A pilot study of the effect of group-administered psilocybin on psychological flexibility and outcomes

BRIAN PILECKI, JASON LUOMA and KATI M. LEAR

Portland Psychotherapy Clinic, Research, and Training Center, Portland, OR, USA

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ABSTRACT

Psychological flexibility has been proposed as a core process of change when psychedelics are used for therapeutic purposes, but to date empirical outcomes have only documented changes on the Acceptance and Action Questionnaire (AAQ-II), a very general measure of psychological flexibility. This pilot study measured outcomes from psilocybin administered in a retreat setting across a range of measures assessing aspects of psychological flexibility. Nine participants attended a 7-day psilocybin retreat and completed measures at baseline, 2-, and 6-month follow up. Participants demonstrated significant improvements in cognitive defusion (Cognitive Fusion Questionnaire), valued living (Valuing Questionnaire), and Self-Compassion (Self-Compassion Scale), as well as a trend towards increased overall psychological flexibility (AAQ). Other outcome and process measures included measures related to acute effects of the psilocybin, belief in oneness, social safeness, mental health, burnout and emotion expressivity. These results offer preliminary evidence that therapeutic benefits obtained from psilocybin experiences may be linked to changes in psychological flexibility.

KEYWORDS

psychedelic-assisted therapy, psilocybin, psychological flexibility, processes of change

THE EFFECT OF GROUP-ADMINISTERED PSilocYBIN ON PSYCHOLOGICAL FLEXIBILITY AND OUTCOMES

Research on the efficacy of psychedelic-assisted therapy (PAT) has expanded rapidly in the last decade. The FDA has designated breakthrough therapy status for MDMA-assisted therapy for PTSD (Feduccia et al., 2019) and for psilocybin-assisted therapy for treatment-resistant depression (Lowe et al., 2021) and clinical trials have provided preliminary evidence that PAT may be helpful in the treatment of depression, anxiety and distress associated with life threatening illness, PTSD, social anxiety, and other problems (Luoma, Chwyl, Bathje, Davis, & Lancelotta, 2020). However, most clinical research to date has focused on symptom reduction outcomes and neglected empirical study of underlying psychological processes of change. There is a need to better understand these processes in order to inform the psychotherapy portion of psychedelic-assisted therapy. In other words, because psychedelic experiences are highly influenced by set and setting, understanding underlying psychological and behavioral processes of change will be helpful in preparing clients through targeted interventions that can maximize benefit by highlighting therapeutic concepts or skills that are most relevant to psychedelic experiences. This is important in conserving resources given the costs associated with psychedelic-assisted therapy and psychotherapy in general.

One process of change that has been proposed by several authors as a central mechanism of change in PAT is psychological flexibility (Kočárová, Horáček, & Carhart-Harris, 2021; Luoma et al., 2020; Walsh & Thiessen, 2018), or the ability to be in contact with the present moment and based on what the situation is, changing or persisting in behavior that aligns...
with our values (Hayes, Strosahl, & Wilson, 2004). Psychological flexibility is a broad construct that spans many disciplines such as emotion regulation, neuroscience, personality, and social psychology and may be fundamental to mental health (Kashdan & Rottenberg, 2010). Acceptance and commitment therapy (ACT) focuses on increasing psychological flexibility and has been or is currently being used in several clinical trials on psychedelic assisted therapy (Sloshower et al., 2020; Watts & Luoma, 2020). ACT has the advantage of being an evidence-based therapeutic approach with support from several hundred trials across a range of diagnostic conditions (A-Tjak et al., 2015; Gloster, Walder, Levin, Twohig, & Karekla, 2020) and is also an approach that seems to map on well to the psychedelic experience (Luoma, Sabucedo, Eriksson, Gates, & Pilecki, 2019; Yaden et al., 2022), perhaps explaining why it has been adopted in multiple PAT studies. ACT posits six core processes that comprise psychological flexibility: acceptance, cognitive defusion, self-as-context, present-moment awareness, values, and committed action (Hayes, Strosahl, & Wilson, 2011). ACT views mental health problems occurring primarily due to psychological inflexibility (the inverse of psychological flexibility) which centers inflexible or rigid coping at the heart of psychopathology.

Initial studies of people taking psychedelics in uncontrolled contexts (Close et al., 2020; Davis, Barrett, & Griffiths, 2020; Zeifman et al., 2020) and retreat contexts (Agin-Liebes et al., 2022; Manning, Averill, & Davis, 2022) have shown increases in psychological flexibility post-administration, as measured by the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011), and that these improvements are correlated with improvements in various measures of depression, anxiety, and PTSD symptoms. One of these studies also showed that improvement in psychological flexibility was associated with occurrences of mystical experiences and emotional breakthroughs during administration, two constructs shown to be associated with treatment efficacy in PAT (Close et al., 2020). It has also been shown that increases in psychological flexibility were associated with reductions in racial trauma symptoms after psychedelic experiences (Haeny et al., 2023). Finally, qualitative reports of participants in a clinical trial of psilocybin for depression suggest spontaneous themes of change related to psychological flexibility such as greater acceptance and clarity of values (Watts & Luoma, 2020). Taken together, these findings suggest the utility of psychological flexibility in understanding processes of change occurring in PAT and the need for further investigation.

One limitation of the empirical data described above is that they have solely used a general measure of psychological flexibility, the AAQ-II, which has been critiqued for several methodological shortcomings. Multiple studies have shown that the AAQ correlates more highly with measures of distress or negative affect than with other measures presumably related to psychological flexibility such as mindfulness or acceptance (Davis, Xin, Sepeda, Garcia-Romeu, & Williams, 2021; Rochefort, Baldwin, & Chmielewski, 2018; Tyndall et al., 2019; Wol gast, 2014) leading several authors to conclude the AAQ is more a measure of negative affect or neuroticism than psychological flexibility (Rochefort et al., 2018; Tyndall et al., 2019; Wol gast, 2014). The AAQ has also been shown to be relatively insensitive to intervention (Benoy et al., 2019) and has shown problems in item-response theory analyses (Ong, Pierce, Woods, Twohig, & Levin, 2019). To the extent the AAQ is valid, it also does not differentiate between different facets of psychological flexibility, thereby providing very little information about what aspects of psychological flexibility may be impacted by psychedelics. Thus, while initial empirical results supporting the role of psychological flexibility are promising, they remain tenuous in the context of the AAQ’s limitations. A better understanding of which facets of psychological flexibility are most affected by psychedelics may inform treatments targeting these facets or selection of clients, as well as inform more targeted studies relating to these particular processes.

The aim of the current study was to advance the current literature by examining the effect of a psychedelic on more specific domains of psychological flexibility using psychometrically stronger measures. Toward this end, longitudinal data was collected on people participating in a psilocybin retreat to examine changes on cognitive fusion and values driven behavior, in addition to the AAQ-II. Cognitive fusion refers to when a person follows rigid rules such as “other people are not to be trusted” or “I can’t handle being rejected again” and then are less attuned to the direct consequences of their actions. Interventions that aim to promote cognitive defusion help people gain more distance from their thoughts and become more flexible by making choices based on their values. Values are freely chosen qualities of action that function as guideposts for our behavior (Dahl, 2015). In simpler terms, values are what give us meaning and purpose and represent how we ideally would like to be living our lives. Mental health problems such as depression and anxiety often take one off-track from their valued directions, so ACT values interventions are designed to help clients identify and orient their behavior around their values. Other relevant variables were also assessed including self-compassion, social and affective process variables, acute effects of the psilocybin experience, and general well-being.

**METHOD**

A pilot study was conducted on a small group of participants attending a week-long psilocybin retreat at a private retreat center in Jamaica, a country where psilocybin-containing fungi are legal to possess and consume. The retreat included three psilocybin sessions during which each participant chose their own dose. Group-based preparation and integration sessions were facilitated by staff members of the retreat center and occurred before and after psilocybin
sessions. Participants shared living quarters and meals together as part of the retreat environment. One individual integration session was offered in the weeks after the retreat ended, though the degree of utilization of this session was not measured.

To examine the effects of psilocybin on psychological processes over time, we administered a series of measures at baseline (one week before the retreat began), two weeks after the retreat, and six months after the retreat. Measures examining psychological processes included the Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011), the Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014), Valuing Questionnaire (VQ; Smout et al., 2014), Self-Compassion Scale (SCS; Raes, Pommier, Neff, & Van Gucht, 2011), and Berkeley Expressivity Questionnaire (BEQ; Gross & John, 1997). Two measures of beliefs, emotions, and attitudes were included: Belief in Oneness Scale (BOS; Diebels & Leary, 2018) and Social Safeness and Pleasure Scale (SSPS; Gilbert et al., 2009). We also included measures of general well-being for non-clinical samples: the Clinical Outcomes in Routine Evaluation Outcome Measure—General Population version (GP-Core; Evans, Connell, Audin, Sinclair, & Leary, 2018) and Social Safeness and Pleasure Scale (OLBI; Demerouti & Nachreiner, 1998).

In order to compare the effects of the retreat setting to the effects of psilocybin administered in clinical trial settings, several measures were administered at the conclusion of the retreat. These included the Challenging Experiences Questionnaire (CEQ; Barrett, Bradstreet, Leoutsakos, Johnson, & Griffiths, 2016), Mystical Experiences Questionnaire (MEQ; Barrett, Johnson, & Griffiths, 2015), and Ego Dissolution Inventory (EDI; Nour, Evans, Nutt, & Carhart-Harris, 2016). Scores for the CEQ and MEQ are expressed as decimals as a percentage of the maximum possible scores (Barrett et al., 2015, 2016). Participants were also asked three questions that have been included in several prior psilocybin clinical trials, including how personally meaningful and spiritually significant the retreat was, as well as the degree to which it led to changes in personal well-being or life satisfaction (Davis, Barrett, May, et al., 2020).

Descriptive statistics were calculated for the end-of-retreat measures and compared against participants in controlled clinical trials. Pre-post measures were analyzed using paired-sample t-tests comparing the sample means at baseline and 2-week follow up, as well as baseline and 6-month follow up. Effect sizes are expressed as Hedges’ g to adjust for the limited sample size (Lakens, 2013).

RESULTS

Participant characteristics

Nine participants (6 female, 3 male) attended the retreat. Eight participants identified as white and one as mixed race. Two participants identified as Hispanic or Latino. Ages ranged from 41 to 68, with a mean of 52.4. Nine participants were employed: four full-time and five part-time. Four participants endorsed having a regular meditation practice while 5 did not. Four participants identified as having a Master’s degree and five participants identified as having a doctoral-level degree. When asked what their highest dose psilocybin session taken during the retreat was, participants reported between 5 and 12 g of dried, homogenized mushrooms, meaning that all participants had at least one psilocybin session with a dose that was at least 5 g. While the psilocybin content of psilocybe cubensis mushrooms can be highly variable, dried, homogenized psilocybe cubensis is typically thought to be in the realm of 0.5–0.6% psilocybin (Gotvaldová et al., 2021). Thus a 5 mg dose is estimated to be equivalent to 25–30 mg of psilocybin, which is comparable to the dose that many recent psilocybin clinical trials have used (Gandy, 2022).

Outcomes

Psychedelic-related end of retreat assessments are found in Table 1 and process and outcome measures in Table 2. Statistically significant changes associated with medium to large effects were observed on all psychological flexibility process measures. Participants reported a small, nonsignificant reduction in general psychological inflexibility as

<table>
<thead>
<tr>
<th>Scale or Item</th>
<th>Mean (SD)</th>
<th>Total Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDI</td>
<td>54.96 (32.60)</td>
<td>0–100</td>
</tr>
<tr>
<td>MEQ-30</td>
<td>0.75 (0.24)</td>
<td>0–1</td>
</tr>
<tr>
<td>Total</td>
<td>0.75 (0.24)</td>
<td>0–1</td>
</tr>
<tr>
<td>Mystical</td>
<td>0.70 (24)</td>
<td>0–1</td>
</tr>
<tr>
<td>Deeply felt positive mood</td>
<td>0.76 (24)</td>
<td>0–1</td>
</tr>
<tr>
<td>Transcendence of time and space inefability</td>
<td>0.79 (0.22)</td>
<td>0–1</td>
</tr>
<tr>
<td>CEQ</td>
<td>0.41 (0.21)</td>
<td>0–1</td>
</tr>
<tr>
<td>Physical Distress</td>
<td>0.62 (0.47)</td>
<td>0–1</td>
</tr>
<tr>
<td>Grief</td>
<td>0.51 (0.25)</td>
<td>0–1</td>
</tr>
<tr>
<td>Fear</td>
<td>0.35 (0.23)</td>
<td>0–1</td>
</tr>
<tr>
<td>Insanity</td>
<td>0.25 (0.34)</td>
<td>0–1</td>
</tr>
<tr>
<td>Isolation</td>
<td>0.46 (0.29)</td>
<td>0–1</td>
</tr>
<tr>
<td>Death</td>
<td>0.16 (0.25)</td>
<td>0–1</td>
</tr>
<tr>
<td>Paranoia</td>
<td>0.20 (0.21)</td>
<td>0–1</td>
</tr>
<tr>
<td>Personal Meaning</td>
<td>6.56 (0.88)</td>
<td>1–8</td>
</tr>
<tr>
<td>Spiritual Significance</td>
<td>4.00 (1.23)</td>
<td>1–6</td>
</tr>
<tr>
<td>Change in well-being of life satisfaction</td>
<td>2.44 (0.53)</td>
<td>−3 − +3</td>
</tr>
</tbody>
</table>

*Indicates a single item; EDI = Ego Dissolution Inventory; MEQ-30 = Mystical Experiences Questionnaire (30-item version); CEQ = Challenging Experiences Questionnaire; Personal Meaning = How personally meaningful was the experience at the retreat?; Spiritual Significance = Indicate the degree to which the retreat was spiritually significant to you; Change in well-being or life satisfaction = Do you believe the experience at the retreat and your contemplation of that experience have led to changes in your current sense of personal well-being or life satisfaction? MEQ and CEQ scores translated to reflect percentage of the maximum possible score (Barrett et al., 2015, 2016).
measured by the AAQ-II at 2-week follow up (g = 0.44), and a larger, statistically significant effect at 6-month follow up (g = 0.86). Participants also reported significantly less values obstruction, defined as the degree to which valued living is disrupted by factors such as avoidance, at 2-week (g = 1.32) and 6-month follow up (g = 0.99). They reported increases on the progress subscale, which assesses the degree to which one is aware of and persisting in values-based living, at 6-month (g = 1.47) but not 2-week follow up. Significant reductions in cognitive fusion were observed at both 2-week (g = 1.15) and 6-month follow up (g = 0.91). Self-compassion increased at both 2-week (g = 0.89) and 6-month follow up (g = 0.95). Participants reported significant decreases in negative emotional expressivity (g = 0.53) and emotional impulse strength (g = 0.76), or how intensely they felt their emotions, at 2-week follow up, but these did not persist at 6-month follow up. Conversely, participants reported significantly increased positive emotional expression at 6-month follow up (g = 0.39) that was not initially observed at 2-weeks.

Participants reported an increase in belief in oneness (g = 0.75) and their experiences of social safeness and pleasure at 2-week follow up (g = 1.34), but not at 6-month follow up. Finally, participants reported significant improvements in mental well-being at 2-week follow up (g = 1.41) but not at 6-month follow up. No significant changes in burnout were reported at either time point.

**DISCUSSION**

This pilot study is the first to our knowledge to assess the impact of psychedelics on specific measures of psychological flexibility processes beyond the AAQ-II. These results lend
support to the idea that psychedelics can enhance psychological flexibility. Participants demonstrated large effect size improvements in overall psychological flexibility as measured by the AAQ-II at 6-month follow up, but not in the short-term. In addition, participants showed very large reductions in obstruction to valued behavior at 2-week follow up that persisted at the 6-month follow up. Increases in valued living were not observed at 2-week follow up but were large in magnitude at 6-month follow up. It is possible that it may have taken some time for reduced barriers to valued living to manifest in new patterns of behavior that are large enough to be detectable in self-report scales. Cognitive fusion showed large reductions at 2-week follow up with effects largely persisting at six months. Finally, large improvements in self-compassion, a construct related to psychological flexibility, were observed at 2-week follow up and persisted through 6-month follow up, consistent with findings that suggest that increased self-compassion may mediate improvements in depression and anxiety via psychedelic experiences (Fauvel, Strika-Bruneau, & Piolino, 2021). These findings highlight the importance of assessing psychological flexibility in terms of its constituent processes and suggest that the retreat may have had unique effects on different aspects of psychological flexibility, both in terms of size of effect and timing. This more nuanced understanding of psychological flexibility may be helpful in selecting which interventions could have the greatest utility during preparation and integration phases. For example, defusion techniques might be used during integration to support initial changes in defusion precipitated during the acute psychedelic experience. Similarly, changes in values clarity due to the psychedelic experience might be supported with techniques related to committed action in an attempt to put insights into action. Similarly, for researchers, information on which processes are most affected by psychedelics could direct their efforts to better investigate how psychedelics can result in useful changes.

Participants also demonstrated short-term effects on more socially relevant variables such as social safeness and emotional expressivity. Participants reported decreased expression of negative emotion and reduced felt intensity of emotional experiences at 2-week follow up. Though not initially observed at 2-week follow up, participants reported moderate increases in their expression of positive emotions at 6-month follow up. Perhaps this is related to the delayed increase in valued living, with increased valued living at follow up resulting in more positive emotions and emotion expression. If this effect replicates, it may help explain positive social sequalae following psilocybin experiences, as frequent expression of positive emotions is associated with a range of positive social and personal outcomes, including increased perceptions of closeness, positive judgments from others, and better maintenance of romantic relationships (Greenaway & Kalokerinos, 2017). Participants also showed a very large increase in felt social safeness at 2-week follow up, though the effect was only marginally significant at 6-month follow up. In all, our results suggest that psilocybin may have effects on a range of variables important to effective social functioning and a sense of belongingness.

Participants reported large increases in beliefs of oneness at 2-week follow up, but these did not persist through 6 month follow up. The diminution of some effects with time could potentially reflect the “afterglow” effect of psilocybin wherein there is a window of time immediately following the experience that tends to be associated with elevated mood, decreased anxiety, and an increased desire to socialize (Majić, Schmidt, & Gallinat, 2015). Changes in worldview and beliefs have been associated with psychedelic experiences, such as adopting more non-physicalist beliefs (Nayak, Singh, Yaden, & Griffiths, 2022) or no longer identifying as an atheist (Davis, Barrett, May, et al., 2020). No significant effect was found on burnout. Overall, our sample was low in burnout at baseline compared to other samples of working adult populations (Halbesleben & Demerouti, 2005) so this may reflect a floor effect.

Finally, it is also noteworthy that participants in the current study seemed to rate their acute experiences of psilocybin in this retreat context as similar to those found in recent clinical trials and in non-clinical samples. For ratings of how meaningful the psilocybin experiences were, 7 out of 9 participants (78%) rated the experience “among the 5 most meaningful experiences of my life.” This rate is similar to answers to the same question in other studies of psilocybin administration with non-clinical (67%; Griffiths, Richards, Johnson, McCann, & Jesse, 2008) and clinical samples (86.7%; Johnson, Garcia-Romeu, & Griffiths, 2017). Scores on the Challenging Experiences Questionnaire are expressed as the percentage of the maximum possible score that could be reported (as in Barrett et al., 2016; Carbonaro et al., 2016). Our mean score of 41% on the Challenging Experiences Questionnaire was higher than a sample of non-clinical participants who received a single acute dose of psilocybin, which ranged from 12 to 21% depending on the size of the dose (Carbonaro et al., 2016). This discrepancy may actually reflect higher levels of challenging experiences in our sample or they may be due to participants reporting challenging experiences across three dosing sessions relative to one session in the comparison sample.

Limitations of the current study include having a small, non-diverse sample that results in low statistical power. This also precluded our ability to investigate possible moderators of effects such as age, gender, or retreat characteristics. Participants also were generally high functioning, as baseline general well-being (M = 1.18, SD = 0.21) was similar to norms in a non-clinical sample (M = 1.02, SD = 0.63) as measured by the GP-Core (Evans et al., 2005). The level of burnout as identified by the disengagement subscale of the OBLI was relatively low (M = 1.92), yet similar to scores reported in a larger comparison sample of mental health practitioners (M = 2.2; SD = 0.52; Delgadillo, Saxon, & Barkham, 2018). At the same time, the results in our sample could be interpreted as indicative of the potential of psilocybin to facilitate wellness in non-clinical populations. Other limitations included that the retreat
conditions and doses were not systematically controlled and there was no control condition against which to compare effects.

Overall, these results suggest the need for future research on how psychedelics might lead to increased psychological flexibility, especially studies using measures of facets of psychological flexibility rather than the more general AAQ. One option is a measure of acceptance in the context of psychedelics that has been created (Wolff, Mertens, Walter, Enge, & Evens, 2022). Similarly, while the AAQ and valued living questionnaire did not increase at 2-week follow up, defusion and values obstruction improved, suggesting that different facets of psychological flexibility may respond to intervention at different rates. Our data also suggest that psychedelics may enhance cognitive defusion even in the absence of explicit intervention (Luoma et al., 2019) and that values-related change might change spontaneously similar to what has been reported in previous qualitative studies that found that psychedelics can help participants clarify life priorities and reconnect with values (Noorani, Garcia-Romeu, Swift, Griffiths, & Johnson, 2018; Swift et al., 2017).

This study is significant in that it is the first to quantitatively document changes in psychological flexibility facets after psychedelic experiences rather than only more general changes in psychological flexibility. Understanding processes of change involved in psychedelic-assisted therapy is important in informing how psychotherapy can support psychedelic experiences. For example, it might be possible to take steps during preparation to make it even more likely that people will experience cognitive defusion or values clarification during dosing sessions. Alternately, techniques based on psychological flexibility theory might be used to support changes in values that begin during dosing and translate these into long-term behavior change. We are just beginning to understand the link between psychedelics and psychological flexibility and hope this pilot study will spur future research on the topic.

Conflicts of interest: None of the authors have any conflicts of interest to declare.

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