**Mini-CAT (Rotation 7, week 1)**

**Clinical & PICO Question:**

38 y.o male presents with minimal and disorganized speech. He admits to auditory hallucination. With further questioning, he is preoccupied with the delusion of his neighbors listening in on his conversations. His family wants to know the options of improving clinical symptoms.

**Question: Does exercise intervention help to improve clinical symptoms and quality of life in patients with schizophrenia?**

**PICO Search Elements:**

|  |  |  |  |
| --- | --- | --- | --- |
| **P** | **I** | **C** | **O** |
| Patients with schizophrenia | Exercise | No intervention | Clinical symptoms |
|  |  | control | Cognitive functioning  |
|  |  |  | Quality of life |
|  |  |  | Depression  |
|  |  |  | Physical and mental outcome |

**Search Strategy:**

Keywords: “schizophrenia”, “exercise”, “clinical symptoms”

Pubmed:

* Schizophrenia/exercise/most recent: 904 results
* Schizophrenia/exercise/best match: 1051 results
* Schizophrenia/exercise/best match/within 5 years: 449 results
* Schizophrenia/exercise/best match/within 5 years/humans/English: 185 results

Cochrane Library:

* Schizophrenia/exercise: 11 results

CINAHL

* Schizophrenia/exercise: 326 results
* Schizophrenia/exercise/within 5 years: 155 results
* Schizophrenia/exercise/ within 5 years/English/adults: 63 results

**Articles Chosen**

1. [Aerobic **Exercise** Improves Cognitive Functioning in People With **Schizophrenia**: A Systematic Review and Meta-Analysis.](https://www.ncbi.nlm.nih.gov/pubmed/27521348)

Firth J, Stubbs B, Rosenbaum S, Vancampfort D, Malchow B, Schuch F, Elliott R, Nuechterlein KH, Yung AR.

Schizophr Bull. 2017 May 1;43(3):546-556. doi: 10.1093/schbul/sbw115. Review.

PMID: 27521348

### Abstract

Cognitive deficits are pervasive among people with schizophrenia and treatment options are limited. There has been an increased interest in the neurocognitive benefits of exercise, but a comprehensive evaluation of studies to date is lacking. We therefore conducted a meta-analysis of all controlled trials investigating the cognitive outcomes of exercise interventions in schizophrenia. Studies were identified from a systematic search across major electronic databases from inception to April 2016. Meta-analyses were used to calculate pooled effect sizes (Hedges g) and 95% CIs. We identified 10 eligible trials with cognitive outcome data for 385 patients with schizophrenia. Exercise significantly improved global cognition (g = 0.33, 95% CI = 0.13-0.53, P = .001) with no statistical heterogeneity (I2 = 0%). The effect size in the 7 studies which were randomized controlled trials was g = 0.43 (P < .001). Meta-regression analyses indicated that greater amounts of exercise are associated with larger improvements in global cognition (β = .005, P = .065). Interventions which were supervised by physical activity professionals were also more effective (g = 0.47, P < .001). Exercise significantly improved the cognitive domains of working memory (g = 0.39, P = .024, N = 7, n = 282), social cognition (g = 0.71, P = .002, N = 3, n = 81), and attention/vigilance (g = 0.66, P = .005, N = 3, n = 104). Effects on processing speed, verbal memory, visual memory and reasoning and problem solving were not significant. This meta-analysis provides evidence that exercise can improve cognitive functioning among people with schizophrenia, particularly from interventions using higher dosages of exercise. Given the challenges in improving cognition, and the wider health benefits of exercise, a greater focus on providing supervised exercise to people with schizophrenia is needed.

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1. [**Exercise** Improves Clinical Symptoms, Quality of Life, Global Functioning, and Depression in **Schizophrenia**: A Systematic Review and Meta-analysis.](https://www.ncbi.nlm.nih.gov/pubmed/26547223)

Dauwan M, Begemann MJ, Heringa SM, Sommer IE.

Schizophr Bull. 2016 May;42(3):588-99. doi: 10.1093/schbul/sbv164. Epub 2015 Nov 7. Review.

PMID: 26547223

Abstract

#### BACKGROUND: Physical exercise may be valuable for patients with schizophrenia spectrum disorders as it may have beneficial effect on clinical symptoms, quality of life and cognition.

#### METHODS: A systematic search was performed using PubMed (Medline), Embase, PsychInfo, and Cochrane Database of Systematic Reviews. Controlled and uncontrolled studies investigating the effect of any type of physical exercise interventions in schizophrenia spectrum disorders were included. Outcome measures were clinical symptoms, quality of life, global functioning, depression or cognition. Meta-analyses were performed using Comprehensive Meta-Analysis software. A random effects model was used to compute overall weighted effect sizes in Hedges' g.

#### RESULTS: Twenty-nine studies were included, examining 1109 patients. Exercise was superior to control conditions in improving total symptom severity (k = 14, n = 719: Hedges' g = .39, P < .001), positive (k = 15, n = 715: Hedges' g = .32, P < .01), negative (k = 18, n = 854: Hedges' g = .49, P < .001), and general (k = 10, n = 475: Hedges' g = .27, P < .05) symptoms, quality of life (k = 11, n = 770: Hedges' g = .55, P < .001), global functioning (k = 5, n = 342: Hedges' g = .32, P < .01), and depressive symptoms (k = 7, n = 337: Hedges' g = .71, P < .001). Yoga, specifically, improved the cognitive subdomain long-term memory (k = 2, n = 184: Hedges' g = .32, P < .05), while exercise in general or in any other form had no effect on cognition.

#### CONCLUSION: Physical exercise is a robust add-on treatment for improving clinical symptoms, quality of life, global functioning, and depressive symptoms in patients with schizophrenia. The effect on cognition is not demonstrated, but may be present for yoga.

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1. [A **systematic review** and **meta-analysis** of **exercise** **interventions** in **schizophrenia** **patients**.](https://www.ncbi.nlm.nih.gov/pubmed/25650668)

Firth J, Cotter J, Elliott R, French P, Yung AR.

Psychol Med. 2015 May;45(7):1343-61. doi: 10.1017/S0033291714003110. Epub 2015 Feb 4. Review.

PMID: 25650668

Abstract

BACKGROUND: The typically poor outcomes of schizophrenia could be improved through interventions that reduce cardiometabolic risk, negative symptoms and cognitive deficits; aspects of the illness which often go untreated. The present review and meta-analysis aimed to establish the effectiveness of exercise for improving both physical and mental health outcomes in schizophrenia patients.

METHOD: We conducted a systematic literature search to identify all studies that examined the physical or mental effects of exercise interventions in non-affective psychotic disorders. Of 1581 references, 20 eligible studies were identified. Data on study design, sample characteristics, outcomes and feasibility were extracted from all studies and systematically reviewed. Meta-analyses were also conducted on the physical and mental health outcomes of randomized controlled trials.

RESULTS: Exercise interventions had no significant effect on body mass index, but can improve physical fitness and other cardiometabolic risk factors. Psychiatric symptoms were significantly reduced by interventions using around 90 min of moderate-to-vigorous exercise per week (standardized mean difference: 0.72, 95% confidence interval -1.14 to -0.29). This amount of exercise was also reported to significantly improve functioning, co-morbid disorders and neurocognition.

CONCLUSIONS: Interventions that implement a sufficient dose of exercise, in supervised or group settings, can be feasible and effective interventions for schizophrenia.

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1. [**Exercise therapy** in **adults** with **serious** **mental illness**: a systematic review and meta-analysis.](https://www.ncbi.nlm.nih.gov/pubmed/24751159)

Pearsall R et al. BMC Psychiatry. (2014)

[BMC Psychiatry.](https://www.ncbi.nlm.nih.gov/pubmed/24751159) 2014 Apr 21;14:117. doi: 10.1186/1471-244X-14-117.

PMID: 24751159

Abstract:

#### BACKGROUND: Individuals with serious mental illness are at a higher risk of physical ill health. Mortality rates are at least twice those of the general population with higher levels of cardiovascular disease, metabolic disease, diabetes, and respiratory illness. Although genetics may have a role in the physical health problems of these patients, lifestyle and environmental factors such as levels of smoking, obesity, poor diet, and low levels of physical activity also play a prominent part.

#### METHODS: We conducted a systematic review and meta-analysis of randomised controlled trials comparing the effect of exercise interventions on individuals with serious mental illness.Searches were made in Ovid MEDLINE, Embase, CINAHL, PsycINFO, Biological Abstracts on Ovid, and The Cochrane Library (January 2009, repeated January 2013) through to February 2013.

#### RESULTS: Eight RCTs were identified in the systematic search. Six compared exercise versus usual care. One study assessed the effect of a cycling programme versus muscle strengthening and toning exercises. The final study compared the effect of adding specific exercise advice and motivational skills to a simple walking programme. The review found that exercise improved levels of exercise activity (n = 13, standard mean difference [SMD] 1.81, CI 0.44 to 3.18, p = 0.01). No beneficial effect was found on negative (n = 84, SMD = -0.54, CI -1.79 to 0.71, p = 0.40) or positive symptoms of schizophrenia (n = 84, SMD = -1.66, CI -3.78 to 0.45, p = 0.12). No change was found on body mass index compared with usual care (n = 151, SMD = -0.24, CI -0.56 to 0.08, p = 0.14), or body weight (n = 77, SMD = 0.13, CI -0.32 to 0.58, p = 0.57). No beneficial effect was found on anxiety and depressive symptoms (n = 94, SMD = -0.26, CI -0.91 to 0.39, p = 0.43), or quality of life in respect of physical and mental domains.

#### CONCLUSIONS: This systematic review showed that exercise therapies can lead to a modest increase in levels of exercise activity but overall there was no noticeable change for symptoms of mental health, body mass index, and body weight.

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1. [**Exercise** for mental illness: a systematic review of inpatient studies.](https://www.ncbi.nlm.nih.gov/pubmed/24119136)

Stanton R, Happell B.

Int J Ment Health Nurs. 2014 Jun;23(3):232-42. doi: 10.1111/inm.12045. Epub 2013 Sep 30. Review.

Abstract:

A substantial body of evidence supports the role of exercise interventions for people with a mental illness. However, much of this literature is conducted using outpatient and community-based populations. We undertook a systematic review examining the effect of exercise interventions on the health of people hospitalized with depression, schizophrenia, bipolar disorder, or anxiety disorders. Eight studies met our inclusion criteria. Several studies show positive health outcomes from short-term and long-term interventions for people hospitalized due to depression. Although positive, the evidence for inpatients with schizophrenia, bipolar disorder, or anxiety disorders is substantially less. There is an urgent need to address the paucity of literature in this area, in particular the optimal dose and delivery of exercise for people hospitalized as a result of mental illness. Standardization of reporting exercise programme variables, the assessment of mental illness, and the reporting of adverse events must accompany future studies.

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**Summary of the Evidence:**

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| Author (Date) | Level of Evidence | Sample/Setting(# of subjects/ studies, cohort definition etc. ) | Outcome(s) studied | Key Findings | Limitations and Biases |
| Firth J, Stubbs B, Rosenbaum S, Vancampfort D, Malchow B, Schuch F, Elliott R, Nuechterlein KH, Yung AR.May, 2017 | Systematic Review and Meta-analysis | 7 RCTs are included with a total of 592 psychiatric patients.  | -Improvement in global cognition-Improvement of cognitive domains of working memory, social cognition, attention/vigilance-Effect on processing speed, verbal memory, visual memory and reasoning and problem solving | -Exercise significantly improved global cognition (g = 0.33, 95% CI = 0.13-0.53, P = .001) with no statistical heterogeneity (I2 = 0%).-Meta-regression analyses indicated that greater amounts of exercise are associated with larger improvements in global cognition (β = .005, P = .065).-Interventions which were supervised by physical activity professionals were also more effective (g = 0.47, P < .001).-Exercise significantly improved the cognitive domains of working memory (g = 0.39, P = .024, N = 7, n = 282), social cognition (g = 0.71, P = .002, N = 3, n = 81), and attention/vigilance (g = 0.66, P = .005, N = 3, n = 104). Effects on processing speed, verbal memory, visual memory and reasoning and problem solving were not significant. | -some of the studies failed to report outcome data for part of the participants-some cognitive subdomains were only measured in a small number of studies-small number of participants are included in each study |
| Dauwan M, Begemann MJ, Heringa SM, Sommer IE.May, 2016 | Systematic Review and Meta-analysis | 29 studies are included, with 1109 patients | - Total symptom severity, positive and negative-Quality of life-Global functioning-Depressive symptoms, long term memory-cognition  | -Exercise was superior to control conditions in improving total symptom severity (k = 14, n = 719: Hedges' g = .39, P < .001), positive (k = 15, n = 715: Hedges' g = .32, P < .01), negative (k = 18, n = 854: Hedges' g = .49, P < .001), and general (k = 10, n = 475: Hedges' g = .27, P < .05) symptoms, quality of life (k = 11, n = 770: Hedges' g = .55, P < .001), global functioning (k = 5, n = 342: Hedges' g = .32, P < .01), and depressive symptoms (k = 7, n = 337: Hedges' g = .71, P < .001).- Yoga, specifically, improved the cognitive subdomain long-term memory (k = 2, n = 184: Hedges' g = .32, P < .05), while exercise in general or in any other form had no effect on cognition. | - Only 6 studies are included in the cognitive meta-analysis, so that the overall effect of exercise on cognition was not reliable |
| Firth J, Cotter J, Elliott R, French P, Yung AR.May, 2015 | Systematic Review and Meta-analysis | 17 studies with 659 participants | -body mass index, physical fitness, other cardio metabolic risk factors-psychiatric symptoms-improvement on functioning, co-morbid disorders, and neurocognition | -Psychiatric symptoms were significantly reduced by interventions using around 90 min of moderate-to-vigorous exercise per week (standardized mean difference: 0.72, 95% confidence interval -1.14 to -0.29). | -Patients with schizophrenia who opt in to exercise interventions could be an atypical subgroup. The observed effects may not generalize across the whole population.-Findings of the studies only based on outcome data from participants who completed the exercise intervention. This may skew results because it will favor individuals who fully engage with exercise. |
| Pearsall R, Apr 2014 | Systematic Review and Meta-analysis | Eight RCTs with 374 participants | -improvement on level of exercise activity -positive and negative symptoms of schizophrenia-body mass index, body weight-anxiety and depressive symptoms | -Exercise improved levels of exercise activity (n=13, SMD=1.81, CI 0.44 to 3.81, p=0.01) -No beneficial effect was found on negative (n=84, SMD =-0.54, CI -1.79 to 0.71, p=0.40) and positive (n=84, SMD=-1.66, CI -3.78 to 0.45, p=0.12) symptoms-No change was found on body mass index (n=151, SMD -0.24, CI -0.56 to 0.08, p=0.14), or body weight (n=77, SMD = 0.13, CI -0.32 to 0.58, p=0.57)-No beneficial effect was found on anxiety and depressive symptoms (n=94, SMD= -0.26, CI -0.91 to 0.39, p= 0.43) | -only small numbers of RCTs are included, with small sample size in each RCT-studies tend to be short in duration-studies did not quantify the amount and intensity of exericise-studies used non-standardized programs and a variety of outcome measures. |
| Stanton R, Happell BJune 2014 | Systematic review | 8 studies with 195 participants | -health outcome from long-term intervention -improvement of positive and negative symptoms | -After 8 weeks, a significant improvement in aerobic fitness was observed in the participants in the exercise group compared to the control group. However, no significant improvement was observed in psychiatric symptoms in either group | -studies not only focused on schizophrenia, but also other mental illness such as bipolar, MDD etc. -small number of studies with small sample size-not all the studies had the outcome assessor blinked and included an intention-to-treat analysis-studies only included inpatient populations |

**Conclusion(s):**

* Article #1: Exercise can improve cognitive functioning among people with schizophrenia, particularly from interventions using higher dosages of exercise. Exercise significantly improved the cognitive domains of working memory, and attention/vigilance.

#### Article #2: Physical exercise is a robust add-on treatment for improving clinical symptoms, quality of life, global functioning, and depressive symptoms in patients with schizophrenia. The effect on cognition is not demonstrated, but may be present for yoga.

* Article #3: A sufficient dose of exercise (around 90 min of moderate to vigorous exercise per week), in supervised or group settings, can be feasible and effective interventions for schizophrenia.
* Article #4: Exercise can lead to an improvement in exercise activity but had no significant effect on symptoms of mental health or body weight.
* Article #5: Exercise does not change or improve psychiatric symptoms in patients with schizophrenia
* Overall conclusion: Article #1, #2, and #3 conclude that exercise can be an effective intervention for schizophrenia. It can improve clinical symptoms and even cognitive functioning as specified by article #1. Article #4 and #5 are not shown to have a significant effect of exercise intervention in patients with schizophrenia.

**Clinical Bottom Line:**

In patients with schizophrenia, they require lifelong treatment even when symptoms have subsided. Treatment with medication and psychosocial therapy can help manage the condition. Out of the 5 articles that I have included, I would weigh the second article the most. It is a recent systematic review and meta-analysis, with 29 studies and over 1,000 participants. The article also addressed a variety of outcomes such as clinical symptoms, quality of life, memory, cognition etc. Exercise is concluded to be an effective intervention in patients with schizophrenia. Exercise may not improve cognition, but only 6 studies are included in the cognition meta-analysis so that the result might not be as reliable. Then article #1 and #3 would outweigh #4 and #5. #4 and #5 are older systematic review and meta-analysis that include older studies. Their sample sizes are not large enough for generalization. #5 also included other mental illness besides schizophrenia. Based on article #1, #2, and #3, exercise is found to be effective in the management of schizophrenia. However, larger numbers of studies with higher level of evidence are still needed to further support this statement. Although the quality and sample size of some studies are not large enough for generalization, exercising does not have negative outcomes. It is beneficial not only in improving clinical symptoms, but also in physical fitness and cardiometabolic risk. Therefore, a sufficient dose of exercise can be recommended to the patient, in supervised or group settings. Future studies can also assess the amount/dosage of exercise as an effective intervention for schizophrenia, as well as its long-term effect, or exercise intervention in other mental illness.