Expectancies for Cannabis-Induced Emotional Breakthrough, Mystical Experiences and Changes in Dysfunctional Attitudes: Perceptions of the Potential for Cannabis-Assisted Psychotherapy for Depression

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ABSTRACT

Psychedelic-assisted psychotherapy has established antidepressant effects. Cannabis users appear to expect high doses administered in a session much like psychedelic-assisted psychotherapy to create comparable subjective effects. The current studies explored expectations of antidepressant effects of such cannabis-assisted sessions to replicate and extend previous work. Users not only expected a cannabis-assisted psychotherapy session to decrease depression, but also to alter some of the same mediators of psychedelic or psychological treatments. Over 500 participants in Study I envisioned a cannabis-assisted therapy session akin to those used in psychedelic therapies and reported the effects that they expected on depression as well as relevant subjective reactions. A second sample of over 500 participants responded to identical measures and an index of dysfunctional attitudes that appears to mediate antidepressant effects of psychotherapy. Expectancies of cannabis-induced antidepressant effects covaried with expected psychedelic effects. Participants also envisioned that cannabis-assisted therapy would alter dysfunctional attitudes, which served as a separate, unique path to expected antidepressant effects unrelated to the subjective effects of psychedelics. These results add support to arguments for relevant clinical trials of cannabis-assisted psychotherapy and suggest that cannabis users would expect it to work in ways similar to psychedelics as well as cognitive therapy.

Key words: = tetrahydrocannabinol; oceanic boundlessness; mystical experiences; psychedelic-assisted psychotherapy; depression

Depression's dramatic, negative impact remains concerning as over 300 million people worldwide appear to suffer from the disorder (WHO, 2017). Combining standard antidepressant medications with psychotherapy helps approximately 65% of individuals, but leaves many others unimproved (see Cuijpers et al., 2020; Earleywine & De Leo, 2020). The link

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between cannabis and depression remains controversial. Cannabis might cause, cure, or have only spurious links to the disorder (Feingold & Weinstein, 2021). Cannabis consumption and depression appear to vary depending upon forms of administration, the presence of confounding factors, and numerous individual difference variables (e.g. Bricker et al., 2007; Grinspoon & Bakalar, 1997; Lev-Ran et al., 2014). For example, recent work reveals that many cannabis users report that their consumption of the plant addresses depressive symptoms (Gorfinkel et al., 2020; Kosiba et al., 2019), but adolescents who use cannabis seem to be at greater risk for subsequent depressive mood or suicidal ideation (Gobbi et al., 2019). Turning to the plant as an attempt at self-medication might be common, but frequent, relatively low-dose use might be ill-advised. Longitudinal data suggest that decreasing frequent use might improve depressive symptoms (Hser et al., 2004). These varied responses leave clinicians and clients in a quandary.

In contrast, recent work suggests that a high dose of psilocybin, when administered in a therapeutic setting with sufficient support, precedes improvements in depression and other forms of human suffering (see Carhart-Harris et al., 2017, 2018; Schenberg, 2018). A comparable approach with cannabis seemed to have potential given parallels between reactions to high dose cannabis and psilocybin (Earleywine et al., 2021; Farmer et al., 2019). Three of the most promising subjective changes include a facet of Mystical Experiences dubbed Oceanic Boundlessness (OBN), a sense of connectedness with a lowered sense of self-importance known as Ego Dissolution (ED), and a categorical leap in affective experience called Emotional Breakthrough (EB). All three of these responses to a psychedelic predict subsequent improvements (e.g. Carhart-Harris et al., 2017; Garcia-Romeu et al., 2019; Nour et al., 2016; Roseman et al., 2018; Roseman et al., 2019; Uthaug et al., 2018). Generally, as these experiences increase, suffering decreases. In contrast, other changes in subjective state do not correlate consistently with improvements. For example, acute ketamine-induced dissociation might appear novel, but it does not predict subsequent antidepressant effects (Mathai et al., 2020).

Cannabis at an ideal dose and low frequency might facilitate the relevant subjective experiences and improve depression as well (Earleywine et al., 2021). Spiritual traditions in some Sufi mystics, Tibetan Buddhists, Zion Coptics, Rastafarians, and Hindus emphasize that ideal dosages of cannabis consumed in appropriate settings precede mystical "peak experiences" (Ferrara, 2016, 2020), the same effects that predict psilocybin's antidepressant effects. Although cannabis does not have the impact on the 5HT2A receptors common to psilocybin and other psychedelics (Curran et al., 2018; Russo & Marcu, 2017), their subjective effects overlap (Barrett et al., 2018; Earleywine et al., 2021; Farmer et al., 2019). One previous relevant study asked experienced cannabis users to envision a high-dose session that would parallel the comfortable environs, trained support from guides, and internal focus of psilocybin trials (Earleywine et al., 2021). Participants reported expecting such a cannabis-assisted session to generate OBN and decrease depression. A replication that extended those results to other facets of mystical experience that covary with improvement in depression appeared in order. Should a new sample report that cannabis might create the relevant subjective effects and that they expect antidepressant impact, the rationale for cannabis-facilitated psychotherapy might improve.

STUDY 1

METHODS

Participants

A total of 560 lifetime cannabis users (274 (48.9%) self-identified as Female) passed attention checks and provided data on Amazon's MTURK. The local IRB approved

all procedures. Ages ranged from 18 to 69 (*Mean* = 35.44, *SD* = 10.931) and education ranged from some high school to a graduate degree (*Modal, median,* and *mean* = Bachelor's degree (262; 46.8%)). The sample included Caucasians (402; 71.8%), African descent (57; 10.2%), Asian (41; 7.3%), Latinx (34; 6.1%), Native American (17; 3%), and Multiracial (9; 1.6%) participants.

Measures

Cannabis consumption. Participants reported days per month they used cannabis (range 0-31, *Mean* = 13.35, *SD* = 10.3) and how high they would feel on average sessions (1 (not at all high) to 6 (very high), *Mean* = 3.40, *SD* = 1.265).

Antidepressant effects of cannabis-assisted psychotherapy. Participants responded to: "New research suggests that depressed people can benefit from taking the hallucinogen psilocybin and sitting quietly in a safe laboratory setting while listening to music, wearing an eye mask, and focusing on the effects. Do you think an ideal dose of cannabis might help depression if administered under comparable circumstances?" from 0 (Not at all) to 100 (A great deal). Scores ranged from 0 to 100 (*Mean* = 65.40; *SD* = 26.384). We chose an ideal dose rather than specify a specific number of milligrams to allow for disparate rates of familiarity and tolerance.

Subjective effects. We used multiple indices (emotional breakthrough, oceanic boundlessness, and ego dissolution) as detailed below. Participants read: "Here are some feelings others have reported in response to peak experiences of many kinds. Please think about your experiences while using an IDEAL DOSE OF CANNABIS and state how much each one applies to you. Please give your best guess on each one." They then answered, "How much would an ideal dose of cannabis in the absence of other drugs make you..." and rated intensity.

Emotional Breakthrough (EB). Participants rated the 8 items of the Emotional Breakthrough Scale (Roseman et al., 2019) from 0 (not at all) to 100 (very much). Dropping two reverse-scored items brought Cronbach's alpha to .931 from .643. The average score per item (*Mean* = 48.0825; *SD* = 24.268) exceeded those in Roseman et al's (2019) study (*Mean* = 43, SD = 31.5; t (937) = 2.787 p < .01; d = .181).

Oceanic Boundlessness (OBN). Participants rated 27 items from the Oceanic Boundlessness subscale of the Altered States of Consciousness Scale (Dittrich, 1998) that showed the highest correlations with subsequent antidepressant effects (Roseman et al., 2018) of psilocybin at 5-week follow-up. The current sample described their likely response using the options of the Mystical Experiences Questionnaire (Griffiths et al., 2006), which covaries with Oceanic Boundlessness above R = .9 (Liechti et al., 2017). Participants responded with: 0 – none; not at all, 1 – so slight cannot decide, 2 – slight, 3 – moderate, 4 – strong (equivalent in degree to any other strong experience), or 5 – extreme (more than any other time in my life and stronger than 4). Cronbach's alpha was .962. Scores ranged from 0-131 (*Mean* = 62.99, *SD* = 28.064).

Ego Dissolution (ED). Participants rated the 8 items (Nour et al., 2016) from 0 (not at all) to 100 (very much), including "I lost all sense of ego" and "I experienced a decrease in my sense of self-importance." ED predicted greater improvement in depression in previous work (e.g. Carhart-Harris et al., 2017; Garcia-Romeu et al., 2019; Uthaug et al., 2018). Cronbach's alpha was .924; scores ranged from 0-800 (*Mean* = 352.232, *SD* = 184.877).

RESULTS

Only p's < .01 were considered significant. P-P plots suggested normal distributions.

Table 1. *Correlations Among Expectancies for Cannabis-Induced Mystical Experiences, Antidepressant Effects, and Use (N = 556)*

	1	2	3	4	5	6
EB						
ED	.735**					
OBN	.583**	.712**				
Freq of Cannabis	.322**	.230**	.155**	.226**		
Avg High	.484**	.424**	.381**	.435**	.476**	
Antidepress	.497**	.446**	.316**	.441**	.274**	.297**

** $p < .01$. EB = Emotional Breakthrough; ED = Ego Dissolution; OBN = Oceanic Boundlessness; Freq = Cannabis Use Days per month; Avg High = Average high per session; Antidep = Improvement in depression

Demographic Correlates

EB, ED, OBN, and expected antidepressant effects were orthogonal to age (maximum R = 0.12). Gender differences (based on self-selected gender identity) were non-significant (maximum Cohen's $d = 0.22$), as were ethnic differences, which did not exceed $d = 0.17$, all $p's > .01$.

Correlations

Pearson's correlations (Table 1) reveal that subjective effects covaried and increased with cannabis involvement.

Antidepressant Effects

We regressed expected antidepressant effects of cannabis-assisted therapy on the expected subjective effects after removing 9 multivariate outliers to conform to assumptions. Only EB remained significant (Standardized Beta ED = -0.163, $t = 2.427$, R-squared change = .008 $p = .016$; Standardized Beta OBN = -0.045, $t = -0.788$, R-squared change = .001 $p > .40$; Standardized Beta EB = .410, $t = 7.360$, $p < .01$, R-squared change = .254, respectively). Participants apparently expect OBN and ED to improve depression via EB.

DISCUSSION

Cannabis might create subjective experiences comparable to those that seem important in psilocybin-assisted treatment (Earleywine et al., 2021). The current study attempted to replicate previous work showing that cannabis users believed that a cannabis-assisted psychotherapy session could increase OBN and improve depression while also extending the results to ED and EB. The expected antidepressant effects correlated significantly with subjective OBN, ED, and EB effects. The link between expected subjective experiences and expected antidepressant effects was no longer significant when EB was present as a predictor. Perhaps an emotional breakthrough is the key source of relevant changes in depression, at least according to what cannabis users expect.

These results raise questions about other potential underlying mechanisms. Standard treatments for depression rarely rely on mystical experiences or emotional breakthroughs (see Cuijpers, 2017). In contrast, cognitive treatments for depression rest on dysfunctional attitudes (see Cristea et al., 2015). Meta-analytic work reveals that these maladaptive beliefs underlie negative

mood, depressive symptoms, and treatment-induced improvements. Even pharmacological treatments alter dysfunctional attitudes (Cristea et al., 2015). The import of this alternative mechanism in assisted therapy is unknown but connecting dysfunctional attitudes to assisted therapy might help explain how best to offer support and integration. The role of dysfunctional attitudes in other disorders also underscores their potential (see Wang et al., 2017; Yapan et al., 2020). Given clarion calls for replication (e.g. Amrhein et al., 2019), we sought to replicate these expected effects of a cannabis-assisted session and extend them to dysfunctional attitudes. We hypothesized that cannabis users would again anticipate that a cannabis-assisted session would decrease depression via the impact on OBN, ED, and EB. We also hypothesized that they would anticipate that the cannabis-assisted session would improve depression via dysfunctional attitudes. We were also eager to explore if dysfunctional attitudes mediated the link with depression independently of the session's impact on OBN, ED, and EB.

STUDY 2

METHODS

Participants

A total of 568 cannabis users (319; 56.1% Female) recruited from MTURK passed attention checks and provided complete data. The local IRB approved procedures. All IP addresses differed from those in Study I. Ages ranged from 18 to 68 (*Mean* = 35.09, *SD* = 10.415). The skew for age exceeded acceptable levels (.860; see Osborne, 2013), but decreased with a square-root transformation (.512). Education ranged from some high school to a graduate degree (*Mode, median*, and *mean* = Bachelor's degree (217; 38.3%) followed by Some College (139; 24.5%)). The sample was primarily Caucasian (417; 73.4%), with African descent (56; 9.9%), Asian (40; 7.0%), Latinx (33; 5.8%), Native American (11; 1.9%), and Multiracial (11; 1.9%) participants as well. Current use averaged 14.81 days per month (*SD* = 11.63) with a subjective "high" averaging 3.45 (*SD* = 1.268).

Measures

Subjective effects. We used the same scales and instructions employed in Study I. Antidepressant Effects ranged from 0 to 100 (*Mean* = 74.00; *SD* = 24.994).

Emotional Breakthrough (EB). The six-item version (Cronbach's alpha = .931) ranged from 0-600 (Mean = 291.356, SD = 160.183), with an average item (*Mean* = 48.560, *SD* = 26.697) that exceeded scores reported previously (Roseman et al., 2019); (*Mean* = 43, *SD* = 31.5; *t* (945) = 2.919, *p* < .01; *d* = .190).

Oceanic Boundlessness (OBN). The 27-item scale (Cronbach's alpha =.962) ranged from 0-132 (*Mean* = 59.73, *SD* = 29.128).

Ego Dissolution (ED). Scores ranged from 0-800 (*Mean* = 347.87, *SD* = 195.268). Cronbach's alpha was .918.

Dysfunctional attitudes. Participants rated how much they thought they would agree with maladaptive statements (from -2 (fully disagree) to +2 (fully agree)) both before and after a session of cannabis-assisted therapy (Beevers et al., 2007). Typical items included: "I must be liked by everyone or it's a disaster," and "If I fail partially, I have failed completely." The "before" and "after" ratings were side by side in adjacent columns. Cronbach's alpha (pre-treatment) was 0.890 (*Mean* = -2.57, *SD* = 13.322) and 0.889 (post-treatment; *Mean* = -8.29, *SD* = 12.783). A difference score ranged from -60 to 32 (*Mean* = -5.71; *SD* = 12.719). Negative skew (-0.986) required transformation by anchoring the lowest score at 1, subtracting total score from the maximum possible plus one and then computing the square root (skew = 0.062; Osborne, 2013). Higher scores were less dysfunctional.

RESULTS

Only p's < .01 were considered significant. P-P plots suggested normal distributions.

Dysfunctional Attitudes

Participants anticipated improved attitudes if they participated in the described cannabis session with an ideal dose and psychological support (Pre-treatment *Mean* = -2.737, *SD* = 13.33; Post-treatment *Mean* = -8.443, *SD* = 12.71; paired *t*(557) = 10.591, *p* < .001, *d* = .449).

Demographics

Responses and attitude changes were not statistically linked to age (maximum Pearson's R = |.13|) or ethnicity (all *d's* < .13). All *p's* > .10. Men reported expecting more ED th an women (368.45 (*SD* = 193.561) vs. 320.525 (*SD* = 191.090), *d* = .249; t(553) = 2.897, p < .004). Although this difference did reach significance, it was not significantly higher than the sex difference present in Sample 1 (*d* = .220; z = 0.16; p > .10.)

Table 2. *Correlations Among Expectancies for Cannabis-Induced Mystical Experiences, Antidepressant Effects, Dysfunctional Attitudes, and Use* (N = *568*)

	1	2	3	4	5	6
EB						
ED	.679**					
OBN	.580**	.702**				
DysAtt	.144**	.133**	.128**			
Freq	.351**	.172**	.119**	-0.013		
Avg High	.432**	.348**	.351**	0.048	.404**	
Antidep	.392**	.245**	.249**	.194**	.251**	.249**

**p < .01. EB = Emotional Breakthrough; ED = Ego Dissolution; OBN = Oceanic Boundlessness; DysAtt = Dysfunctional Attitudes; Freq = Cannabis Use Days per month; Avg High = Average high per session; Antidep = Improvement in depression

Correlations

Pearson's correlations (Table 2) showed that subjective effects covaried with each other, expected changes in dysfunctional attitudes, and anticipated impact on depression. They also increased with cannabis involvement.

Anticipated Antidepressant Effects

Tests of regression assumptions confirmed normal distributions after we dropped 16 multivariate outliers based on Mahalonabis distances. Only EB and dysfunctional attitudes predicted antidepressant effects when all variables were included: Standardized Beta EB = 0.388, *t* = 7.188, R-squared change = 0.149; Standardized Beta dysfunctional attitudes = .156, *t* = 3.973 R-squared change = .020, *p* < .001; Standardized Beta OBN = 0.066, *t* = 1.172, R-squared change = .001 *p* > .10; Standardized Beta ED = -.087, R-squared change = 0.002, *t* = -1.399, *p* > .10).

DISCUSSION

Links between cannabis consumption and depression remain varied. A high dose of cannabis can create subjective effects that parallel psilocybin's subjective effects, which seem to precede improvements in depression in psilocybin-assisted therapy. Two samples of cannabis users reported expecting that an ideal dose of cannabis administered in a therapeutic setting could create subjective effects like those linked to psilocybin-related improvements. These results confirm previous work on cannabis-induced oceanic boundlessness (OBN; Earleywine et al., 2021). These new data reveal that users expect that an ideal dose administered in ways that parallel current psilocybin-assisted therapy will alter psychedelic experiences of multiple types, including oceanic boundlessness and emotional breakthroughs. In addition, users report that an ideal dose might alter dysfunctional attitudes—a key contributor to depression in cognitive models of the disorder (Cristea et al., 2015). Expected antidepressant effects correlated with expected cannabis-induced mystical experiences, EB, and changes in dysfunctional attitudes. The impact of expected mystical experiences on expected antidepressant effects was mediated by EB. Dysfunctional attitudes, however, remained significant with mystical experiences and EB in the equation. Apparently, users believe that a session of cannabis-assisted psychotherapy would improve depression through two paths: Emotional Breakthrough and dysfunctional attitudes.

These results have implications for cannabis-assisted psychotherapy. Sessions akin to the psilocybin-assisted trials would require initial meetings to develop rapport with guides, ingesting cannabis in a therapeutic setting with a consistent focus on internal experience, and follow-ups for discussion of insights, altered cognitions, and new behaviors (see Johnson et al., 2019; Luoma et al., 2020). Standard treatments rarely emphasize Emotional Breakthrough or Mystical Experiences as mechanisms, but cognitive approaches often focus on dysfunctional attitudes. In a first study of this kind, the current data suggest that cannabis users anticipate that cannabis-assisted psychotherapy could not only elicit mystical and emotional experiences, but also improve maladaptive beliefs like, "I must be liked by everyone or it's a disaster," and "If I fail partially, I have failed completely," etc. Users report that they believe that links between changes in dysfunctional attitudes and improvements in depression remain even when the effects of mystical experiences and emotional breakthroughs are considered. The case for a randomized clinical trial of cannabis-assisted psychotherapy seems stronger under these circumstances. These effects might be unique to cannabis and the psychedelics. Opiates and stimulants, for example, do not appear to create the relevant changes in mystical experiences (Griffiths et al., 2006; Lamas et al., 1994), and seem less likely to alter EB, dysfunctional attitudes, or symptoms of depression. Examinations of the discriminant validity of these subjective effects of other psychoactive substances could prove informative.

Cannabis-assisted psychotherapy might seem unnecessary given successes with psilocybin or ayahuasca (Palhano-Fontes et al., 2019), but rates of treatment failure and the chance to reveal novel information about neurotransmitter functioning underscore the need for cannabis trials. Available treatments fall short because of low success rates and delayed onset of improvement (Cuijpers et al., 2020; Earleywine & De Leo, 2020). Cannabis treatment might have pharmacological advantages. A treatment that relies on the cannabinoid system rather than monoamines could provide insights into neurotransmitters and psychopathology (Cowen & Browning, 2015; Harmer et al., 2017; Nutt et al., 2007). Of course, other important contributors

(including the psychotherapy relationship and process) can improve outcomes as well (Cuijpers et al., 2020).

These data require cautious interpretation. Given the range of cannabis consumption in this sample and the small number of studies that have examined psychedelic-like effects of the plant or its constituents, the accuracy of any single person's prediction is unknown. We have asked participants to envision a cannabis-assisted session that might be unlike any that they have experienced. We also asked about an ideal dosage, which might vary dramatically across participants without an initial reaction to a test dosage. Generally, those who were more involved with cannabis reported that they anticipated greater psychedelic effects after use (see Tables 1 and 2). Few laboratory administration studies address links between any cannabis expectancies and actual responses, but work with alcohol suggests that experienced drinkers have expectancies and actual subjective changes align (Morean et al., 2013, 2015). Had participants reported that they doubted that cannabis could help create the relevant experiences, this line of research could end. But users envision a potential here that might be worthy of pursuit. Perceptions of efficacy of this treatment would likely vary with previous experience with depressive symptoms and various interventions, suggesting that future work would benefit from a thorough assessment of psychopathology and therapy experience.

Extending this work to other problems responsive to psilocybin also seems reasonable. Cannabis users might expect improved cancer-related distress, post-traumatic stress disorder, and drug problems for relevant sessions, for example (Bogenschutz et al., 2015; Carhart-Harris et al., 2016; Garcia-Romeu et al., 2014; Griffiths et al., 2016; Johnson et al., 2017; Klavetter & Mogar, 1967; Kurland et al., 1972; MacLean et al., 2011; O'Reilly & Funk, 1964; Pahnke et al., 1970; Richards et al., 1977; Ross et al., 2016). Should comparable expectancies appear for cannabis-assisted treatments for these problems, perhaps cannabis can join the current psychedelic renaissance and become part of an assisted form of psychotherapy.

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