



Online mindfulness ameliorate self-observation in psychiatric outpatients with brooding

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ARTICLE INFO

Handling Editor: Dr. Leonardo Fontenelle

Keywords:

Mindfulness

MBI

Psychiatric disorders

Rumination

Brooding

ABSTRACT

Mindfulness-based interventions (MBI) have been used in different psychiatric conditions. Despite that, only a few online mindfulness approaches have focused on psychiatric patients, providing limited and heterogeneous results, making the comparison with in-presence interventions complex. The objective of this pilot study is to evaluate (a) whether online mindfulness practices can improve patients' mindfulness abilities (observation, description, acting with awareness, non-judging, non-reactivity), (b) whether an online MBI can impact general distress as well as on worries and stress perception. Sixty-two psychiatric outpatients with medium-high levels of brooding (41.9 % male, mean age = 44.6, SD = 13.4; 58.1 % female, mean age = 41.7, SD = 12.6) divided into nine groups attended an online (8 sessions) mindfulness intervention. Patients were asked to complete self-assessment questionnaires before (T0) and after (T1) the intervention. We found a significant improvement in mindfulness total scores between T0 and T1, implying increased patient awareness about experiences. We also found a significant improvement in the skill of observing, indicating an ability to see and feel what occurs around and inside us, as well as increased capabilities in non-judging and non-reactivity to inner experiences. Significant differences between T0 and T1 in general distress and an improvement in perceived stress were found, suggesting that an online MBI can increase patients' well-being.

1. Introduction

Mindfulness practice has gained increasing attention in recent years as it has been shown to improve a range of mental health outcomes. Specifically, studies have demonstrated that mindfulness-based interventions (MBI), which include different approaches and protocols, can improve symptoms of anxiety, depression, and stress (Bostock et al., 2019; Kim et al., 2021; Lilly et al., 2019; Özdemir and Kavak Budak, 2022), as well ameliorate self-awareness, emotion regulation, and cognitive flexibility in both clinical and non-clinical populations.

A growing number of studies support the use of MBI as a non-pharmacological integrative treatment also among patients with psychiatric conditions (Chiesa and Serretti, 2011), for example, major depressive disorder (MDD) (Tseng et al., 2023), obsessive-compulsive disorder (OCD) (Chien et al., 2022; Riquelme-Marín et al., 2022;

Zhang et al., 2021) or psychosis (Rossi et al., 2023; Caletti et al., 2023; Yip et al., 2022). A recent systematic review and meta-analysis aiming to investigate the effect of online MBIs revealed that online interventions had statistically significant small to moderate effects in reducing anxiety, depression and stress (Witarto et al., 2022) as well as it highlighted the non-homogeneity of the MBI's protocols and their duration (Goldberg, 2022). Interestingly, the authors suggested that MBIs may be incorporated in other forms of online psychotherapies to enhance their utility in improving various mental health issues. Therefore, our work could contribute to the line of studies given that the protocol used includes techniques based on MBSR and MBCT.

Existent literature suggests that psychiatric patients reported improvements in at least some facets of mindfulness measured, for example, by the Five Facets Mindfulness Questionnaire (FFMQ) developed by Baer and colleagues (Baer et al., 2006a) and, specifically, the

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<https://doi.org/10.1016/j.psycom.2025.100234>

Received 18 March 2024; Received in revised form 6 October 2025; Accepted 11 October 2025

Available online 25 October 2025

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capability of acting with awareness (Randal et al., 2016a; Tong et al., 2016), the ability to observe emotions (Tong et al., 2016; Böge et al., 2021a; Tang et al., 2021), the conscious response to internal stressful stimuli, such as disturbing voices and thoughts (Chadwick et al., 2005; Langer et al., 2012), as well as the capabilities to observe, describe.

In addition, aspects related to wellbeing (Özdemir and Kavak Budak, 2022; Chiesa and Serretti, 2011; Tseng et al., 2023; Chien et al., 2022; Riquelme-Marín et al., 2022; Zhang et al., 2021; Rossi et al., 2023; Caletti et al., 2023; Yip et al., 2022; Witarto et al., 2022; Goldberg, 2022; Baer et al., 2006a; Randal et al., 2016a; Tong et al., 2016; Böge et al., 2021a; Tang et al., 2021; Chadwick et al., 2005; Langer et al., 2012, 2017), perceived stigma (Tang et al., 2021), stress (Kim et al., 2021; Lilly et al., 2019; Özdemir and Kavak Budak, 2022; Chiesa and Serretti, 2011; Tseng et al., 2023; Chien et al., 2022; Riquelme-Marín et al., 2022; Zhang et al., 2021; Rossi et al., 2023; Caletti et al., 2023; Yip et al., 2022; Witarto et al., 2022; Goldberg, 2022; Baer et al., 2006a; Randal et al., 2016a; Tong et al., 2016; Böge et al., 2021a; Tang et al., 2021; Chadwick et al., 2005; Langer et al., 2012, 2017; Jacobsen et al., 2019), social functioning (Özdemir and Kavak Budak, 2022; Böge et al., 2021b; Randal et al., 2016b) and quality of life (Tong et al., 2016; Böge et al., 2021b) seem to be improved after MBI.

However, it is essential to highlight that the primary objective of MBI in psychosis is the possibility of increasing patients' awareness about their experiences and sources of suffering and not getting rid of unpleasant experiences. The aim is to help the patient relate differently with the psychotic symptoms, learning how to manage the stress associated with psychotic experience through present-moment awareness, non-responsiveness, and non-judgment (Abba et al., 2008; Goodliffe et al., 2010; Segal et al., 2002), as well as decrease the degree to which such experiences, if judged, trigger counterproductive reactions (Chadwick et al., 2005; Chadwick, 2019). So, mindfulness' primary objective is not related to changes in symptoms but mainly to their conscious acceptance.

As mentioned, MBIs and the contexts where they are used are highly heterogeneous (Chadwick et al., 2005; Abba et al., 2008; Goodliffe et al., 2010; Segal et al., 2002; Chadwick, 2019). Further research is needed to determine the optimal dose, duration, and delivery of mindfulness interventions in psychiatric populations. In addition, to the best of our knowledge, only a few studies focused on the implementation of mindfulness protocols through online or mobile-app interventions in psychiatric patients (Alvarez-Jimenez et al., 2018; Ellett et al., 2022; Mistler et al., 2017), and to date, it is not yet clear whether the results of these interventions can be considered encouraging and, above all, comparable to those obtained in the presence.

Due to the recent COVID-19 pandemic and the changes in the social context, along with technological progress, clinicians are faced with the need to adapt even more the interventions toward their patients' needs and give continuity to their treatments from remote. For this reason, it is necessary to evaluate whether mindfulness interventions could be carried out via digital technologies, such as mobile applications or delivered online through, for example, video conferencing tools. In this context, it seems crucial and even more urgent to evaluate if the mindfulness interventions delivered through online platforms can benefit patients.

For these reasons, we decided to run a pilot study with the primary aim of evaluating if an online mindfulness intervention, proposed to a group of psychiatric patients who present medium-high levels of rumination, will increase mindfulness abilities (observation, description, acting with awareness, non-judging, and non-reactivity). Rumination is a core feature in the discernment of psychopathology (Kim et al., 2019) and a well-established risk factor for the onset of major depression and anxiety symptomatology. Worry is a cognitive process that includes the negative affectivity (Borkovec et al., 1983). It has been defined by Borkovec et al. (1983) as "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable; it represents an attempt to engage in mental problem-solving on an issue whose outcome is

uncertain but contains the possibility of one or more negative outcomes; consequently, worry relates closely to the fear process". It has been closely examined in numerous models in relation to Generalized Anxiety Disorder (GAD) proposing that individuals with it may use worry as a technique to regulate overwhelming emotional experiences (Borkovec et al., 2004; Mennin et al., 2005; Roemer and Orsillo, 2005).

Experimental data indicates that worry diminishes emotional responses to a subsequent negative stressor in contrast to the preceding worrisome state, implying that worry aims to avert or repress negative feelings in line with regulation models. Nonetheless, the notion that worry fosters emotional avoidance is conflicting, given the ample evidence that worry generates and sustains negative affect. Moreover, several studies indicate that worry can activate both the sympathetic and parasympathetic nervous systems, resulting in an elevation of physiological activity (Andor et al., 2008; Brosschot et al., 2007; Llera and Newman, 2010; Stapinski et al., 2010) as well as the subjective senses, as both individuals with and without GAD reported higher levels of negative emotion in a state of worry (Andor et al., 2008; Llera and Newman, 2010; Borkovec and Costello, 1993).

As a secondary aim, we are interested in measuring the level of general psychological distress and evaluating whether there is a decrease in perceived stress and worry.

This pilot study can be relevant because, in its objective, it wants to provide scientific evidence of the effects of mindfulness practices with remote tools in clinical practice as a support and as an integration into main pharmacological treatments. We expect that online MBIs can be effective in improving patients' mindfulness abilities, which could help patients to relate differently to psychotic symptoms, developing through awareness of the present moment, non-reactivity and non-judgment new strategies to manage the stress associated with the psychotic experience (Segal et al., 2002; Alvarez-Jimenez et al., 2018; Ellett et al., 2022; Mistler et al., 2017; López-Navarro et al., 2015).

2. Material and methods

2.1. Participants

The current study examined data from a cohort of adult patients collected at the Fondazione Ca' Granda, Ospedale Maggiore Policlinico of Milan (Italy), who attended online mindfulness groups starting during the COVID-19 pandemic in April 2020 and ended in December 2022. Between April 2020 and December 2022, we held around three mindfulness groups per year with about 6–8 patients each (9 groups total). Sixty-two psychiatric outpatients who presented medium-high levels of brooding were enrolled. For this pilot study, a waitlist control group or an active control group (e.g. in-person treatment) were not considered based on approved protocols by our ethical committee (CRT, CR2, DigiCovid).

Brooding was measured using The Penn State Worry Questionnaire (PSWQ) (Meyer et al., 1990a). It is a 16-item inventory designed to assess trait Worry and capture the generality, excessiveness, and uncontrollability characteristics of pathological worry (e.g., "my worries overwhelm me". "I worry all the time"). Each item is rated on a 1 (not at all typical of me) to 5 (very typical of me) Likert-type scale. The PSWQ has consistently been found to have good internal consistency and test-retest reliability among samples of college undergraduates for intervals of up to 8–10 weeks (Meyer et al., 1990a). Patients were excluded if they were in an acute phase of symptomatology and could only participate in the mindfulness group once. No other exclusion criteria were applied.

2.2. Procedure

The number of participants was limited to allow the mindfulness instructor to adequately support all patients during meditation, as suggested by literature (Chadwick et al., 2005, 2009, 2016; Chadwick,

2014).

Patients participated in eight weekly sessions, each lasting 2 h, as part of a mindfulness-based course led by an experienced and certified mindfulness instructor, who is also a psychologist-psychotherapist. The group was further supported by two psychologists with a background in clinical cognitive psychology, each with at least two months of practice and experience. These psychologists, a trainee in psychology and a trainee in psychotherapy, had also completed an eight-week course (e.g., Mindfulness for Health in the Psychiatric Unit) and served as both observers and facilitators. The eight sessions were developed based on the Mindfulness-Based Stress Reduction MBSR (Kabat-Zinn, 1982) and Mindfulness-Based Cognitive Therapy MBCT training (Segal et al., 2002). The protocol structure is presented as Supplementary Material (Appendix 1). Briefly, every session had a specific topic: 1) Awareness and autopilot, 2) Living in the mind, keeping the body in mind, 3) Gathering the scattered mind, 4) Recognizing aversion, 5) Accepting, allowing to be, 6) Thoughts are not facts, 7) How can I best take care of myself? 8) Cultivating or nurturing new teachings. Moreover, the program has been integrated with some psychotherapy components, including a focus on dysfunctional thoughts, feeling exercises and behavioural activities.

The protocol intersperses both formal and informal mindfulness practices. Formal mindfulness practices consist of following a guided meditation with clear instructions and using predetermined techniques. This practice helps participants become more confident and start learning mindfulness. On the contrary, informal practices require participants to become as aware as possible of their daily activities, of any type and duration, always trying to pay attention to the present moment.

Homework was assigned at the end of each session as a home practice to support the patients during the week (Jacobsen et al., 2022; Perlini et al., 2020). They were asked to replicate the techniques learned during the last session, and at the beginning of the following lesson, they were asked to comment on their thoughts and difficulties related to the previous week's session.

Groups were performed online through the Zoom platform (Moulton-Perkins et al., 2022), which is considered one of the most efficient and secure video calling platforms, to avoid, as much as possible, technical problems. Patients were reminded to participate in the group thanks to a reminder email sent a few days before each meeting. In case of technical problems, the facilitators called the participants back and informed them of the problems. The session was rescheduled if the problem was not resolved within an adequate time frame (about 15 min). At the end of each week, the facilitators constantly maintained contact with the participants, through a personalized follow-up phone call, aiming at providing constant support by responding to their possible requests or doubts on the topics covered in the session.

At the beginning of each session, the facilitators register the presence of participants in a digital worksheet and ask for feedback regarding homework assignments from all the participants, and at the end of the session, they qualitatively assess the level of engagement of participants reporting comments and feedback related to the activities proposed.

Before the enrolment, participants were asked to read and sign the informed consent. They were also asked to complete a series of self-report questionnaires before (T0) and after (T1) the online group sessions.

To ensure confidentiality during the online sessions, the instructor and facilitators checked the physical environment/setting to avoid interruptions and to prevent conversations from being overheard by others (for example, by reserving a specific room to hold the session). The phone number and email used by facilitators to be in contact with participants were not used or shared for other purposes. At the same time, participants were requested to follow rules of engagement (also reported in Appendix 1), which asked each participant to respect the confidentiality of the group, not to share or divulge what is shared by other participants, not to register the session, to respect others opinion, to

practice in a quiet place to not being disturbed or to disturb other participants. In addition, participants were requested to present themselves only using their first name. Lastly, it is essential to remember that both the instructor and facilitators as psychologists were bound by professional secrecy.

2.3. Assessments

At baseline (T0) and after the end of the group sessions (T1), the Italian-validated versions of four self-assessment scales were administered to participants (Caletti et al., 2020). The Five Facets Mindfulness Questionnaire (FFMQ), 39 items, was specifically focused on changes in the 5-facets of mindfulness. Specifically, it explores thoughts, experiences, and actions in everyday life from a mindfulness perspective (Baer et al., 2006a; Randal et al., 2016a, 2016b; Tong et al., 2016; Böge et al., 2021a, 2021b; Tang et al., 2021; Chadwick et al., 2005, 2009, 2016; Langer et al., 2012, 2017; Jacobsen et al., 2019, 2022; Abba et al., 2008; Goodliffe et al., 2010; Segal et al., 2002; Chadwick, 2014, 2019; Alvarez-Jimenez et al., 2018; Ellett et al., 2022; Mistler et al., 2017; Kim et al., 2019; Borkovec et al., 1983, 2004; Mennin et al., 2005; Roemer and Orsillo, 2005; Andor et al., 2008; Brosschot et al., 2007; Llera and Newman, 2010; Stapinski et al., 2010; Borkovec and Costello, 1993; López-Navarro et al., 2015; Meyer et al., 1990a; Kabat-Zinn, 1982; Perlini et al., 2020; Moulton-Perkins et al., 2022; Caletti et al., 2020; Didonna and Bosio, 2012). This multifactorial rating scale validated for Italian population is divided into 5 subscales evaluating our thoughts, our experiences and our actions in everyday life, each of which evaluates an aspect associated with mindfulness (Observation - Description - Conscious action - Not judgment - Non-reactivity). The scores are calculated by summing the answers and dividing them according to the number of items, with subscales ranging from 1 (very rare) to 5 (always true). High scores are indicative of someone who is more capable of self-awareness in their daily life.

Several studies have investigated the psychometric validity of the FFMQ in different populations reporting good internal consistency and construct validity (Baer et al., 2006b; Bohlmeijer et al., 2011; Hou et al., 2014; Christopher et al., 2012).

Two questionnaires focused on participants' subjective experiences: The Penn State Worry Questionnaire (PSWQ), examining symptoms of pathologic worries (Meyer et al., 1990a), and The Perceived Stress Scale (PSS), which is the most common tool used to measure perceived stress (Cohen et al., 1994). Respectively, the PSWQ was developed to assess the trait of worry and has proven to be a reliable and valid measure in a large series of studies (Hirsch et al., 2013) because it examines symptoms of pathological concern detecting therefore the presence of pathological anxiety-type brooding/worry. Scores may fall within the following severity ranges: above a score of 55 the presence of a moderate tendency to brooding is detected, while a score above 66 underlines the tendency for brooding to be strong.

Several studies demonstrated excellent internal consistency, test-retest reliability, and convergent validity across different populations (Meyer et al., 1990b) with a study recommending careful interpretation of total scores in clinical contexts (Behar et al., 2003).

The PSS is a measure of the degree to which situations in a person's life are appraised as stressful in the last month; so it is important to pay attention to the temporal characteristics, since the levels of perceived stress is influenced by major events and changes in adaptive resources as occurred during the pandemic. This scale has been widely validated as a measure of perceived stress. Several studies demonstrated strong internal consistency and construct validity, correlating well with measures of life events and psychological symptoms (Roberti et al., 2006; Lee, 2012; Barbosa-Leiker et al., 2013).

Finally, the Outcome Questionnaire-45 (OQ-45) evaluates symptomatology, interpersonal problems, and social functioning (Chiappelli et al., 2008; Lambert et al., 2004), measuring general physiological distress. The Italian version of the questionnaire seems promising as a

measure of general psychological distress and could be used to measure the outcome of psychotherapy in routine clinical practice. Also, some other studies found consistent results supporting its use in clinical settings (Bludworth et al., 2010) and its sensitivity to clinical change, which makes it valuable for outcome monitoring (Vermeersch et al., 2000).

It is formed by three subscales: 1) The SD subscale is composed of items that reflect anxious symptoms. A high score indicates perceived annoyance, while low scores indicate the absence or denial of symptoms. Symptom scores are highly correlated with various measures of depression (e.g., the BDI) and anxiety (e.g., the State-Trait Anxiety Inventory). 2) The IR subscale evaluates disorders such as loneliness, conflicts with others, family and marital problems. High scores suggest difficulties in these areas, while low scores indicate the absence of problems and satisfaction with the quality of intimate relationships. Lastly, in the SR subscale, difficulties in social roles (work or student) are highlighted, evaluating conflicts, overwork, discomfort and inefficiency in these roles. High scores indicate difficulties in social roles, while low scores indicate adequate adaptation.

2.4. Materials

At each session, patients were given a participants' workbook containing chapters for each of the eight weeks of practice, including formal and informal practices. Moreover, during each session, some slides were shared with the lesson's content, and audio recordings were provided to allow participants the possibility to practice at home. Materials were created ad-hoc and were based on published literature (Segal et al., 2002; Kabat-Zinn, 1982; Didonna, 2012, 2019; Linehan, 2014; Williams and Penman, 2014).

2.5. Statistical analysis

Statistical analyses were conducted using R-backed JASP 0.16.1 software (JASP Team, 2023). Descriptive analyses were performed for the variables under consideration, including mean and standard deviation. Differences between T0 and T1 in mindfulness abilities (observation, description, acting with awareness, non-judging, and non-reactivity), general psychological distress, and perceived stress and worry were assessed using the Wilcoxon test. This choice was made due to the non-normal distribution of some variables, confirmed via the Shapiro-Wilk test, to ensure methodological consistency. This makes it especially useful when the distribution of the variables is skewed, contains outliers, or deviates from normality in other ways. Skewed data or heavy-tailed distributions can distort the mean, making it an inaccurate measure of central tendency, and outliers can disproportionately influence the test results. The Wilcoxon test circumvents these problems in our data by using the median rather than the mean and ranks rather than the actual data values. This rank-based approach means that the test focuses on the relative order of the data points rather than their exact values. As a result, extreme values (outliers) have less influence on the outcome of the test. By ranking the data, the Wilcoxon test makes the analysis more robust to violations of normality because the ranks are not as sensitive to the shape or spread of the distribution as the raw data values are. Due to the exploratory nature of this study, a formal sample size calculation would have been of little value and therefore it was not performed. Similarly, Bonferroni correction was not applied in our analyses as we were interested in identifying possible trends that can be further validated in future research rather than being overly stringent with Type I error control. Given the small amount of missing data in our dataset, the handling of missing data was performed through case-wise deletion, whereby any records with missing values were excluded from the analysis. Consequently, the results are based solely on complete cases.

3. Results

3.1. Demographics

Sixty-two subjects were enrolled in the study (mean age = 44, SD = 12.86). Of them, 58.1 % were female (mean age = 43, SD = 12.4), while 41.9 % were male (mean age = 46, SD = 13.5). Between them, the average years of education are 14, with a minimum of 8 years and a maximum of 18 years. 60 % of the participants had a diagnosed mood disorder, 27 % were diagnosed with an anxiety disorder while only 13 % had a diagnosis within the schizophrenia spectrum or other psychotic disorders (Supplementary Material, Tables 4). Eight participants (12.9 %) dropped initially and did not complete the baseline assessment (T0). Fifteen participants (24.2 %) dropped after the treatment before completing the post-intervention assessment (T1) (Supplementary Material, Table 3). Overall, 39 patients (62.9 %) completed the training, and the post-test assessments (T1), and their results were included in the analysis.

3.2. Primary outcomes (five facets of mindfulness)

We observed a statistically significant T0-T1 change in the total scores of the FFMQ scale ($W = 115.500$, $p < 0.001$; Cohen's $d = 0.03$) (Table 1), showing increased mindfulness abilities after eight weeks of training. In addition, we found a statistically significant effects on three of the five subscales of the FFMQ: observing subscale ($W = 72.500$, $p = 0.002$; Cohen's $d = 0.01$), non-judging of inner experience ($W = 144.500$, $p = 0.043$; Cohen's $d = 0.02$) and non-reactivity to inner experience ($W = 93.000$, $p = 0.002$; Cohen's $d = 0.03$) (Fig. 1). No further differences were observed in other FFMQ subscales ($p > 0.05$).

3.3. Secondary outcomes

Analyses also revealed statistically significant T0-T1 differences in general distress as measured by the OQ-45 scale ($W = 541.500$, $p < 0.001$; Cohen's $d = 0.01$) (Table 2), and detailed in Fig. 2. The T0-T1 difference was also statistically significant on the subscales interpersonal relationships ($W = 491.500$, $p < 0.001$; Cohen's $d = 0.01$) and symptoms distress ($W = 531.500$, $p = 0.002$; Cohen's $d = 0.01$) (Table 2).

However, following the criteria for the cut-off scales, the reduction in the whole score does not reach the level of non-pathological symptoms. The total score does not decrease by fourteen (14) or more points as needed to speak of improvements. As described in the literature (Chiappelli et al., 2008; Lambert et al., 2004), a decrease of less than fourteen (14) points leads to dubious cases.

No significant changes were observed neither in the Penn State Worry Questionnaire (PSWQ), nor in the Perceived Stress Scale (PSS) T0-T1 scores (Table 2).

4. Conclusions

4.1. Theoretical and practical implications

The primary aim of this pilot study was to analyze whether an online mindfulness intervention on patients with high rumination could improve the five facets of mindfulness. Secondly, because mindfulness does not act directly on symptoms but mainly on awareness, we were interested in evaluating whether online MBI could impact perceived stress and worries and improve general psychological distress.

As for the primary aim, we found a statistically significant impact of the treatment on the total score of the FFMQ scale, meaning an increased patient's awareness about experiences and, possibly, amelioration in their approach to unpleasant experiences (Abba et al., 2008; Goodliffe et al., 2010; Segal et al., 2002). Also, we found an improvement in the peculiar skill of observing, which may suggest an increased patient's

Table 1
T0-T1 differences in five facets of mindfulness.

| T0 score | T1 score | Test | Statistic | z | df | p |
|---|---|----------|-----------|--------|----|--------|
| FFMQ-39 Total_T0 | FFMQ-39 Total_T1 | Wilcoxon | 115.500 | -3.417 | 35 | <0.001 |
| FFMQ-39 Observing_T0 | FFMQ-39 Observing_T1 | Wilcoxon | 72.500 | -3.135 | 35 | 0.002 |
| FFMQ-39 Describing_T0 | FFMQ-39 Describing_T1 | Wilcoxon | 173.500 | -1.214 | 35 | 0.227 |
| FFMQ-39 Acting with awareness_T0 | FFMQ-39 Acting with awareness_T1 | Wilcoxon | 178.000 | -1.608 | 35 | 0.109 |
| FFMQ-39 Non judging of Inner Experience_T0 | FFMQ-39 Non judging of Inner Experience_T1 | Wilcoxon | 144.500 | -2.028 | 35 | 0.043 |
| FFMQ-39 Non reactivity to Inner Experience_T0 | FFMQ-39 Non reactivity to Inner Experience_T1 | Wilcoxon | 93.000 | -3.037 | 35 | 0.002 |

Note: T0 = Measure1; T1 = Measure2.

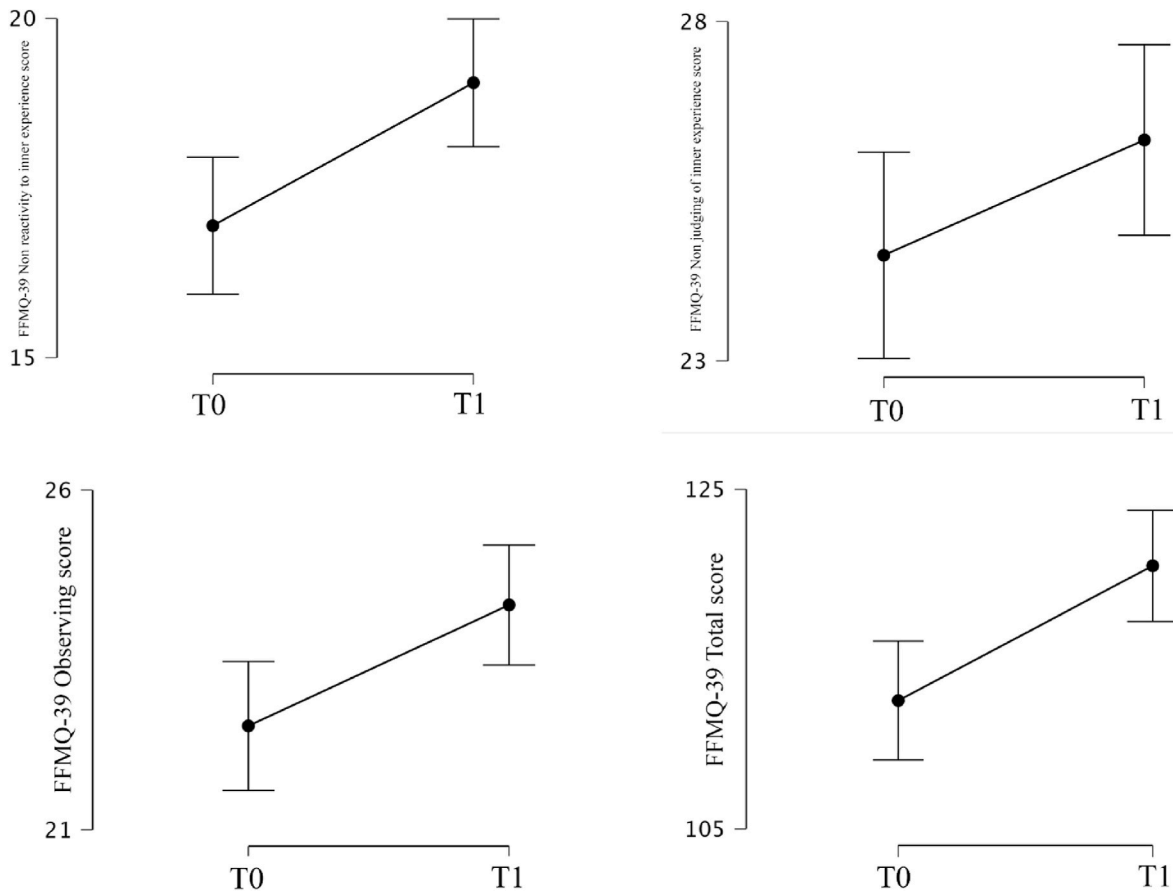


Fig. 1. T0-T1 difference in Five Facets Mindfulness total score and observing, non judging of inner experience and non reactivity to inner experience subscales.

Table 2
T0-T1 differences in secondary outcomes.

| T0 score | T1 score | Test | Statistic | z | df | p |
|----------------------------------|----------------------------------|----------|-----------|-------|----|--------|
| OQ-45 Total_T0 | OQ-45 Total_T1 | Wilcoxon | 541.500 | 3.710 | 36 | <0.001 |
| OQ-45-Symptoms Distress_T0 | OQ-45-Symptoms Distress_T1 | Wilcoxon | 531.500 | 3.119 | 36 | 0.002 |
| OQ-45-Interpersonal Relations_T0 | OQ-45-Interpersonal Relations_T1 | Wilcoxon | 491.500 | 3.770 | 36 | <0.001 |
| OQ-45-Social Role_T0 | OQ-45-Social Role_T1 | Wilcoxon | 438.500 | 1.657 | 36 | 0.098 |
| PSWQ_T0 | PSWQ_T1 | Wilcoxon | 447.500 | 1.799 | 37 | 0.073 |
| PSS_T0 | PSS_T1 | Wilcoxon | 266.000 | 0.353 | 37 | 0.731 |

Note: T0 = Measure1; T1 = Measure2.

ability to see and feel what occurs around and inside them (Tong et al., 2016; Böge et al., 2021a). In addition, non-responsiveness and non-judgment attitudes were significantly improved. This may imply that an online MBI could help psychiatric outpatients with medium to high levels of brooding to develop a more conscious response to external stimuli (non-responsiveness) and, at the same time, help them to let go the ruminative thoughts and the related self-critiques (non-judgment) (Abba et al., 2008; Goodliffe et al., 2010; Segal et al., 2002). Even more,

these results strengthen the idea that the mindfulness approach can improve the conscious acceptance of symptoms and bring positive implications in the daily lives of patients and in their approach to symptoms and treatment. Albeit not reaching the statistical significance, the mean scores of describing and acting with awareness subscales increased after the treatment, suggesting a trend for a positive effect of the online mindfulness intervention we administered. This is in line with previous literature, suggesting online MBIs as an additional support tool for

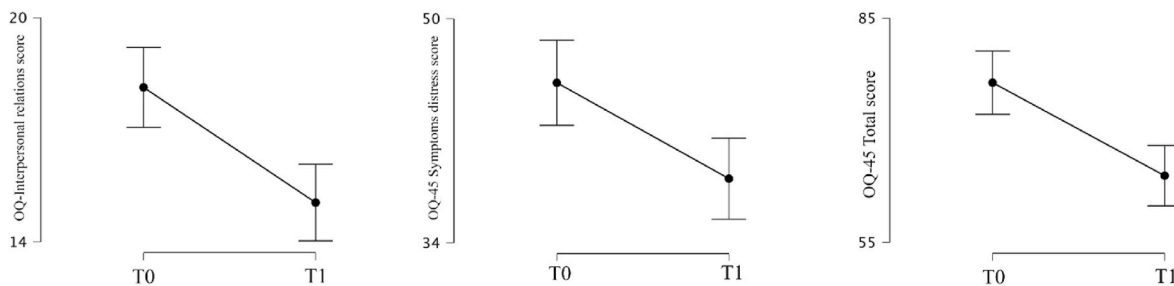


Fig. 2. T0-T1 difference in interpersonal relations and symptoms distress subscales and in general distress scale.

managing patient's psychopathology (Chiesa and Serretti, 2011). Regarding our second objective, we found a significant reduction between T0 and T1 in the general psychological distress level, as measured by OQ-45, and positive results in the subscales related to symptoms of distress and interpersonal relations. Such results suggest that online MBI can help reduce suffering and, at the same time, improve participants' psychosocial functioning. Within the OQ-45, the total score did not reach the level of non-pathological symptoms. This lack of change may be attributed to the fact that improvements require more time supported also by more targeted cognitive interventions. A single MBI intervention, given its limited duration and the absence of follow-up, may not be sufficient to directly influence the whole level of pathology (Cramer et al., 2016). In addition, a significant improvement in perceived stress was observed at the end of the treatment, which suggests that intervention can help patients to better cope with stress perception and its impact on daily life. Overall, this pilot study offers some initial evidence of how an online mindfulness protocol offered to a psychiatric population can increase mindfulness skills. It also highlighted how mindfulness-acquired skills can improve the patient's ability to relate differently to discomfort and suffering. After our MBIs intervention we observed significant changes in the Observing, Non-reactivity to inner experience and Not judging of inner experience subscales of the FFMQ. The practical implications of these clinical positive outcome may result in improvement of the ability to pay attention, therefore to observe own feelings, thoughts and emotions without becoming overwhelmed by them and without assigning positive or negative evaluations to them. In addition, becoming able to be in contact with thoughts, emotions, or physical sensations without trying to change or suppress them could lead to a reduction in impulsive reactions. Differently, according to our results, the present MBI does not lead to significant improvement in labeling experiences with words (describing facet) and in focusing attention on one's current activity (acting with awareness facet). These are important factors that could be taken into account when structuring a more rigorous protocol. Moreover, further studies are warranted, especially because we believe that, for patients experiencing psychiatric symptoms, an extended follow-up period could be particularly beneficial. This would allow the positive effects of the practice to be more fully reflected in the facets of acting with awareness and describing, as these aspects, as one might expect, require more sustained personal effort. Acting with awareness fosters a deeper sense of fulfilment in everyday life and may only become truly accessible as symptoms improve. Similarly, the describing facet likely necessitates additional time for individuals to cultivate a clear and precise understanding of their internal and external experiences—an insight that develops gradually (Chien et al., 2020).

Despite the fact that general results are encouraging, they need to be tested more in-depth to understand, for example, if specific facets of MBI can impact more directly on symptoms. However, we know that the focus of MBI is not to cope with symptoms but conversely to increase patients' strategies and awareness to cope with pathology (Chadwick et al., 2005; Jacobsen et al., 2019; Abba et al., 2008; Goodliffe et al., 2010; Segal et al., 2002).

4.2. Strengths, limitations, and future directions

This pilot study has both strengths and limitations. Strengths are mainly related to the limited number of studies that focus on online mindfulness intervention in this specific population, so this intervention can be identified as a first step to evaluating remote MBI impact on patients with psychiatric conditions. In addition, the results obtained from our study suggest that Mindfulness practised online, as well as widely studied and practised in person, if practised continuously, can help individuals with a high level of rumination to develop a more conscious response to external stimuli and, at the same time, allow them to let go of ruminative thoughts and related self-criticisms. Even more, these results strengthen the idea that Mindfulness can improve the conscious acceptance of symptoms, positively impact patients' daily lives, and improve their approach to symptoms and treatment.

Conversely, the first limitation is mainly related to the limited number of participants involved and their clinical heterogeneity (table 4, supplementary material), which may have limited the generalizability of our results. Therefore, future studies should pay more attention to selection. Participants should be identified and included in the study based on their diagnosis. This was not done in our pilot study because the idea of intervention starts from a clinical need to help patients during COVID-19, when they can no longer reach day hospital service and not specifically from a research question. Composing homogeneous groups will help to evaluate specific differences related to psychiatric diagnosis.

For this reason, we hope that starting from our preliminary results, future studies can increase the number of patients or outpatients recruited. This will lead to the possibility of conducting additional analyses to explore possible differences in responses based on variables of interest that we could not consider, like age, gender, status, symptoms, etc. Moreover, another limitation of this study is the sensitivity of the Wilcoxon test to outliers. Since the Wilcoxon test ranks data rather than relying on raw values, extreme values can still disproportionately impact the results, especially in small samples. Nonetheless, non-parametric tests like Wilcoxon are often chosen for their robustness when data do not meet parametric assumptions. However, future studies might consider complementary methods or additional data screening procedures to minimize the impact of outliers.

Additionally, in our study we did not consider intermediate evaluations throughout the study period and therefore, without multiple time points, it was impossible to assess how outcomes evolved over time or whether any observed changes were consistent, gradual, or fluctuated. This limits the ability to capture temporal trends and may overlook important transitional phases or early indicators of change. Incorporating intermediate assessments in future research would provide a more comprehensive understanding of the dynamics at play and could offer deeper insights into the progression and timing of effects.

A further limitation lies in the fact that our pilot study lacked a control condition, which limits the ability to draw definitive conclusions. However, it is important to point out that many studies in the field of psychological and behavioral interventions have been conducted without the inclusion of a control group, particularly in early-stage or

pilot research. These studies are still considered valuable for assessing the practicality, acceptability, and potential efficacy of new interventions (Leon et al., 2011).

Also, it will be important that future studies can compare online with in-person intervention to strengthen the effectiveness of the results.

Our preliminary data also opens some research directions. One of them is undoubtedly related to the feasibility of such an intervention. As stated before, around 37 % of participants dropped out of the study. Study drop-out is one of the main problems reported in the literature relating to MBI, in which adherence to the protocol varies from 56 % to 100 % (Li et al., 2021; van der Valk et al., 2013). In clinical terms, ensuring continuity and adherence to protocols is essential. The online environment was one of the main critical issues encountered and, therefore, considered a limitation to participation. Indeed, our sample demonstrated some difficulties in using digital devices at the beginning of the intervention. In our case, a big challenge of this type of intervention was that participants were required to learn to use a digital tool such as Zoom. In our case, facilitators have personally followed up with outpatients through calls and emails. However, future studies could identify more personalized and digital follow-ups. Another limitation related to online intervention was technical issues that can lead to session interruptions or suspensions. Future studies should foresee a recovery plan or, in any case, explain how to behave at the beginning of the intervention in case of technical problems.

However, in general, future studies should identify strategies to improve engagement, such as, for example, creating more homogeneous groups per clinical conditions; this could potentially help to build peer relationships that would support participants to be adherent to intervention. At the same time, this could help instructors and facilitators adapt content to outpatients' specific needs. Also, digital device properties can help improve adherence and engagement. For example, future studies can include automatic electronic reminders for participating in sessions, practice, and homework. A gamified reward after each session completed can increase the intention to participate and to practice. Also, more on-request support can be evaluated to increase participation. Another interesting approach for increased adherence could be related to the valorization of home practice. Indeed, one of the most relevant components in the success of MBI is the continuity of home practice that should be suggested but not imposed on patients with psychiatric conditions (Bøge et al., 2021b; Randal et al., 2016b; Abba et al., 2008; Goodliffe et al., 2010; Segal et al., 2002; Chadwick, 2019; Alvarez-Jimenez et al., 2018; Ellett et al., 2022; Mistler et al., 2017; Kim et al., 2019; Borkovec et al., 1983; Borkovec et al., 2004; Mennin et al., 2005; Roemer and Orsillo, 2005; Andor et al., 2008; Brosschot et al., 2007; Llera and Newman, 2010; Stapinski et al., 2010; Borkovec and Costello, 1993; López-Navarro et al., 2015; Meyer et al., 1990a; Chadwick, 2014; Chadwick et al., 2009; Chadwick et al., 2016; Kabat-Zinn, 1982; Jacobsen et al., 2022; Perlini et al., 2020; Moulton-Perkins et al., 2022; Caletti et al., 2020; Didonna and Bosio, 2012; Baer et al., 2006b; Bohlmeijer et al., 2011; Hou et al., 2014; Christopher et al., 2012; Cohen et al., 1994; Hirsch et al., 2013; Meyer et al., 1990b; Behar et al., 2003; Roberti et al., 2006; Lee, 2012; Barbosa-Leiker et al., 2013; Chiappelli et al., 2008; Lambert et al., 2004; Bludworth et al., 2010; Vermeersch et al., 2000; Didonna, 2019; Didonna, 2012; Linehan, 2014; Williams and Penman, 2014; JASP Team, 2023; Cramer et al., 2016; Chien et al., 2020; Leon et al., 2011; Li et al., 2021; van der Valk et al., 2013; Lacaille et al., 2018). Even if our protocol included the use of home practice and the possibility of commenting on them during the subsequent session, these home practice sessions could be more well-structured, also defining specific feedback moments between one session and another. Future studies should pay greater attention to documenting the type and frequency of home practice carried out by patients to understand the possible relationship between it and the effects of interventions.

Finally, we found changes in interpersonal relationship subscales. It suggests that mindfulness online practice can improve patients' psychosocial functioning (Harvey and Strassnig, 2012; Jansen et al., 2020),

which in turn could reduce perceived social isolation. Therefore, further studies are needed to evaluate if mindfulness can be beneficial in decreasing social isolation since online approaches could lessen the difficulties of these patients due to social isolation, keeping patients involved and compliant with the lessons, the group, and their standard therapies.

Our preliminary results suggest a positive impact of online mindfulness practice on our sample of psychiatric outpatients. Indeed, due to the presence of mood disorders in our sample, the intervention also made use of techniques described by DBT which may led to potential benefits for depressive symptoms and emotion regulation as shown in literature (Jones et al., 2023).

This approach started from clinical needs and could be extended to more detailed research questions, validating the presented structured online mindfulness therapy protocol, which should also be enlarged, focusing on home practice and feedback. Therefore, further studies on larger scale are needed to confirm our results.

CRediT authorship contribution statement

Elisabetta Caletti: Writing – review & editing, Writing – original draft, Conceptualization. **Giuseppe Delvecchio:** Methodology, Data curation. **Margherita Herold:** Writing – review & editing, Writing – original draft, Conceptualization. **Nunzio Turtulici:** Methodology, Formal analysis. **Ylenia Barone:** Writing – review & editing, Conceptualization. **Cinzia Perlini:** Writing – review & editing. **Paolo Brambilla:** Supervision, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Paolo Brambilla was partially supported by grants from the Italian Ministry of Education and Research - MUR ('Dipartimenti di Eccellenza' Programme 2023–27 - Dept. of Pathophysiology and Transplantation, Università degli Studi di Milano), the Italian Ministry of Health (Hub Life Science- Diagnostica Avanzata, HLS-DA, PNC-E3-2022-23683266–CUP: C43C22001630001 / MI-0117; Ricerca Corrente 2025), by ERA-NET Neuron JTC 2023 (ERP-2023-23684211- ResilNet).

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.psychom.2025.100234>.

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