Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity
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BRIEF REPORT

Positive effects of psychedelics on depression and wellbeing scores in individuals reporting an eating disorder

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Abstract

Purpose Psychedelic therapy is showing promise for a broad range of mental health conditions, indicative of a transdiagnostic action. While the efficacy of symptom-focused treatments for eating disorders (EDs) is limited, improved mental health and psychological wellbeing are thought to contribute to greater treatment outcomes. This study provides the first quantitative exploration of the psychological effects of psychedelics in those reporting an ED diagnosis.

Methods Prospective, online data were collected from individuals planning to take a psychedelic drug. Twenty-eight participants reporting a lifetime ED diagnosis completed measures of depressive symptomology (Quick Inventory of Depressive Symptomology; QIDS-SR16) and psychological wellbeing (Warwick–Edinburgh Mental Wellbeing Scale; WEMWBS) 1–2 weeks before, and 2 weeks after a psychedelic experience. Twenty-seven of these participants also completed a measure of emotional breakthrough [Emotional Breakthrough Inventory (EBI)] in relation to the acute psychedelic experience.

Results Bayesian *t* tests demonstrated overwhelming evidence for improvements in depression and wellbeing scores following the psychedelic experience. Marginal evidence was also found for a correlation between emotional breakthrough and the relevant mental health improvements.

Conclusion These findings provide supportive evidence for positive psychological aftereffects of a psychedelic experience that are relevant to the treatment of EDs. It is hoped that this will encourage further research and will bolster initiatives to directly examine the safety and efficacy of psychedelic assisted therapy as a treatment of EDs in future clinical trials.

Level of evidence Level III, cohort study.

Keywords Anorexia · Bulimia · Binge eating disorder · Prospective online survey · Longitudinal · Psychedelics

Introduction

The leading psychotherapeutic treatment for eating disorders (EDs) such as bulimia nervosa (BN) and binge eating disorder (BED) is cognitive behavioural therapy (CBT), however there is no consensus on a first-line psychotherapeutic model for anorexia nervosa (AN). While psychotherapeutic treatment is often combined with pharmacological treatments, these may only be efficacious in the management of co-morbid conditions or for weight recovery in AN [1]. As these symptom-focused treatments may be overlooking other, more fundamental components that underlie EDs [2, 3], there is a great need for novel treatment avenues to be explored that may be efficacious across different ED presentations.

There is growing interest in the therapeutic use of classic psychedelic compounds, i.e. drugs that exert their key behavioural effects via serotonin type 2A (5-HT_{2A}) receptor agonism. Classic psychedelics include lysergic acid diethylamide (LSD), psilocybin (the major psychedelic component in magic mushrooms), and dimethyltryptamine (DMT, the major psychedelic component of ayahuasca). A growing list of recent clinical trials have yielded supportive evidence for the safety and positive mental health impact of psychedelic therapy, with the power of acute psychedelic experience and the emotional breakthroughs therein, being predictive of positive outcomes [4, 5]. As abnormal serotonin functioning [6] and high emotional avoidance [7] are hypothesised to play a role in EDs, there is a mechanistic grounding for exploring the use of psychedelics in the treatment of EDs.

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To date, no controlled trials have been published on the treatment of EDs with psychedelics, however, research in this area has begun (e.g., NCT04052568, NCT04505189). Reports of naturalistic use can also provide pilot data to inspire early phase trials. For example, Lafrance and colleagues identified reductions/cessations of ED pathology, improvements in the processing of painful memories and increased self-acceptance in a qualitative analysis of the reports of those with an ED following ceremonial ayahuasca [8]. The present study utilises online prospective survey data completed before and after a psychedelic experience to provide the first quantitative assessment of the psychological effects of the psychedelic experience in those reporting a diagnosis of an ED. As improved mental wellbeing is associated with greater outcomes in those with EDs [3], the focus is on measures of depressive symptomology and psychological wellbeing, with the hypothesis that both will improve after the psychedelic experience. Additionally, the current study explores the role of emotional release or breakthrough during the acute experience, hypothesising that emotional breakthroughs during the acute experience will facilitate positive long-term outcomes. It is hoped that this preliminary study will provide insight into possible mechanisms of psychedelic assisted psychotherapy relevant for EDs that can be further explored in future research.

Methods

Design

Data were collected as part of three anonymous, online cohort studies conducted between March 2017 and December 2019 through the online platform 'Psychedelic Survey' (www.psychedelicsurvey.com). This novel data acquisition method allows for the collection of large amounts of data from non-controlled, naturalistic settings in a prospective manner. Measures were collected 1–2 weeks before (baseline) and 2 weeks after (end-point) the intended date of the psychedelic experience. Ratings relating to the acute experience were collected 1 day after the experience. For full methodological details of each study, see [9, 10].

Participants

Inclusion criteria were: aged > 18 years, good comprehension of the English language, and intention to take a psychedelic drug in the near future (i.e., psilocybin/magic mushrooms/truffles, LSD/1P-LSD, ayahuasca, DMT/5-MeO-DMT, *Salvia divinorum*, mescaline, or iboga/ibogaine). Of the 50 participants reporting an ED diagnosis during their lifetime (across the three studies), 28 completed the dependent variables at baseline and at 2 weeks post-experience, and 27 completed measures of their acute experience.

Measures

Demographics

Demographic information including age, gender, country of origin, frequency of lifetime and recent (6 months) psychedelic use, lifetime psychiatric diagnoses and current medication were collected at baseline.

WEMWBS

The Warwick–Edinburgh Mental Wellbeing Scale (WEMWBS) is a 14-item scale designed to measure hedonic (i.e., subjective experience of happiness) and eudemonic (i.e., psychological functioning) aspects of positive mental health/wellbeing [11]. Items are rated on a 5-point Likert scale from "none of the time" to "all of the time" in reference to the previous 2 weeks.

QIDS-SR16

The self-report Quick Inventory of Depressive Symptomology (QIDS-SR16) is a 16-item measure of depressive symptom severity [12]. Symptoms of depression are rated on a scale from 0 to 3 with reference to the past seven days (total score 0–5 = no depression, 6–10 = mild, 11–15 = moderate, 16–20 = severe, and 21–27 = very severe).

EBI

The Emotional Breakthrough Inventory (EBI) is a newly developed and recently validated measure of emotional release/breakthrough during the acute psychedelic experience [5]. Six statements that are designed to reflect aspects of overcoming emotional blockages through the psychedelic experience are rated on a 0–100 visual analogue scale from "not at all" to "very much so".

Statistics

Bayesian hypothesis testing was employed for all analyses. As some readers may wish to compare, equivalent frequentist results are also presented following each Bayesian analysis. All analyses were performed in R Studio (https://rstudio.com/) using the following packages: BayesFactor [13], ggplot2 [14], and dplyr [15]. Moderate JZS priors $r = 0.701$ and Jefferies-Beta priors $r = 0.3$ were used for Bayesian t tests and correlations respectively. Shapiro–Wilk tests performed on QIDS-SR16 and WEMWBS were non-significant and thus parametric frequentist t tests were employed.

Table 1 Demographic information

Demographic	Category	*N* (%)	M (SD)
Age			35.97 (11.05)
Gender	Male	4 (14.3)	
	Female	24 (85.7)[a]	
Origin	United Kingdom	12 (42.9)	
	North America	7 (25)	
	Scandinavia	6 (21.4)	
	European other	2 (7.1)	
	Australia	1 (3.5)[a]	
Substance used	Ayahuasca	5 (17.9)	
	DMT/5-MeO-DMT	2 (7.1)	
	LSD/1P-LSD	6 (21.4)	
	Psilocybin/magic mushrooms/truffles	14 (50)[a]	
	San Pedro cactus/mescaline	1 (3.5)	
Lifetime use of psychedelics	Never	2 (7.1)	
	1–20 times	15 (53.5)[a]	
	20 + times	11 (39.3)	
Psychedelic use within the last 6 months	Unspecified	5 (17.9)[a]	
	None	3 (10.7)	
	1–5 times	15 (53.6)	
	6–10 times	5 (17.9)	
Number of co-morbid conditions	None	11 (39.3)[a]	
	1–2	14 (50)	
	3 +	3 (10.7)	
Co-morbid depression	Yes	10 (35.7)	
	No	18 (64.3)[a]	
Currently on medication for ED/co-morbid condition	No	26 (92.9)[a]	
	Yes	2 (7.1)	

[a]Category of the single participant who did not complete the EBI

Results

Demographics and preliminary analyses

Demographic information for the 28 participants who completed the dependent variables, and 27 who completed all measures can be found in Table 1.

As the QIDS-SR16 is a measure of depressive symptomology, preliminary analyses were performed to assess differences between those with and without a co-morbid diagnosis of depression. Bayesian *t* tests demonstrated weak evidence towards the null of no differences in either the baseline QIDS-SR16 score ($BF_{10} = 0.453$; $t_{(28)} = -0.78$, $p = 0.446$) or the change in QIDS-SR16 from baseline to endpoint ($BF_{10} = 0.45$; $t_{(16.12)} = 0.715$, $p = 0.484$). Conversely, there was overwhelming evidence for a correlation between change in QIDS-SR16 and change in WEMWBS ($r = -0.65$, $BF_{10} = 2270.84$; $r_{(26)} = -0.746$, $p < 0.0001$).

WEMWBS

A Bayesian *t* test provided overwhelming evidence for the alternative hypothesis of a change in WEMWBS score following the psychedelic experience ($BF_{10} = 126.24$). This was supported by a significant paired Student's *t* test ($t_{(27)} = 4.25$, $p = 0.0002$). As can be seen in Fig. 1a, WEMWBS scores were greater two weeks after the psychedelic experience ($M = 53.6$, $SD = 8.29$) than at baseline ($M = 45.6$, SD = 10.00).

QIDS-SR16

A Bayesian *t* test provided overwhelming evidence for the alternative hypothesis of a change in QIDS-SR16 score following the psychedelic experience ($BF_{10} = 202.81$). This was supported by a significant paired Student's *t* test ($t_{(27)} = -4.45$, $p = 0.0001$). As can be seen in Fig. 1b, QIDS-SR16 scores decreased 2 weeks after the psychedelic

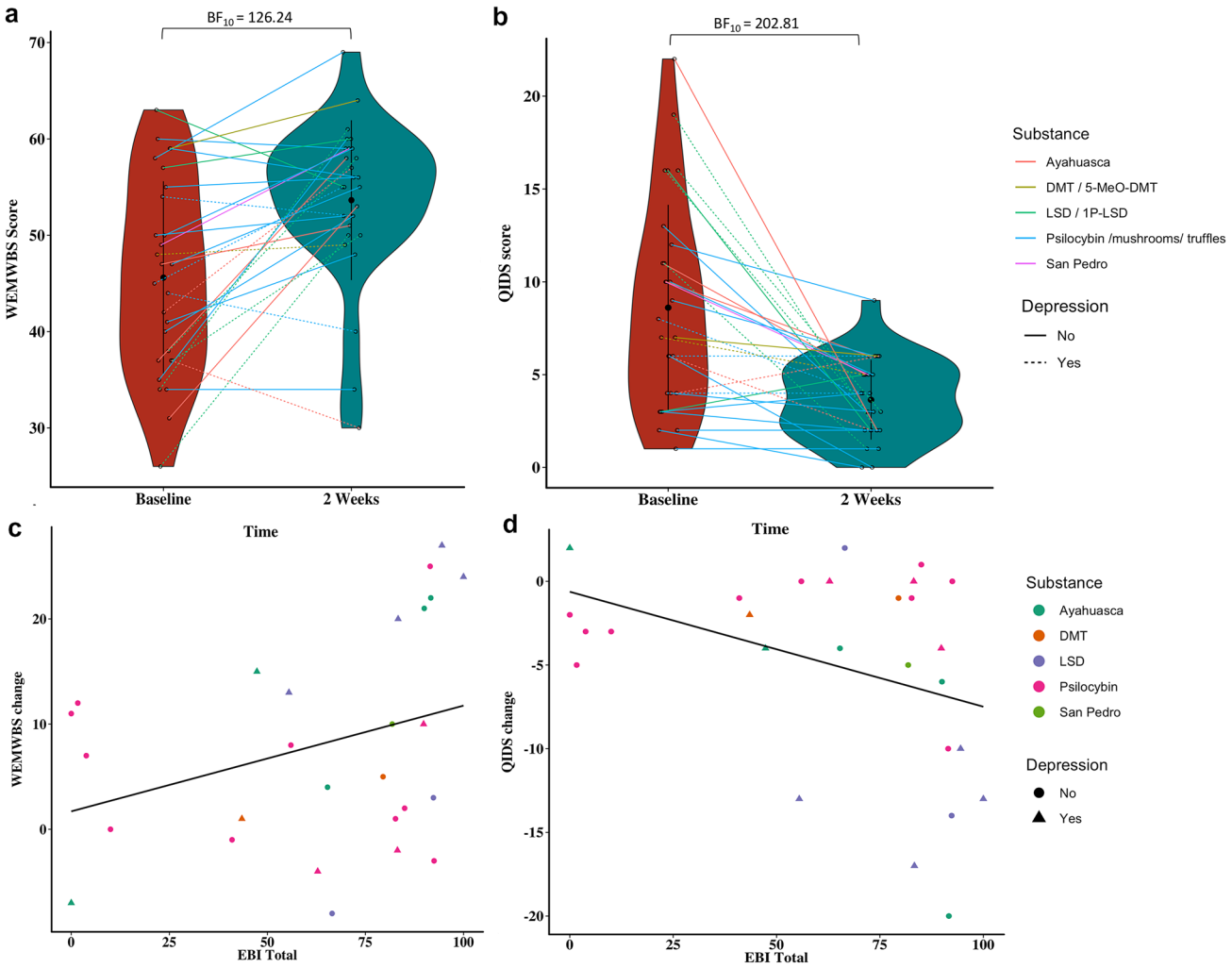

Fig. 1 Changes in wellbeing (**a**) and depressive symptomology (**b**) from baseline to 2 weeks following a psychedelic experience. Violin plots represent the distribution of scores. Black dots and bars represent the mean and standard deviation respectively. Coloured lines connecting dots represent individual participants, with the colour of the line representing the substance used and line style representing co-morbid diagnosis of depression. Scatter plots depicting the correlation between EBI score and change in wellbeing ($r = 0.26$) (**c**) and depressive symptomology ($r = -0.29$) (**d**). Dot colours represent the substance used. Dot shapes indicate comorbid diagnosis of depression. r values represent the mean of the posterior distribution of the true linear correlation

experience ($M = 3.64$, SD = 2.15) compared with baseline ($M = 8.61$, SD = 5.54).

EBI

Bayesian correlations revealed weak evidence for a positive relationship between EBI and change in WEMWBS ($r = 0.26$, $BF_{10} = 1.34$; Fig. 1c) and very moderate evidence for a negative relationship between EBI score and change in QIDS-SR16 ($r = -0.29$, $BF_{10} = 2.05$; Fig. 1d). These were supported by two trending frequentist correlations (WEMWBS $r_{(25)} = 0.328$, $p = 0.094$, QIDS-SR16 $r_{(25)} = -0.380$, $p = 0.050$).

Discussion

The current study provides the first quantitative exploration of the psychological aftereffects of a psychedelic experience in those reporting a lifetime diagnosis of an ED. In interpreting this study, it is important to emphasise the preliminary nature of the results which require replication and further exploration in future controlled trials. Consistent with previous studies in clinical and non-clinical populations [4], the results demonstrate overwhelming evidence for improvements in both depression symptomology (QIDS-SR16) and psychological wellbeing (WEMWBS) two weeks after a psychedelic experience. With regards to depression, 10 participants (36%) reported a lifetime comorbid diagnosis

of major depression, however, neither baseline QIDS-SR16 scores nor change in QIDS-SR16 scores differed between those with and without such a diagnosis. At baseline, nine participants (32%) scored within the moderate to very severe range for depression, and the group mean was within the range of mild depression [12]. Two weeks after the psychedelic experience, there were no participants within the moderate–severe range for depression, and the mean dropped below the threshold for depression.

Importantly, improvements in QIDS-SR16 were highly correlated with changes in WEMWBS scores. Psychological wellbeing and quality of life remain lower in those in remission from an ED than in the general population, which has been associated with greater rates of relapse [16]. Moreover, people who have recovered from EDs report positive wellbeing as a central component of their recovery, beyond remission of core ED pathology [2]. As an absence of pathology does not necessarily imply high wellbeing and vice versa [2, 3], these dual-aspect improvements in mental health may be an important consideration for mitigating the risk of relapse in EDs. While no firm conclusions can be drawn based on this evidence alone, this reflects well on the possible mechanisms through which psychedelic assisted psychotherapy may be relevant for EDs, thus supporting the need for clinical trials.

Additionally, the current results hint towards a potential mediating role for emotional breakthrough during the acute psychedelic experience in these positive outcomes. While the direction of this effect is consistent with previous findings in healthy populations [5], the weak Bayes Factors and marginal significance mean that the results must be interpreted with caution. Confrontation with challenging emotions is a core feature of psychedelic therapy, where it can yield emotional release and personal insight [4]. Such processes can result in patients revising problematic, long-held mental schemata and behaviours [5]. This may be particularly pertinent in EDs where emotional and experiential avoidance is high [7]. The revision of core beliefs and behaviours was also a central theme in the personal testimonies from individuals with EDs presented by Lafrance et al. [8]. In their study, an improved ability to process intense emotions or memories, was associated with long-term benefits following ceremonial ayahuasca (a brew containing the psychedelic DMT). Therefore, emotional breakthrough may be an additional mechanism through which psychedelic assisted psychotherapy may be relevant for the treatment of EDs. In light of weak–moderate Bayes Factors (and marginal significance) in the current study, it will be important for future studies to explore this further in a controlled setting and with larger sample sizes.

The primary limitations of the current study pertain to the use of online, self-report surveys, and have been outlined elsewhere [10]. Briefly, participants' intention to take a psychedelic was an inclusion criterion and this may have led to the recruitment of a sample that is unrepresentative of the general population. As demonstrated in Table 1, the large majority of participants had taken a psychedelic at least once before in their life, with 20 participants reporting use within the last 6 months. As such, a self-selection bias cannot be ruled out. Additionally, only 56% of the participants reporting an ED across the three studies completed all study measures, thus attrition bias at later time points may have favoured those who responded well to the psychedelic. Lack of experimental control meant we could not verify drug dose, purity, or the environment in which the substance was taken. Additionally, there was no control group or control substance. Finally, as these surveys were designed for administration to the general population, there was no distinction between different EDs or their severity and there was no specific measure of ED psychopathology. Due to the naturef the of the study, we were also unable to confirm diagnosis and instead rely on accurate self-report. Nevertheless, the knowledge acquired from this prospective, naturalistic study reflects well on mental health improvements that are relevant for the treatment of EDs and can be utilised in the design and development of future clinical trials of psychedelics in this population.

To our knowledge, the current study provides the first preliminary quantitative exploration of the psychological effects of psychedelics in individuals with a self-reported diagnosis of an ED. Results revealed improvements in depression and wellbeing scores two weeks after a psychedelic experience. Additionally, tentative evidence was found for emotional breakthroughs during the acute experience being associated with subsequent positive mental health changes. These preliminary findings highlight the need for further research in this area, and provide a foundation for future explorations of the safety and efficacy of psychedelics in the treatment of EDs.

What is already known on this subject?

There is a current paucity of effective treatments for EDs. Psychedelics have demonstrated transdiagnostic efficacy and are an important avenue for exploration in the development of new treatments.

What this study adds?

This is the first quantitative demonstration of psychological improvements after a psychedelic experience in those with an ED, thus providing preliminary support for future clinical trials.

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Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Code availability The code used for analysis is available from the corresponding author upon reasonable request.

Compliance with ethical standards

Conflict of interest There is no conflict of interest to report.

Ethical approval All surveys received ethical approval from the Imperial College Research Ethics Committee and the Joint Research Compliance Office at Imperial College London and were conducted within the framework of Good Clinical Practice.

Informed consent Informed consent was obtained from all participants.

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