



Short communication

Mindfulness improves theory of mind in people experiencing psychosis: A pilot randomized clinical trial

Emilio López-Navarro^{a,b,*}, Eduardo Fonseca-Pedrero^b, José Errasti^c, Susana Al-Halabí^c

^a Department of Psychology, EvoCog Group, IFISC, Associated Unit to CSIC, University of Balearic Islands, Guillem Cifre Building, Ctra Valldemossa km 7,5, Balearic Islands, Spain

^b Programa Riojano de Investigación en Salud Mental (PRISMA), University of La Rioja, Logroño, Spain

^c Department of Psychology, University of Oviedo, Principality of Asturias, Oviedo, Spain



ARTICLE INFO

Keywords:

Psychotic disorders
Theory of mind
Mindfulness-based-interventions

ABSTRACT

Impaired Theory of Mind (ToM) ability is a core feature of psychotic disorders that challenges psychosis treatment. We aimed to explore the effect of a Mindfulness-Based Intervention (MBI) on ToM ability in a randomized clinical trial (RCT). A sample of 36 participants diagnosed with psychotic disorder were recruited from a community center and randomly allocated to Integrated Rehabilitation Treatment (IRT) or IRT+MBI. ToM skills were assessed through the Hinting Test and the Reading the Mind in the Eyes Test (RMET). IRT+MBI scored higher in RMET than IRT at posttreatment. MBI is a promising tool for improving ToM ability in psychosis.

1. Introduction

Impaired Theory of Mind (ToM) ability is a core feature of psychotic disorders which has a negative impact on different domains of functioning such as instrumental activities of daily life or social functioning (Thibaut et al., 2021). Interventions targeting ToM deficits are an ongoing challenge due its small effect (Thibaut et al., 2021). Mindfulness-Based Interventions (MBI) are a promising intervention due its effects improving ToM skills in the general population (Trautwein et al., 2020) and its benefits in psychosis (Böge et al., 2021; López-Navarro and Al-Halabí, 2021).

The aim of our study was to explore the effect of an MBI added to Integrated Rehabilitation Treatment (IRT) on ToM and compare it with IRT alone.

2. Methods

We used data from a cohort involved in a prior clinical trial (López-Navarro et al., 2020). A pilot randomized clinical trial with pre- and post-treatment measures was designed. The independent variable was treatment delivered, while the outcome variable was ToM performance. 36 participants diagnosed with psychotic disorder were recruited from a community rehabilitation center and randomly

allocated by software to IRT or IRT+MBI. IRT entailed 26 one- hour weekly group sessions of cognitive behavior therapy for psychosis and social skills training. Each participant was interviewed once a week to adjust drug treatment - if necessary -. The IRT+MBI group involved IRT supplemented with 26 weekly group MBI sessions. The aim of MBI was to teach participants to react with acceptance to the content of the psychotic sensations instead struggling with them. Details about treatment delivery, inclusion criteria, and recruitment can be found in Lopez-Navarro et al. (2020). The study was registered with ISRCTN Registry: ISRCTN52873519.

Assessment was conducted by two clinical psychologists blinded to the treatment allocation. The instruments comprised:

- A clinical record form to collect age, sex, years of education, and clinical diagnosis (psychotic disorder according to DSM criteria).
- The Positive and Negative Syndrome Scale (Kay et al., 1987) was used to assess frequency and intensity of psychotic symptoms.
- Executive function assessment was designed to cover the main components of the Miyake et al. (2000) model of executive functioning. The *Shifting* component was measured with Trail Making Test-Part B, *Updating* was measured with the Digit Span subtest from the Wechsler Adult Intelligence Scale, and *Inhibition* was assessed

* Corresponding author at: Department of Psychology, EvoCog Group, IFISC, Associated Unit to CSIC, University of Balearic Islands, Guillem Cifre Building, Ctra Valldemossa km 7,5, Balearic Islands, Spain.

E-mail address: Emilio.lopez@uib.es (E. López-Navarro).

<https://doi.org/10.1016/j.psychres.2022.114440>

Received 1 February 2021; Received in revised form 31 January 2022; Accepted 11 February 2022

Available online 12 February 2022

0165-1781/© 2022 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

through the Interference effect in the Stroop Colour Word Test. Additional information can be found in the supplementary material. - ToM was assessed through the Hinting Test (Corcoran et al., 1995) and the Reading the Mind in the Eyes Test (RMET) (Baron-Cohen et al., 2001). Details are provided in the supplementary materials.

Data analysis involved repeated measures ANCOVA for each ToM variable, setting intervention as the independent variable. For each measure, there are seven lines of results: the four simple effects, the two main effects - Treatment and Time-, and the interaction effect between these two factors. Executive functioning baseline and post-intervention scores as covariates due to their influence on ToM in psychosis (López-Navarro, 2018). Analysis of interaction components was done via Bonferroni correction. Eta squared was used to estimate effect size. Statistical significance was set at 5%.

3. Results

There were no differences between treatment groups in clinical and demographic variables, executive functions, or ToM outcomes before treatment started (supplementary material, Table S1).

ANCOVA analysis of the Hinting scores showed no statistically significant differences for the Treatment factor ($F = 0.40$, $p = 0.534$, $\eta^2 = 0.013$), Time factor ($F = 0.66$, $p = 0.421$, $\eta^2 = 0.022$), or the interaction ($F = 0.03$, $p = 0.857$, $\eta^2 = 0.001$). ANCOVA of the RMET scores showed statistically significant differences in the Time factor ($F = 5.83$, $p = 0.022$, $\eta^2 = 0.167$) and Interaction between factors ($F = 5.24$, $p = 0.030$, $\eta^2 = 0.153$). Analysis of the Interaction showed that at posttreatment the IRT+MBI group had statistically significant improvements in their scores compared to pretreatment ($F = 7.61$, $p = 0.010$, $\eta^2 = 0.208$) and IRT group ($F = 4.33$, $p = 0.046$, $\eta^2 = 0.130$). Table 1 gives detailed data for the ANCOVA analysis. Details about covariables can be found in supplementary material (Table S2).

4. Discussion

Our data suggest that mindfulness plus standard rehabilitation treatment improves ToM skills related to emotion recognition, and this improvement is greater than from standard rehabilitation treatment. Add mindfulness to IRT has a larger effect on emotion recognition than on reasoning about social situations.

Our study provides the first evidence of the positive effects of an MBI on ToM performance in psychosis. Improving ToM deficits go beyond the domain of social functioning and could contribute to recovery in every sphere of functioning in schizophrenia (Thibaudeau et al., 2021). Bearing in mind the challenge of treating negative symptoms and cognitive impairment in psychosis –the main predictors of impairment of daily-life functioning–, MBI is a promising tool for improving ToM ability and related domains (Monfort-Escrig and Pena-Garijo, 2021; Strauss et al., 2021). These results could help to optimize treatment, since empirically-supported psychological interventions contribute to the field of mental health treatment (Rodríguez-Muñoz and Al-Halabi, 2020).

The study does have some limitations that should be noted: a small sample size, although enough to test the main hypothesis, and an uneven gender distribution-it remains unclear whether sex accounts for differences in treatment of psychosis (Fernández-Modamio et al., 2020). Our pilot RCT results add to the growing literature attesting for the benefits of mindfulness applied to psychosis (Böge et al., 2021; López-Navarro et al., 2015).

CRedit authorship contribution statement

Emilio López-Navarro: Visualization, Formal analysis, Data curation, Writing – original draft. **Eduardo Fonseca-Pedrero:** Writing – original draft. **José Errasti:** Formal analysis, Data curation. **Susana Al-**

Table 1
Repeated Measures ANCOVA on Hinting Test and RMET scores.

Outcome – mean (SD)		PRE	POST	F	p value	η^2
Hinting Test	IRT	14.72 (3.23)	15.11 (2.11)	0.98	0.330	0.033
	IRT+MBI	14.61 (2.55)	15.56 (3.62)	0.52	0.476	0.018
	PRE			0.17	0.679	0.006
	POST			0.41	0.527	0.014
	Treatment			0.39	0.534	0.013
	Time			0.66	0.421	0.022
	Treatment x Time Interaction			0.03	0.857	0.001
RMET	IRT	17.67 (4.43)	17.39 (3.44)	0.37	0.547	0.013
	IRT+MBI	18.11 (4.65)	20.33 (3.55)	7.61	0.010	0.208
	PRE			0.05	0.827	0.002
	POST			4.33	0.046	0.130
	Treatment			0.75	0.395	0.025
	Time			5.83	0.022	0.167
	Treatment x Time Interaction			5.24	0.030	0.153

Note. IRT and IRT+MBI rows show interaction analysis for the Time factor (Within subjects); PRE and POST rows show interaction analysis for the Treatment factor (Between subjects).

Halabi: Visualization, Writing – original draft.

Declaration of Competing Interest

None

Acknowledgements

This work was supported by the European Social Fund-European Commission [FSE2014-2020]; the Board of Innovation, Research and Tourism of the Balearic Islands [FPI/1806/2015]; and the Spanish Ministry of Economy and Competitiveness [FFI2013-43270-P].

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2022.114440.

References

- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., Plumb, I., 2001. The “reading the mind in the eyes” test revised version: a study with normal adults, and adults with Asperger syndrome or high-functioning autism. *J. Child Psychol. Psychiatry* 42, 241–251.
- Böge, K., Hahne, I., Bergmann, N., Wingenfeld, K., Zierhut, M., Thomas, N., Ta, T.M.T., Bajbouj, M., Hahn, E., 2021. Mindfulness-based group therapy for in-patients with schizophrenia spectrum disorders-feasibility, acceptability, and preliminary outcomes of a rater-blinded randomized controlled trial. *Schizophr. Res.* 228, 134–144. <https://doi.org/10.1016/j.schres.2020.12.008>.
- Corcoran, R., Mercer, G., Frith, C.D., 1995. Schizophrenia, symptomatology and social inference: investigating “theory of mind” in people with schizophrenia. *Schizophr. Res.* 17, 5–13. [https://doi.org/10.1016/0920-9964\(95\)00024-G](https://doi.org/10.1016/0920-9964(95)00024-G).
- Fernández-Modamio, M., Gil-Sanz, D., Arrieta-Rodríguez, M., Gómez de Tojeiro-Roce, J., Bengochea-Seco, R., González-Fraile, E., 2020. Emotion recognition in patients with schizophrenia: the role of sex. *Psicothema* 32, 197–203. <https://doi.org/10.7334/psicothema2019.310>.
- Kay, S.R., Fiszbein, A., Opler, L.A., 1987. The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophr. Bull.* 13, 261–276.
- López-Navarro, E., 2018. Contributions of executive functions components to affective and cognitive theory of mind in outpatients diagnosed with schizophrenia. *Psychiatry Res.* 269, 124–125. <https://doi.org/10.1016/j.psychres.2018.08.018>.
- López-Navarro, E., Al-Halabi, S., 2021. Effects of mindfulness on psychotic symptoms: insights from a randomized clinical trial. *Psychosis* 1–6. <https://doi.org/10.1080/17522439.2021.1889649>.
- López-Navarro, E., Del Canto, C., Belber, M., Mayol, A., Fernández-Alonso, O., Lluís, J., Munar, E., Chadwick, P., 2015. Mindfulness improves psychological quality of life in

- community-based patients with severe mental health problems: a pilot randomized clinical trial. *Schizophr. Res.* 168 <https://doi.org/10.1016/j.schres.2015.08.016>.
- López-Navarro, E., Del Canto, C., Mayol, A., Fernández-Alonso, O., Reig, J., Munar, E., 2020. Does mindfulness improve inhibitory control in psychotic disorders? A randomized controlled clinical trial. *Int. J. Clin. Health Psychol.* <https://doi.org/10.1016/j.ijchp.2020.07.002>.
- Miyake, A., Friedman, N.P., Emerson, M.J., Witzki, A.H., Howerter, A., Wager, T.D., 2000. The unity and diversity of executive functions and their contributions to complex “frontal lobe” tasks: a latent variable analysis. *Cogn. Psychol.* 41, 49–100. <https://doi.org/10.1006/cogp.1999.0734>.
- Monfort-Escrig, C., Pena-Garijo, J., 2021. Attributional styles and social functioning in schizophrenia. Is the learned helplessness model suitable? *Clín. Salud* 32, 7–14. <https://doi.org/10.5093/clysa2020a21>.
- Rodríguez-Muñoz, M.F., Al-Halabí, S., 2020. A pathway to excellence. *Clín. Salud* 31, 125–126. <https://doi.org/10.5093/clysa2020a31>.
- Strauss, C., Gu, J., Montero-Marin, J., Whittington, A., Chapman, C., Kuyken, W., 2021. Reducing stress and promoting well-being in healthcare workers using mindfulness-based cognitive therapy for life. *Int. J. Clin. Health Psychol.* 21, 100227 <https://doi.org/10.1016/j.ijchp.2021.100227>.
- Thibaudeau, É., Cellard, C., Turcotte, M., Achim, A.M., 2021. Functional impairments and theory of mind deficits in schizophrenia: a meta-analysis of the associations. *Schizophr. Bull.* <https://doi.org/10.1093/schbul/sbaa182>.
- Trautwein, F.M., Kanske, P., Böckler, A., Singer, T., 2020. Differential benefits of mental training types for attention, compassion, and theory of mind. *Cognition* 194, 104039. <https://doi.org/10.1016/j.cognition.2019.104039>.