction in negative symptoms. People with early-stage schizophrenia, who have not endured so many years of illness or functional decline, generally respond better to treatment (Correll et al., 2018). In the initial phase of psychosis, there is a window of opportunity (Singh 2010), or, "critical period", which is predictive of the long-term trajectory of the disease (Singh 2010; Chaves 2007) and malleable to therapeutic interventions (Chaves 2007), since at this stage there is neuronal plasticity (Singh 2010).

The majority of included studies used the PANSS scale, however, the SANS and CAINS scale was also used. All scales are validated so its use for negative symptoms is expected, however the multiplicity of evaluation scales can make it difficult to compare studies (Grot et al., 2020).

Regarding to all included body-oriented therapies, Yoga therapy is the one that has the largest number of studies included (n = 5),

Table 4
Strength of evidence of negative symptoms (total value) of all body-oriented therapies.

Variable	Assesment tool	Study	Result	PEDro scale	BES scale
Negative Symptoms (total value)	PANSS	Tan et al. (2016)	Improved	7	No Evidence
		Qiu et al. (2017)	Improved	5	
		Priebe et al. (2016)	There were no differences	8	
		Lee (2019)	There were no differences	5	
		Visciglia and Lewis (2011)	Improved	5	
		Lu et al. (2013)	Improved	7	
		Behere et al. (2010)	Improved	5	
		Rohricht and Priebe (2006)	Improved	7	
		Ho et al. (2016)	There were no differences	6	
		Gökçen et al. (2020)	Improved	6	
		Duraiswamy et al. (2007)	Improved	5	
		Isuru and Dahanayake (2015)	There were no differences	4	
		Wang et al. (2016)	Improved	7	
	SANS	Lee (2019)	Improved	5	Moderate Evidence
		Cho and Lee (2018)	Improved	3	
		Gangadhar et al. (2013)	Improved	4	
		Ulrich et al. (2007)	Improved	6	

Table 5
Strength of evidence of negative (subvariable) symptoms of all body-oriented therapies.

Assesment tool	Subvariables	Study	Result	PEDro scale	BES scale
PANSS	Affective Blunting	Paikkatt et al. (2015)	Improved	4	Moderate Evidence
		Rohricht and Priebe (2006)	Improved	7	
	Avolition	Paikkatt et al. (2015)	Improved	4	No Evidence
	Psychomotor Slowing	Paikkatt et al. (2015)	Improved	4	Moderate Evidence
		Rohricht and Priebe (2006)	Improved	7	
SANS	Affective Blunting	Ho et al. (2012)	There were no differences	6	No Evidence
		Ulrich et al. (2007)	Improved	6	
	Anhedonia/Asociality	Ho et al. (2012)	There were no differences	6	No Evidence
		Ulrich et al. (2007)	Improved	6	
	Avolition	Ho et al. (2012)	There were no differences	6	Strong Evidence
		Ulrich et al. (2007)	There were no differences	6	
	Alogia	Ho et al. (2012)	There were no differences	6	No Evidence
		Ulrich et al. (2007)	Improved	6	
CAINS	Anhedonia	Priebe et al. (2016)	Improved	8	Limited Evidence
	Avolition		Improved		
	Asociality		Improved		

Table 6
Strength of evidence of negative symptoms (total value) in each type of intervention of body-oriented therapies.

Type of intervention	Variable	Assesment tool	Study	Result	PEDro scale	BES scale
Creative Arts	Negative Symptoms (total value)	PANSS	Tan et al. (2016)	Improved	7	Strong Evidence
			Qiu et al. (2017)	Improved	5	
			Lu et al. (2013)	Improved	7	
			Gökçen et al. (2020)	Improved	6	
		SANS	Cho and Lee (2018)	Improved	3	Moderate Evidence
			Ulrich et al. (2007)	Improved	6	
				Improved	6	
Mind-Body Interventions		PANSS	Lee (2019)	There were no differences	5	No Evidence
			Visciglia and Lewis (2011)	Improved	5	
			Behere et al. (2010)	Improved	5	
			Ho et al. (2016)	There were no differences	6	
		SANS	Duraiswamy et al. (2007)	Improved	5	Moderate Evidence
			Wang et al. (2016)	Improved	7	
			Lee (2019)	Improved	5	
			Gangadhar et al. (2013)	Improved	4	
Body Psychotherapy		PANSS	Priebe et al. (2016)	There were no differences	8	No Evidence
			Rohricht and Priebe (2006)	Improved	7	
Creative Arts + Mind-Body		PANSS	Isuru and Dahanayake (2015)	There were no differences	4	No Evidence

giving us the feeling that this type of therapy is the most investigated and applied to individuals with schizophrenia with a predominance of negative symptoms in the studies that were included. Four of these studies were carried out in India and that may be because this type of therapy is more rooted in ancient Eastern

cultures (Nauphal et al., 2019). Surprisingly Tai-Chi has not been so studied.

Concerning for each type of intervention groups, mind-body interventions are the ones that have the largest number of included studies ($n = 9$), which may mean that these types of

Table 7

Strength of evidence of negative symptoms (subvariables) in each type of intervention of body-oriented therapies.

Type of intervention	Assessment tool	Subvariables	Study	Result	PEDro scale	BES scale
Creative Arts	SANS	Affective Blunting Anhedonia/Asociality Avolition Alogia	Ulrich et al. (2007)	Improved Improved There were no differences Improved	6	Limited Evidence
Mind-Body Interventions	PANSS	Affective Blunting Avolition Psychomotor Slowing	Paikkatt et al. (2015)	Improved Improved Improved	4	No Evidence
	SANS	Affective Blunting Anhedonia/Asociality Avolition Alogia	Ho et al. (2012)	There were no differences There were no differences There were no differences There were no differences	6	Limited Evidence
Body Psychotherapy	CAINS	Anhedonia Avolition Asociality	Priebe et al. (2016)	Improved Improved Improved	8	Limited Evidence

interventions are the most usual when it is intended to reduce the symptoms of people with schizophrenia.

The most recent studies investigated the creative arts. This may mean that in recent years there has been more emphasis on therapies based on the arts to reduce symptoms in schizophrenia than the others included. Being a more recent type of therapy, it is natural that there is an interest in investigating its scientific evidence.

It was expected to find all the negative symptoms that we considered, but action planning was never investigated in these studies. One explanation for this may be because most of the authors consider how this parameter can be considered a cognitive symptom and not a negative one. Schizophrenia affects a wide range of cognitive skills (Holt et al., 2013), including executive functions, where planning capacity is inserted (Young and Geyer 2014; Holt et al., 2013).

The mean of studies had a high methodological quality. It would be expected that more recent studies would have greater methodological quality, however, it appears that studies with low quality are relatively recent. In general, the researchers had a concern with the bias of the results and with a randomizing group. However, no study met the “blind therapist” criterion and that only the study by Ulrich and collaborators (2007) met the “blind subjects” criterion. This fact leads us to relate these criteria to the difficulty of keeping the therapist and the subjects “blind” as to the intention of the intervention, in experimental studies. It is known that in studies with complex interventions (De Morton 2009), such as those that evaluate exercise and manual therapy (Moseley et al., 2002), it is difficult to keep therapists and subjects without knowing the objectives of the study (Moseley et al., 2002; De Morton 2009). Another hypothesis that can be raised regarding the difficulty in keeping the therapist “blind” may be due to the lack of technical resources to evaluate and intervene in specialized therapies and in the specific population - schizophrenia. In 2002, Moseley et al., reported that the lack of knowledge of the study objective by the evaluator should almost always be possible, however, in only 34% of the studies filed with PEDro this is verified.

There is **strong evidence** that body-oriented therapies have **do not affect avolition**, when assessed using the SANS scale. An explanation for these results may be due to the apparent tendency of people with schizophrenia to remain in a current state of inaction - called psychological inertia - contributing to avolition (Suri et al., 2018). If this symptom is too marked in the subjects, it will probably hinder the effect of body-oriented therapies in reducing it. Another possible explanation may be related to the fact that avolition may be related to deficits of motivation, showing difficulties in anticipatory pleasure (DeRosse et al., 2019; Marder and Galderisi

2017; Galderisi et al., 2018). Thus, if the therapists already carried out the planned session activities, it may be difficult for an individual with schizophrenia to anticipate that a suggested activity will be pleasurable and, consequently, lead to decreased persistence in activities aimed at an objective. We can also hypothesize whether a deficit in the executive function, responsible for decision-making, cannot compromise volitional aspects in individuals with schizophrenia.

In each type of intervention, only the **creative arts obtained strong evidence** for the reduction of negative symptoms (total value), through the PANSS scale. One of the reasons that may have led these interventions to be more effective in reducing negative symptoms is the fact that they encourage the exploration of unconscious material with the help of creative processes, improving the individual's ability to express themselves, through the symbolic (Anzacata 2021). Creative arts resort to non-verbal processes and have an embodiment approach, which transcends literal and logical meanings (Malchiodi 2019), enhancing the individual's healing (Chiang et al., 2019) and well-being (Anzacata 2021) through the therapeutic effects of creativity (Chiang et al., 2019; Anzacata 2021).

Moderate and limited evidence is expected due to the small number of studies that assess the sub variables and due to the low quality of some studies.

When there is **no evidence** due to **contradictory findings**, we can hypothesize several reasons: the differences range of groups, the same variables were evaluated by different scales, different intervention and their durations, which range from three weeks to 48 weeks. Another possible cause could be the different frequencies of interventions and interventions with and without presential supervision.

Of all the body-oriented therapies included in the systematic review, Tai-Chi was the only intervention that did not show a reduction in negative symptoms (total value and sub variables). Ho et al. (2016) suggest that the practice of Tai-Chi emphasizes the (re) connection between the mind and the body, and this reconnection can lead to temporary increases in symptoms, reflecting bodily responses to a “healing crisis”. In the case of Ho et al. (2012), it was mentioned that the height of the post-test data collection coincided with festivities, and family visits and other activities carried out in the facilities where they lived, may have influenced the daily functioning and the activities of the participants. These results are corroborated by a recent systematic review (Sabe et al., 2019) that also found no effects of Tai-Chi on negative symptoms.

In interventions in which more than one study evaluated their effects on the negative symptoms, Yoga and Art Therapy have always improved on negative symptoms. Since Yoga combines the maintenance of physical postures, regulation of breathing, and

meditation or a state of attention during postures (Mehta et al., 2016), this type of intervention may be the one that works best within mind-body interventions as it allows the person becomes aware of their mental and body state at their own pace during the postures. In contrast, tai-chi uses movement to raise awareness, which may not give the person enough time, or, in the case of mindfulness, focus only on mental activity. In the case of Art Therapy, such discoveries can be explained by the fact that this type of therapy can distract subjects from their symptoms and promote an improvement in social interaction (Van Lith et al., 2012), mitigating negative symptoms, such as asociality.

5. Conclusion

There was strong scientific evidence that all body-oriented therapies have not changes on avolition, when assessed with the SANS scale. The effects of these therapies on the remaining (sub) variables had moderate and limited scientific evidence. There was no scientific evidence of effects of body-oriented therapies on the following variables: negative symptoms (total value) and avolition when assessed with the CAINS and affective blunting, anhedonia/asociality, and alogia, when evaluated with the SANS.

Regarding each type of intervention of body-oriented therapies, there was strong scientific evidence of creative arts on reduction of negative symptoms (total value), when evaluated with the PANSS. The effects of each type of intervention (creative arts, mind-body interventions, body psychotherapy, and creative art therapy + mind-body) on the remaining (sub)variables had moderate and limited evidence. There was no scientific evidence of the effects of mind-body interventions, body psychotherapy and creative arts + mind-body group for negative symptoms (total value), when evaluated with the PANSS. There was no scientific evidence on mind-body interventions on affective blunting, avolition, and psychomotor slowing, with the same scale.

This finding provides a clue for psychomotor therapists who work with patients experiencing mental illness, in particular schizophrenia, to use more often in their session's mediators using the arts. Due to the result of body-oriented therapies not seeming to influence avolition, the psychomotor therapist may try to meet the patient's interests, providing the choice of some activities for future sessions. In addition to increasing motivation, an attempt is made to promote more active participation in the sessions and encouragement of initiative. Consequently, it can improve persistence in goal-directed activities and decrease psychological inertia. Once the possibility was raised that avolition could be compromised due to deficits in executive function, it is suggested that the psychomotor intervention for individuals with schizophrenia should also be based on awareness processes of action, that is, a therapy directed towards gnosis-praxis practices.

5.1. Limitations

This systematic review had the following limitations: inclusion only studies in English and Portuguese, no access to three studies, some studies did not have enough information about the age limits. Regarding the use of the PEDro scale, it can be considered another limitation, as it can lead to biased results because the items are satisfied only if the study clearly states that the criterion was met.

5.2. Future research

More research in the field of body-oriented therapies is needed with greater scientific rigor and with greater methodological quality. Another suggestion is trying to increase the number of the sample included.

For mental health professionals, including psychomotor therapists, it would be interesting to develop further studies of this type to verify which type of therapy and which type of mediators influence the reduction of avolition.

Regarding the duration of interventions, the minimum duration for a reduction in negative symptoms is 5 weeks. Considering that schizophrenia is a chronic disease that needs monitoring and support, it is suggested that psychomotor intervention should not be punctual and of short duration. Rather, it should be an ongoing intervention to keep negative symptoms stabilized and/or reduced.

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CRediT authorship contribution statement

Bruna Isabelinha: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Resources, Writing – original draft, Writing – review & editing, Visualization. **Ana Cruz-Ferreira:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – review & editing. **Janete Maximiano:** Conceptualization, Investigation, Writing – review & editing. **Gabriela Almeida:** Conceptualization, Validation, Investigation, Data curation, Writing – review & editing.

Declaration of competing interest

All authors have nothing to declare.

References

- Abboud, R., Noronha, C., Diwadkar, V.A., 2017. Motor system dysfunction in the schizophrenia diathesis: neural systems to neurotransmitters. *Eur. Psychiatr.* 44, 125–133. <https://doi.org/10.1016/j.eurpsy.2017.04.004>.
- American Psychiatric Association (APA), 2013. *Manual de Diagnóstico e Estatística das Perturbações Mentais: DSM-5*. Lisboa, Climepsi.
- Armijo-Olivo, S., da Costa, B.R., Cummings, G.G., Ha, C., Fuentes, J., Saltaji, H., Egger, M., 2015. PEDro or Cochrane to assess the quality of clinical trials? A meta-epidemiological study. *PLoS One* 10. <https://doi.org/10.1371/journal.pone.0132634>.
- Anzacata, 2021. About creative arts therapies. *Anzacata*, obtained on February 26, 2021. <https://www.anzacata.org/About-CAT>.
- Behere, R.V., Arasappa, R., Jagannathan, A., Varambally, S., Venkatasubramanian, G., Thirthalli, J., et al., 2010. Effect of yoga therapy on facial emotion recognition deficits, symptoms and functioning in patients with schizophrenia. *Acta Psychiatr. Scand.* 123, 147–153. <https://doi.org/10.1111/j.1600-0447.2010.01605.x>.
- Bervoets, C., Docx, L., Sabbe, B., Vermeulen, S., Van Den Bossche, M.J., Morsel, A., Morrens, M., 2013. The nature of the relationship of psychomotor slowing with negative symptomatology in schizophrenia. *Cognit. Neuropsychiatry* 19, 36–46. <https://doi.org/10.1080/13546805.2013.779578>.
- Bryl, K., Bradt, J., Cechnicki, A., Fisher, K., Sossin, K.M., Goodill, S., 2020. The role of dance/movement therapy in the treatment of negative symptoms in schizophrenia: a mixed methods pilot study. *J. Ment. Health* 1–11. <https://doi.org/10.1080/09638237.2020.1757051>.
- Chaves, A.C., 2007. Primeiro episódio psicótico: uma janela de oportunidade para tratamento? *Rev. Psiquiatr. Clínica* 34, 174–178. <https://doi.org/10.1590/S0101-60832007000800005>.
- Chiang, M., Reid-Varley, W.B., Fan, X., 2019. Creative art therapy for mental illness. *Psychiatr. Res.* <https://doi.org/10.1016/j.psychres.2019.03.025>.
- Cho, J.M., Lee, K., 2018. Effects of Motivation Interviewing Using a Group Art Therapy Program on Negative Symptoms of Schizophrenia. *Archives of Psychiatric Nursing*. <https://doi.org/10.1016/j.apnu.2018.07.002>.
- Ciompi, L., Tschacher, W., 2021. Affect-Logic, embodiment, synergetics, and the free energy principle: new approaches to the understanding and treatment of schizophrenia. *Entropy* 23. <https://doi.org/10.3390/e23121619>.
- Correll, C.U., Gallinger, B., Pawar, A., Krivko, A., Bonetto, C., Ruggeri, M., et al., 2018. Comparison of early intervention services vs treatment as usual for early-phase psychosis. *JAMA Psychiatr.* 75, 555. <https://doi.org/10.1001/jamapsychiatry.2018.0623>.
- De Morton, N.A., 2009. The PEDro scale is a valid measure of the methodological quality of clinical trials: a demographic study. *Aust. J. Physiother.* 55, 129–133. [https://doi.org/10.1016/s0004-9514\(09\)70043-1](https://doi.org/10.1016/s0004-9514(09)70043-1).
- DeRosse, P., Barber, A.D., Fales, C.L., Malhotra, A.K., 2019. Deconstructing Avolition: initiation vs persistence of reward-directed effort. *Psychiatr. Res.* 273, 647–652.

- <https://doi.org/10.1016/j.psychres.2019.01.073>.
- Duraiswamy, G., Thirithalli, J., Nagendra, H.R., Gangadhar, B.N., 2007. Yoga therapy as an add-on treatment in the management of patients with schizophrenia? A randomized controlled trial. *Acta Psychiatr. Scand.* 116, 226–232. <https://doi.org/10.1111/j.1600-0447.2007.01032.x>.
- Freedman, A., Mehling, W., 2021. Methods for measuring embodiment, an instrument: the multidimensional assessment of interoceptive awareness (MAIA). In: Tania, J.F. (Ed.), *The Art and Science of Embodied Research Design Concepts, Methods and Cases*. Routledge, New York, pp. 63–74.
- Fuchs, T., Koch, S.C., 2014. Embodied affectivity: on moving and being moved. *Front. Psychol.* 5. <https://doi.org/10.3389/fpsyg.2014.00508>.
- Galerisi, S., Mucci, A., Buchanan, R.W., Arango, C., 2018. Negative symptoms of schizophrenia: new developments and unanswered research questions. *Lancet Psychiatr.* 5, 664–677. [https://doi.org/10.1016/s2215-0366\(18\)30050-6](https://doi.org/10.1016/s2215-0366(18)30050-6).
- Gallagher, S., Payne, H., 2014. The role of embodiment and intersubjectivity in clinical reasoning. *Body Mov. Dance Psychother.* 10, 68–78. <https://doi.org/10.1080/17432979.2014.980320>.
- Gangadhar, B., Jayaram, N., Varambally, S., Behere, R., Venkatasubramanian, G., Arasappa, R., Christopher, R., 2013. Effect of yoga therapy on plasma oxytocin and facial emotion recognition deficits in patients of schizophrenia. *Indian J. Psychiatr.* 55, 409. <https://doi.org/10.4103/0019-5545.116318>.
- Gökçen, A., Ekici, G., Abaoğlu, H., Tiryaki Şen, D., 2020. The healing effect of goal-oriented dance and movement therapy in schizophrenia: a rater-blinded randomized controlled trial. *Arts Psychother.* <https://doi.org/10.1016/j.aip.2020.101702>.
- Grot, S., Giguère, C., Sminé, S., Mongeau-Pérusse, V., Nguyen, D.D., Preda, A., et al., 2020. Converting scores between the PANSS and SAPS/SANS beyond the positive/negative dichotomy. *PsyArXiv*. <https://doi.org/10.31234/osf.io/9nzd8>.
- Ho, R.T.H., Au, Yeung FSW, Lo, P.H.Y., Law, K.Y., Wong, K.O.K., Cheung, I.K.M., Ng, S.M., 2012. Tai-chi for residential patients with schizophrenia on movement coordination, negative symptoms, and functioning: a pilot randomized controlled trial. *Evid. base Compl. Alternative Med.* 1–10. <https://doi.org/10.1155/2012/923925>.
- Ho, R.T.H., Fong, T.C.T., Wan, A.H.Y., Au-Yeung, F.S.W., Wong, C.P.K., Ng, W.Y.H., et al., 2016. A randomized controlled trial on the psychophysiological effects of physical exercise and Tai-chi in patients with chronic schizophrenia. *Schizophr. Res.* 171, 42–49. <https://doi.org/10.1016/j.schres.2016.01.038>.
- Holt, D.V., Wolf, J., Funke, J., Weisbrod, M., Kaiser, S., 2013. Planning impairments in schizophrenia: specificity, task independence and functional relevance. *Schizophr. Res.* 149, 174–179. <https://doi.org/10.1016/j.schres.2013.06.018>.
- Huang, P.S.B., Chen, C.L., Yeung, K.T., Hsu, M.Y., Wan, S.W., Lou, S.Z., 2020. Effects of different types of sensory signals on reaching performance in persons with chronic schizophrenia. *PLoS One* 15. <https://doi.org/10.1371/journal.pone.0234976>.
- Isuru, A., Dahanayake, D.M.A., 2015. Impact of dance, drama, yoga and music therapy workshops on symptom reduction in patients with Schizophrenia: a randomized controlled study. *South Asian J. Psychiatry* 3, 1–7.
- Koch, S.C., 2006. Interdisciplinary embodiment approaches Implications for creative arts therapies. In: Koch, S., Brauninger, I. (Eds.), *Advances in Dance Movement Therapy: Theoretical Perspective and Empirical Findings*. Logos Verlag, Berlin, pp. 17–29.
- Lee, K.H., 2019. A randomized controlled trial of mindfulness in patients with schizophrenia. *Psychiatr. Res.* 275, 137–142. <https://doi.org/10.1016/j.psychres.2019.02.079>.
- Liemburg, E.J., Dlabac-De Lange, J.J.L.A.S., Bais, L., Knegtering, H., van Osch, M.J.P., Renken, R.J., Aleman, A., 2015. Neural correlates of planning performance in patients with schizophrenia — relationship with apathy. *Schizophr. Res.* 161, 367–375. <https://doi.org/10.1016/j.schres.2014.11.028>.
- Lu, S.F., Lo, C.H.K., Sung, H.C., Hsieh, T.C., Yu, S.C., Chang, S.C., 2013. Effects of group music intervention on psychiatric symptoms and depression in patient with schizophrenia. *Compl. Ther. Med.* 21, 682–688. <https://doi.org/10.1016/j.ctim.2013.09.002>.
- Maher, C.G., Sherrington, C., Herbert, R.D., Moseley, A.M., Elkins, M., 2003. Reliability of the PEDro scale for rating quality of randomized controlled trials. *Phys. Ther.* 83, 713–721.
- Malchiodi, C.A., 2019. Creative arts therapies and arts-based research. In: Leavy, P. (Ed.), *Handbook of Arts-Based Research*. The Guilford Press, New York, pp. 68–87.
- Marder, S.R., Galerisi, S., 2017. The current conceptualization of negative symptoms in schizophrenia. *World Psychiatr.* 16, 14–24. <https://doi.org/10.1002/wps.20385>.
- Maroney, M., 2020. An update on current treatment strategies and emerging agents for the management of schizophrenia. *Am. J. Manag. Care* 26, S55–S61. <https://doi.org/10.37765/ajmc.2020.43012>.
- Martin, L.A.L., Koch, S.C., Hirjak, D., Fuchs, T., 2016. Overcoming disembodiment: the effect of movement therapy on negative symptoms in schizophrenia—a multicenter randomized controlled trial. *Front. Psychol.* 7. <https://doi.org/10.3389/fpsyg.2016.00483>.
- Mehta, U.M., Keshavan, M.S., Gangadhar, B.N., 2016. Bridging the schism of schizophrenia through yoga—review of putative mechanisms. *Int. Rev. Psychiatr.* 28, 254–264. <https://doi.org/10.1080/09540261.2016.1176905>.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 6. <https://doi.org/10.1371/journal.pmed.1000097>.
- Moseley, A.M., Herbert, R.D., Sherrington, C., Maher, C.G., 2002. Evidence for physiotherapy practice: a survey of the Physiotherapy evidence database (PEDro). *Aust. J. Physiother.* 48, 43–49. [https://doi.org/10.1016/s0004-9514\(14\)602816](https://doi.org/10.1016/s0004-9514(14)602816).
- Nadesalingam, N., Chapellier, V., Lefebvre, S., Pavlidou, A., Stegmayer, K., Alexaki, D., Gama, D.B., Maderthaner, L., von Känel, S., Wüthrich, F., Walther, S., 2022. Motor abnormalities are associated with poor social and functional outcomes in schizophrenia. *Compr. Psychiatr.* 115. <https://doi.org/10.1016/j.comppsy.2022.152307>.
- Nauphal, M., Mischoulon, D., Uebelacker, L., Streeter, C., Nyer, M., 2019. Yoga for the treatment of depression: five questions to move the evidence-base forward. *Compl. Ther. Med.* 46, 153–157. <https://doi.org/10.1016/j.ctim.2019.08.012>.
- Ottoboni, G., Iacono, M., Chattat, R., 2016. Body-oriented techniques, affect and body consciousness. *Body Mov. Dance Psychother.* 11, 290–305. <https://doi.org/10.1080/17432979.2016.1188153>.
- Paikkatt, B., Singh, A.R., Singh, P.K., Jahan, M., Ranjan, J.K., 2015. Efficacy of Yoga therapy for the management of psychopathology of patients having chronic schizophrenia. *Indian J. Psychiatr.* 57, 355–360. <https://doi.org/10.4103/00195545.171837>.
- Payne, H., Warnecke, T., Karkou, V., Westland, G., 2016. A comparative analysis of body psychotherapy and dance movement psychotherapy from a European perspective. *Body Mov. Dance Psychother.* 11, 144–166. <https://doi.org/10.1080/17432979.2016.1165291>.
- Pedersen, I., Bonde, L., Hannibal, N., Nielsen, J., Aagaard, J., Bertelsen, L., et al., 2019. Music therapy as treatment of negative symptoms for adult patients diagnosed with schizophrenia—study protocol for a randomized, controlled and blinded study. *Medicine* 6, 46. <https://doi.org/10.3390/medicines6020046>.
- Priebe, S., Savill, M., Wykes, T., Bentall, R.P., Reininghaus, U., Lauber, C., et al., 2016. Effectiveness of group body psychotherapy for negative symptoms of schizophrenia: multicentre randomised controlled trial. *Br. J. Psychiatry* 209, 54–61. <https://doi.org/10.1192/bjp.bp.115.171397>.
- Qiu, H.Z., Ye, Z.J., Liang, M.Z., Huang, Y.Q., Liu, W., Lu, Z.D., 2017. Effect of an art brut therapy program called go beyond the schizophrenia (GBTS) on prison inmates with schizophrenia in mainland China—A randomized, longitudinal, and controlled trial. *Clin. Psychol. Psychother.* 24, 1069–1078. <https://doi.org/10.1002/cpp.2069>.
- Rohricht, F., Priebe, S., 2006. Effect of body-oriented psychological therapy on negative symptoms in schizophrenia: a randomized controlled trial. *Psychol. Med.* 36, 669–678. <https://doi.org/10.1017/s0033291706007161>.
- Sabe, M., Sentissi, O., Kaiser, S., 2019. Meditation-based mind-body therapies for negative symptoms of schizophrenia: systematic review of randomized controlled trials and meta-analysis. *Schizophr. Res.* 212, 15–25. <https://doi.org/10.1016/j.schres.2019.07.030>.
- Shiwa, S., Costa, L., Moser, L., Aguiar, I., Oliveira, L., 2011. PEDro: a base de dados de evidências em fisioterapia. *Fisioterapia em Movimento* 24, 523–533.
- Singh, S.P., 2010. Early intervention in psychosis. *Br. J. Psychiatry* 196, 343–345. <https://doi.org/10.1192/bjp.bp.109.075804>.
- Suri, G., Lavaysse, L.M., Young, G., Moodie, C., Tersakyan, A., Gross, J.J., Gard, D.E., 2018. An investigation into the drivers of avolition in schizophrenia. *Psychiatr. Res.* 261, 225–231. <https://doi.org/10.1016/j.psychres.2018.01.001>.
- Tan, S., Zou, Y., Wykes, T., Reeder, C., Zhu, X., Yang, F., et al., 2016. Group cognitive remediation therapy for chronic schizophrenia: a randomized controlled trial. *Neurosci. Lett.* 626, 106–111. <https://doi.org/10.1016/j.neulet.2015.08.036>.
- Tschacher, W., Giersch, A., Friston, K., 2017. Embodiment and schizophrenia: a review of implications and applications. *Schizophr. Bull.* 43, 745–753. <https://doi.org/10.1093/schbul/sbw220>.
- Tulder, M.W.V., Koes, B.W., Bouter, L.M., 1997. Conservative treatment of acute and chronic nonspecific low back pain. *Spine* 22, 2128–2156. <https://doi.org/10.1097/0007632-199709150-00012>.
- Ulrich, G., Houtmans, T., Gold, C., 2007. The additional therapeutic effect of group music therapy for schizophrenic patients: a randomized study. *Acta Psychiatr. Scand.* 116, 362–370. <https://doi.org/10.1111/j.1600-0447.2007.01073.x>.
- Van Lith, T., Schofield, M.J., Fenner, P., 2012. Identifying the evidence-base for art-based practices and their potential benefit for mental health recovery: a critical review. *Disabil. Rehabil.* 35, 1309–1323. <https://doi.org/10.3109/09638288.2012.732188>.
- Vogel, J.S., van der Gaag, M., Slofstra, C., Knegtering, H., Bruins, J., Castelein, S., 2019. The effect of mind-body and aerobic exercise on negative symptoms in schizophrenia: a meta-analysis. *Psychiatr. Res.* <https://doi.org/10.1016/j.psychres.2019.03.012>.
- Visciglia, E., Lewis, S., 2011. Yoga therapy as an adjunctive treatment for schizophrenia: a randomized, controlled pilot study. *J. Alternative Compl. Med.* 17, 601–607. <https://doi.org/10.1089/acm.2010.0075>.
- Walther, S., 2015. Psychomotor symptoms of schizophrenia map on the cerebral motor circuit. *Psychiatry Res. Neuroimaging* 233, 293–298. <https://doi.org/10.1016/j.pscychres.2015.06.010>.
- Walther, S., Strik, W., 2012. Motor symptoms and schizophrenia. *Neuropsychobiology* 66, 77–92. <https://doi.org/10.1159/000339456>.
- Wang, L.Q., Chien, W.T., Yip, L.K., Karatzias, T., 2016. A randomized controlled trial of a mindfulness-based intervention program for people with schizophrenia: 6-month follow-up. *Neuropsychiatric Dis. Treat.* 12, 3097–3110. <https://doi.org/10.2147/ndt.s123239>.
- Weineck, F., Messner, M., 2018. Embodiment research — building bridges to evidence-based clinical practice. *Embodiment in Psychotherapy* 113–126. https://doi.org/10.1007/978-3-319-92889-0_9.
- Young, J., Geyer, M., 2014. Developing treatments for cognitive deficits in schizophrenia: the challenge of translation. *J. Psychopharmacol.* 29, 178–196. <https://doi.org/10.1177/0269881114555252>.