EXPERIENCES OF MICRODOSING PSYCHEDELICS IN AN ATTEMPT TO SUPPORT WELLBEING AND MENTAL HEALTH

by

Rebecca Ryan

Volume One

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Department of Clinical Psychology

School of Psychology

The University of Birmingham

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THESIS OVERVIEW

This thesis contains two volumes and is submitted as partial fulfilment for the degree of Doctorate in Psychology (Clin.Psy.D) at the University of Birmingham.

Volume One

This volume has three chapters that comprise of the research component of the doctorate. The first chapter is a literature review which used a meta-analysis to investigate the reliability of the Warwick-Edinburgh Mental Well-Being Scale. The second chapter is an empirical study exploring individual's experiences of microdosing psychedelics in an attempt to support their wellbeing and mental health. The third chapter contains two press releases, one which provides a descriptive of the meta-analysis, and the second which details the empirical study.

Volume Two

Volume two comprises of five clinical practice reports (CPR) that were completed over the course of the doctorate. The first CPR details the assessment and formulation of a man with depressive symptoms. His presenting difficulties were formulated using cognitive-behavioural and psychodynamic models. The second CPR is a service evaluation of a cognitive-behavioural skills training course for staff in a community mental health service, to determine if there was any impact of upskilling staff on the quality of service provided to service users. The third CPR details a gentleman who had difficulties with anxiety and panic, and used a single case experimental design to evaluate the implementation of a cognitive-behavioural intervention. The fourth CPR presents an example of leadership, and the

development and delivery of team formulation sessions in a service for adults with learning disabilities. The final CPR is an abstract for an oral presentation which integrated attachment and systemic psychological models in the assessment, formulation and intervention of a young person.

All names and potentially identifying information have been changed to ensure anonymity and confidentiality.

DEDICATION

This thesis is dedicated to my little sister, Millie. You are truly the most beautiful soul and my rock. I would not have got through this doctorate without your love and support.

ACKNOWLEDGEMENTS

It struck me numerous times whilst writing this thesis, that I couldn't quite believe I had got to this stage in my education and career. I acknowledge that this would not have been possible without a number of wonderful people in my life, who have guided and inspired me along my journey.

My family have always encouraged me in my learning and education, and for that I am so grateful. Whether it was extra tuition or helping me revise, you always supported and believed in me, even when I didn't. University must have felt quite alien to us at one point, and perhaps we didn't realise at the time that it would be seven years of University that I would require to reach my dream. However, I promise you Mom and Dad, I will stop now – for a few years at least! To my sister, and my brother-in-law Kane, you have both always been there for me, locked me in the house at one point to do my work, and I love you both for it. Thank you isn't enough for your support.

On this journey I have been grateful for the safety net of my supervisors, all of who have encouraged my learning and growth. I would also like to acknowledge all the support and wisdom shared by my personal tutor, Dr Shradha Lakhani, thank you for your guidance and kindness along this journey.

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To all my strong, beautiful friends, I don't know where I would be without you. Freesia, you are my best friend and the most wonderful woman. You've inspired me, constantly held me in mind, and been there for me through the good and the bad. You are my constant. To my cohort, it's been lovely to be on this journey with you. I have to make a special thank you to Tamara, for being there for me and always offering your support. You have a beautiful, kind heart.

Finally, I share my gratitude to everyone who participated in my study. I don't know who you are, or where you are, but my thanks go out to you. Thank you for sharing your stories.

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CHAPTER 1:

LITERATURE REVIEW: THE RELIABILITY OF THE WARWICK-EDINBURGH MENTAL WELL-BEING SCALE: A META-ANALYSIS

ABSTRACT

Background

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) is a 14-item scale which measures mental wellbeing in the general population. To date there has been no meta-analysis of the reliability of this scale, and hence, this review used a meta-analysis to assess for the internal consistency (Cronbach's alpha) of the 14-item scale.

Method

PsychINFO, Ovid and Web of Science electronic databases were used to conduct a systematic search of the literature. In total 902 articles were reviewed, which resulted in 53 articles being included with a total of 65 datasets.

Results

The results showed that for the total of all studies using the 14-item scale, alpha was 0.904. Analysis showed that there was an unacceptable level of heterogeneity, however, there was little variation noted when completing subgroup analysis of the quality effects, study design, publication bias and small study effects. There was a significant difference in reporting of alpha (X^2 = 10.82, p=0.0287) for the different language versions of the WEMWBS.

Conclusion

Results were suggestive of a good internal consistency of the WEMWBS. There was no significant difference in the reporting of alpha when quality of studies, study design, publication bias and small study effects were considered. There was some evidence of

difference in internal consistency across different language versions, although all these studies still reported an acceptable alpha coefficient. This meta-analysis suggests that the WEMWBS is a reliable scale to use, which is important given this scale has been translated to 25 languages and it is used worldwide.

INTRODUCTION

With Covid-19 leading to a worldwide pandemic, where people's lives have been significantly disrupted and restricted, as well as people feeling suffocated by the anxieties of catching the virus and adjusting to a new way of living, wellbeing has been on the agenda. In the UK, there have been a number of guidelines published to promote wellbeing amongst the population, such as those by Public Health England (e.g. Guidance for the public on the mental health and wellbeing aspects of coronavirus, 2021) and the NHS (e.g. Mental wellbeing whilst staying at home, 2020). The British Psychological Society (BPS) also created guidance for leaders of healthcare services to support the wellbeing of all healthcare staff (BPS, 2020).

However, the idea of promoting wellbeing is not just something to come out of a global pandemic. There has been growing interest worldwide in strengthening mental wellbeing amongst populations and this has long been on the agenda of governments and organisations (Tennant et al. 2007). In a document by the Department of Health (2014), the importance of wellbeing is highlighted as a means for a person to live a satisfactory and healthy life, with broader positive outcomes such as in employment, education and relationships. Internationally, the World Health Organization's (WHO) Mental Health Action Plan for 2013-2020 (World Health Organization, 2013) was a response to work with governments in taking action to improve citizens' mental wellbeing. The reason for this is that wellbeing is associated with many factors, for example, depression and anxiety are mental illnesses that are related to lower levels of wellbeing (Keyes, 2005). Due to the impact of wellbeing on mental health and health in general, it is believed by the UK government

that policies and guidance that focus on strengthening the population's wellbeing would lead to a reduction on healthcare demands (Department of Health, 2014).

What is Mental Wellbeing?

There are a number of definitions for mental wellbeing due to it being a multifactorial idea and there is not one agreed definition (Dodge et al., 2012). A definition by HM Government describes wellbeing as *"A positive state of mind and body, feeling safe and able to cope, with a sense of connection with people, communities and the wider environment."* (HM Government, 2010, p. 18). The WHO suggest wellbeing is a state where the individual is able to realise their own abilities, can deal with ordinary life stressors, can work effectively and can make a contribution to the community they live within (World Health Organization, 2013).

However, the definition of wellbeing is actually more complex than just a definition. As such, wellbeing can be divided into objective and subjective measures. Objective measures include adequate living conditions, amount of food and clothing. Subjective measures refer to hedonic (e.g. perceived life-satisfaction, feeling happy) and eudemonic wellbeing (e.g. finding purpose in life and self-realisation) (Schulte et al. 2015; Trudel-Fitzgerald et al. 2019).

Furthermore, the WHO suggest that mental health is an important factor in overall health and wellbeing, and in their definition of health they suggest that health is "*a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity".* (World Health Organization, 2013, p.7). In a similar fashion, when devising the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), a model was drawn upon of mental wellbeing that was less about the absence of mental illness and more about a person's

sense of being able to function and feel good. The WEMWBS acknowledges the now widely accepted idea that mental wellbeing covers both hedonic and eudemonic perspectives (NHS Health Scotland, 2015).

Development of the Warwick-Edinburgh Mental Well-Being Scale

In order to measure mental wellbeing, conduct research, appraise guidelines, policies and programmes, an instrument is required that is able to monitor mental wellbeing amongst the general population (Tennant et al. 2007). Historically there have been a number of instruments employed to do so, such as the Scale of Psychological Well-being (SPWB) (Ryff & Keyes, 1995), WHO Wellbeing Index (WHO-5) (WHO, 1998) and the Affectometer 2 (Kammann & Flett, 1983). In 2005, NHS Health Scotland funded research to develop a new scale in line with the Scottish Executive's National Programme for Improving Mental Health and Well-being in Scotland (Warwick Medical School, 2020). As the Affectometer 2 was viewed as promising in terms of its measure of wellbeing, it became the first step in the development of a new scale (Warwick Medical School, 2020). The Affectometer 2 was preferable as a starting point given that it covered both hedonic and eudemonic perspectives of mental wellbeing and was shown to have good validity in the UK. However, it also had limitations such being too long and there's a potential for social desirability bias (NHS Health Scotland, 2015; Tennant et al., 2007).

The WEMWBS was the product of a UK validation of the Affectometer 2 scale, and focus group discussions with an expert panel consisting of a range of disciplines (Tennant et al., 2007). The purpose of this scale was to assess mental wellbeing in the general population, and to use the scale to evaluate mental wellbeing in different projects, programmes and policies that target wellbeing. It was developed as a measure of mental wellbeing and not a

measure of mental illness (Taggart, Stewart-Brown & Parkinson, 2015). The 14-item scale covers both wellbeing and psychological functioning using a 0-5 Likert scale. The scale is positively worded as it comes from a model that is about more than the lack of any mental illness (Taggart, et al., 2015).

Reliability of the WEMWBS

In the development of instruments like the WEMWBS, authors are required to ensure that their instruments are reliable and valid for use. Therefore, to ensure quality of an instrument the validity may be assessed, which is the extent the instrument measures what it claims to measure. The reliability of the instrument may also be assessed for, which is the extent the instrument is consistent and will have the same measured outcome when repeating measures (Taber, 2013). One measure of reliability is Cronbach's alpha (Cronbach, 1951), which is reportedly one of the most commonly used measures of internal consistency (Raykov & Marcoulides, 2017). Internal consistency is the extent to which the different items in a measure are measuring the same underlying concept and the Cronbach's alpha is reported as a number between 0 and 1, with values closer to 1 indicating greater internal consistency (Tavakol & Dennick, 2011).

Some researchers use a broad guide for interpreting Cronbach's alpha. George and Mallery (2003) suggested a tiered approach with values over 0.7 being good, and those less than 0.5 being poor. Similarly, Cortina (1993) suggested that values of 0.80 or higher are preferred, values of 0.70-0.79 are acceptable, and values of 0.60–0.69 are good. However, interpretation needs to be addressed with caution as there are differing opinions on how to interpret Cronbach's alpha. Nunnally (1978) suggested that a Cronbach's alpha of 0.70 or above was acceptable. However, more recent work, such as a meta-analysis of Cronbach's

alpha by Greco et al. (2018) suggest that Nunnally's threshold should be discontinued, and provided different baseline alphas for planning research. They also found that alphas mostly exceeded 0.70 and commonly were above 0.80. Furthermore, Taber (2013) suggested that a very high alpha does not necessarily indicate the instrument is unidimensional, and it could imply redundancy in items. Similarly, Streiner (2003) suggested that alphas of 0.95 or higher are not desirable for the same reasons. Although it is appropriate for items of a psychometric scale to all measure something in common and be related, a high estimate of internal consistency or item homogeneity may be indicative that all items are actually being rephrased in different ways (Boyle,1991).

Meta-analysis Aims

A meta-analysis is a statistical method for integrating a number of studies to combine their results into a single conclusion (Lee, 2019). According to the University of Warwick website, the WEMWBS has been translated in over 25 languages, and there are 1, 200 registrations each year to use the scale (Warwick Medical School, 2021). Despite this use of the WEMWBS across a number of different populations, to date there has not been a meta-analysis conducted on the 14-item WEMWBS to gather a detailed understanding of the internal consistency of this instrument. Hence, by conducting a meta-analysis to investigate the internal consistency of the WEMWBS a clearer estimate of its reliability can be attained, and this is the purpose of this review.

METHOD

Identifying Primary Studies: Search of Electronic Databases

A systematic search of the literature was initially carried out on 17th July 2020 using PsychINFO, Ovid and Web of Science databases. The aim of the search was to obtain a comprehensive overview of the literature into the reliability of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). Synonyms of each key construct of this question were listed and papers on the reliability of the WEMWBS were examined to see what search terms they had used. Peer-reviewed articles were searched for since the year 2007, as the WEMWBS development study was published in this year. The search terms were combined and are outlined in Table 1. Limits that applied to the search results were that the studies had to be available in English language and that the papers should be peer-reviewed.

Table 1.

Search Strategy

Construct	**Free Text Search Terms**	**Method of Search**	**Limits**
WEMWBS	"WEMWBS" "Warwick Edinburgh well-being scale" "Warwick Edinburgh wellbeing scale" "Warwick-Edinburgh wellbeing scale" "Warwick-Edinburgh well-being scale" "wellbeing" "well-being"	Free search terms All search terms combined with *OR*	Peer reviewed articles 2007-present. Articles in English language.

Internal Consistency	"Internal consistency" "Valid*" "Reliab*" "Cronbach's alpha" "Alpha" "test retest" "test-retest"		

Once the initial studies were identified, the reference sections of the papers were examined to see whether there were any additional studies not identified in the search. As the search was conducted some of the studies using the 14-item scale also included the 7-item shortened version of the WEMWBS, the SWEMWBS (Stewart-Brown et al. 2009), so these were recorded but will not form part of this analysis, as this search and analysis is specific to the 14-item scale.

Inclusion Criteria

Full inclusion criteria are described in Table 2. In order to establish the reliability of the WEMWBS, the main inclusion criteria were that the article must report Cronbach's alpha, or report a measure of internal consistency that could be transformed into Cronbach's alpha, such as the Person Separation Index (PSI). Also, the article must have been peer-reviewed and be in English language. There were a number of methodologies identified in the articles, and hence, the inclusion criteria were broad to account for this. There were no restrictions placed on study design, study purpose, country of origin, participants, setting, timeframe, or any mental health disorders or problem of interest.

Table 2.

Inclusion Criteria

Inclusion criteria	Justification
Scale Focus	
Studies that used the full 14-item scale WEMWBS.	This scale is the focus of the review. This is because most validation studies and translations have been conducted with the full 14-item scale (Warwick Medical School, 2020).
Studies that used the WEMWBS and reported the total internal consistency measure of this scale.	This ensures that only the 14-item version of the WEMWBS was included and that any versions of this scale that have been changed are not included e.g. studies where items in the scale have been missed or altered.
The scale can be delivered in any self-completed modality.	The developers of the WEMWBS suggested the scale is robust when used in on paper, online or on a computer as long as it is self-completed (Warwick Medical School, 2020). Any different delivery of the scale can be noted in the risk of bias, and will affect the quality of the study .
Participant focus	
No restrictions on the age of participants, gender, demographic, language, mental health disorders, or problem of interest.	This meta-analysis is examining the internal consistency of the WEMWBS across all populations where it has been used. If it is felt there would be any variation of effect due to participants, then a sub-group analyses can be conducted.
Outcome data	
There is no restriction on study design, study purpose, country of origin, setting, or timeframe. All the studies are required to report an original Cronbach's alpha or equivalent that has not been reproduced from previous published work.	To ensure that the measure is novel and has not been arrived at by secondary analysis of existing studies to prevent overlapping which may influence the overall analysis.
Type of article	
The following article types were excluded: meta-analysis/theoretical papers/ reviews/commentaries/ clinical guidance/ /qualitative papers	These articles do not provide the outcome data needed for this meta-analysis.

The results of the systematic search are presented in the PRISMA chart in Figure 1 (Moher, Liberati, Tetzlaff & Altman, 2009). The search yielded 1, 536 articles after the search was completed (which excluded most articles that were not in English language) and 902 once duplicates were removed. These articles were then screened using the inclusion/exclusion criteria from the study titles, abstract, and full-text. All full-texts of studies were reviewed because often the WEMWBS or internal consistency measures were not included in titles or abstracts. The two most common reasons for exclusion were because studies were not specifically related to WEMWBS (*n=709*), and/or no measure of internal consistency was reported for the WEMWBS (*n=73*). The remaining 57 studies were excluded for reasons such as having no English translation text available, full-texts were not available or accessible, and no original measure of internal consistency was reported. Articles were then reviewed in more detail against the exclusion criteria. In total, 53 articles met the full inclusion/exclusion criteria for the meta-analysis. Of these studies, nine articles reported measures of internal consistency from two or more separate samples, therefore, 65 measures of Cronbach's alpha are reported for the 14-item WEMWBS in this review. A summary of the studies included in this review can be seen in Figure 2.

Figure 1.

Results of the systematic search and the application of the inclusion criteria using PRISMA Flow Diagram (Moher Liberati Tetzlaff and Altman, 2009).

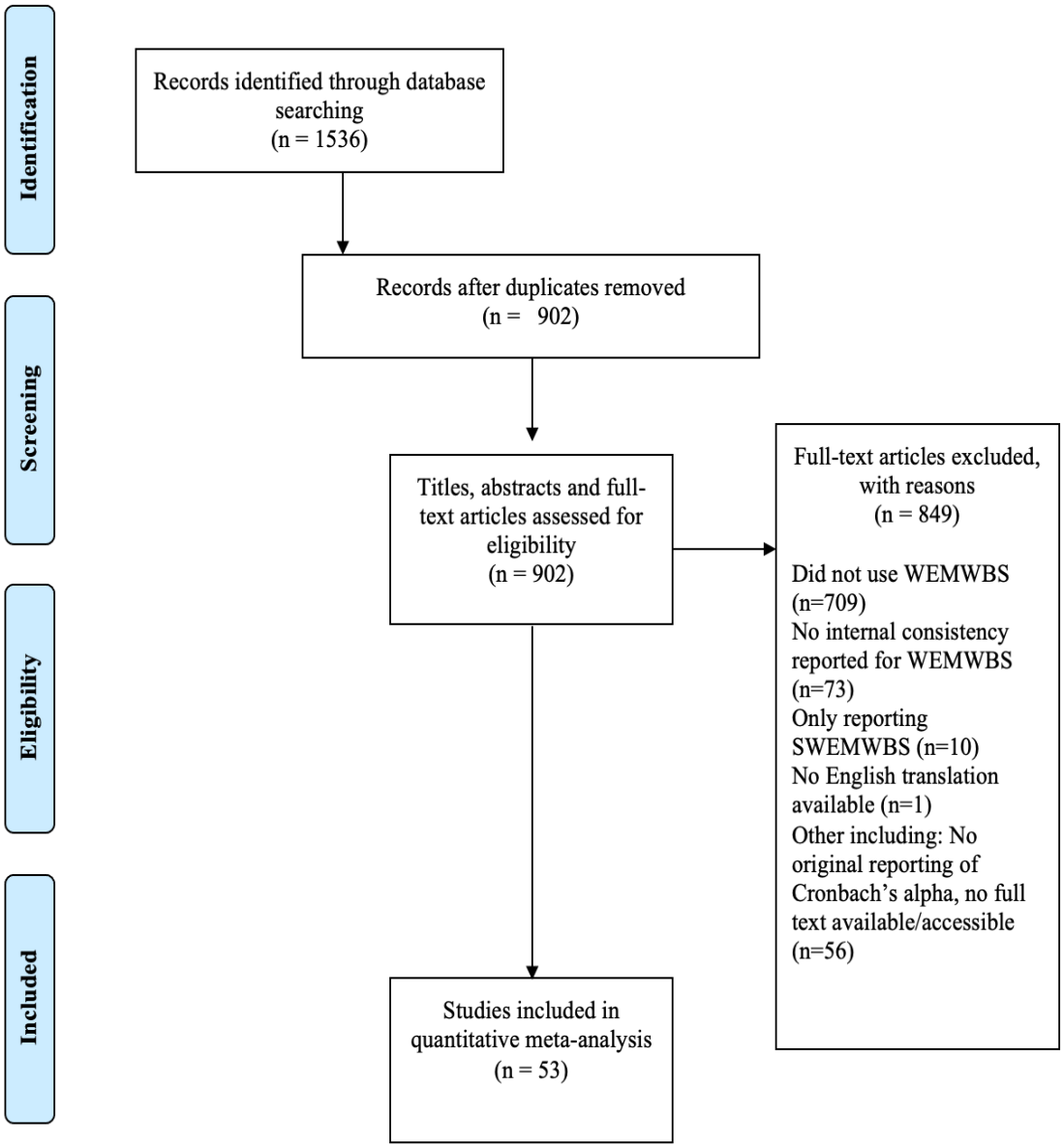


Figure 2.

A summary of the studies included in this review.

Study Authors	Year	Study Title	Total number of Participants	Description of Study
Bacon, T , Doughty, C , Summers, A , Wiffen, B , Stanley, Z , & McAlpine, S	2018	The Emotional Resources Group: Provisional outcome data for a pilot six-session emotion regulation programme for secondary care	47	To look at the effectiveness of a six-session emotional regulation group designed for the secondary care setting in the UK
Bartram, D J ; Sinclair, J M & Baldwin, D S	2013	Further validation of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) in the UK veterinary profession: Rasch analysis	500	To assess the psychometric properties of the WEMWBS in the UK veterinary profession by the application of Rasch analysis, and to assess the external construct validity of the derived interval scale measurements
Bartram, D, J , Yadegarfar, G , & Baldwin, D, S	2009	A cross-sectional study of mental health and well-being and their associations in the UK veterinary profession	1796	To assess the contribution of mental health and wellbeing to elevated risk of suicide in veterinary surgeons via postal questionaries
Bass, M , Dawkin, M , Muncer, S , Vigurs, S & Bostock, J	2016	Validation of Warwick-Edinburgh Mental Well-being Scale (WEMWBS) in a population of people using Secondary Care Mental Health Services	1180	To assess the validity of the WEMWBS in secondary care mental health with a service user population across two NHS Trusts and one charity
Cai, R Y , Richdale, A L , Dissanayake, C , Trollor, J , & Uljarevic, M	2018	Emotion regulation in autism: Reappraisal and suppression interactions	56	To look at how the individual differences in self-reported emotion regulation strategy use relate to levels of both positive and negative psychological well-being in individuals with ASD in Australia
Castellvi, P , Forero, C G , Codony, M , Vilagut, G , Brugulat, P , Medina, A , Gabilondo, A , Mompart, A , Colom, J , Tresserras, R , Ferrer, M Stewart-Brown, S , Alonso, J	2013	The Spanish version of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) is valid for use in the general population	1900	To assess the validity and reliability of the Spanish version of WEMWBS in the general population in Catalonia
Clarke, A , Friede, T , Putz, R , Ashdown, J , Martin, S , Blake, A , Adi, Y , Parkinson, J , Flynn, P , Platt, S & Stewart-Brown, S	2011	Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Validated for teenage school students in England and Scotland A mixed methods assessment	1650	To assess the reliability and validity of the WEMWBS in UK teenagers
Clift, S , Manship, S & Stephens, L	2017	Further evidence that singing fosters mental health and wellbeing: the West Kent and Medway project	67	To test the robustness of previous findings that mental distress is reduced by weekly singing, with a sample from the UK
Cronly, J , Duff, A , Riekert, K , Horgan, A , Lehane, E , Perry, I , Fitzgerald, A , Howe, B , Chroinin, M N , & Savage, E	2019	Positive mental health and wellbeing in adults with cystic fibrosis: A cross sectional study	147	To study positive mental health and wellbeing, and associations with physical health and health-related quality of life in adults with Cystic Fibrosis in Ireland
Dong, A , Chen, X , Zhu, L , Shi, L , Cai, Y , Shi, B , Shao, L & Guo, W	2016	Translation and validation of a Chinese version of the Warwick-Edinburgh Mental Well-being Scale with undergraduate nursing trainees	189	To translate the WEMWBS to Chinese lanuguage and test the reliability and validity of this version on undergraduate nursing trainees
Dong, A , Zhang, X , Zhou, H , Chen, S , Zhao, W , Wu, M , Guo, J , & Guo, W	2019	Applicability and cross-cultural validation of the Chinese version of the Warwick-Edinburgh mental well-being scale in patients with chronic heart failure	191	To study the mental wellbeing of patients with chronic heart failure and evaluated the reliability and validity of the Chinese version of the WEMWBS
dos Santos, J J A , da Costa, T A , Guilherme, J H , da Silva, W C , Abentroth, L R L , Krebs, J A & Sotoriva, P	2015	Adaptation and cross-cultural validation of the Brazilian version of the Warwick-Edinburgh mental well-being scale	122	To assess the validity of a translated Portuguese version of the WEMWBS on college students in Brazil

Study Authors	Year	Study Title	Total number of Participants	Description of Study
Fat, L N , Scholes, S , Boniface, S , Mindell, J & Stewart-Brown, S	2017	Evaluating and establishing national norms for mental wellbeing using the short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS): findings from the Health Survey for England	26617	Relative validity was examined by comparing SWEMWBS (7-item shortened version) with WEMWBS, using a Health Survey for England 2010-2013 questionnaire
Faudzi, F N M , Armitage, C J , Bryant, C & Brown, L J E	2020	Moderating effects of age on relationships between attitudes to aging and well-being outcomes	911	To study chronological age moderated relationships between attitudes to aging and wellbeing outcomes, and whether these relationships differ according to the specific attitudinal construct measured in a Malaysian population
Forero, C G , Adroher, N D , Stewart-Brown, S , Castellvi, P , Codony, M , Vilagut, G , Mompart, A , Tresseres, R , Colom, J , Castro, J I & Alonso, J	2014	Differential item and test functioning methodology indicated that item response bias was not a substantial cause of country differences in mental well-being	2679	To study cross-cultural equivalences of mental wellbeing constructs by comparing WEMWBS total scores and item responses in Scottish and Catalonian populations
Francis, L J , Laycock, P & RatteR, H	2019	Testing the Francis Burnout Inventory among Anglican clergy in England	99	To assess the Francis Burnout Inventory on Anglian clergy serving for the Church of Enlgand
Fung, S-F	2019	Psychometric evaluation of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) with Chinese university students	903	To assess the validity of the Chinese version of the WEMWBS and SWEMWBS on students from a Chinese University
Gatt, J, M , Alexander, R , Emond, A , Foster, K , Hadfield, K , Mason-Jones, A , Reid, S , Theron, L , Ungar, M , Wouldes, T A , & Wu, Q	2020	Trauma, resilience, and mental health in migrant and non-migrant youth: An international cross-sectional study across six countries	194	To explore the differences in resilience, wellbeing, and mental health behaviours in migrant and non-migrant adolescents aged 10-17 years old, tested across six countries with different levels of trauma exposure
Geldhof, G , Larsen, T , Urke, H , Holsen, I , Lewis, H , & Tyler, C P	2019	Indicators of positive youth development can be maladaptive: The example case of caring	2386	To assess the assumption that more-is-better approach to positive youth development in Norwegian students
Goh, H E , Marais, I & Ireland, M	2018	The Impact of Differential Item Functioning on the Warwick-Edinburgh Mental Well-Being Scale	471	To assess whether WEMWBS items that refer to interpersonal relationships may operate differently for those in a relationship compared to those who are not
Hoffman, S , Rueda, H A & Lambert, M C	2019	Confirmatory factor analysis of the Warwick-Edinburgh Mental Wellbeing Scale among youth in Mexico	112	To assess the internal structure of the Spanish version of the WEMWBS on youth in Mexico
Houghton, S , Hattie, J , Carroll, A , Wood, L , & Baffour, B	2016	It Hurts To Be Lonely! Loneliness and Positive Mental Wellbeing in Australian Rural and Urban Adolescents	1143	To explore associations between loneliness and positive mental wellbeing in adolescents in Australia
Houghton, S , Wood, L , Marais, I , Rosenberg, M , Ferguson, R , & Pettigrew, S	2015	Positive Mental Well-Being: A Validation of a Rasch-Derived Version of the Warwick-Edinburgh Mental Well-Being Scale	2005	To use a Rasch analysis model to assess psychometric properties of the WEMWBS on the general population in Australia
Hull, L , Mandy, W , Lai, M C , Baron-Cohen, S , Allison, C , Smith, P & Petrides, K V	2018	Development and Validation of the Camouflaging Autistic Traits Questionnaire (CAT-Q)	832	To assess a self-report measure for social camouflaging behaviours in autistic adults in the UK
Hunter, S C , Houghton, S & Wood, L	2015	Positive Mental Well-being in Australian Adolescents: Evaluating the Warwick-Edinburgh Mental Well-being Scale	829	Evaluate the use of the WEMWBS in Australian adolescents
Karpaviciute, S & Macijauskiene, J	2016	The Impact of Arts Activity on Nursing Staff Well-Being: An Intervention in the Workplace	115	The explore the impact of arts activity on the wellbeing of nursing staff in Lithuania using a translated version of the WEMWBS and other scales
Koushede, V , Lasgaard, M , Hinrichsen, C , Meilstrup, C , Nielsen, L , Rayce, S B , Torres-Sahli, M , Gudmundsdottir, D G , Stewart-Brown, S & Santini, Z I	2019	Measuring mental well-being in Denmark: Validation of the original and short version of the Warwick-Edinburgh mental well-being scale (WEMWBS and SWEMWBS) and cross-cultural comparison across four European settings	3508	To assess the psychometric properties of the Danish WEMWBS and its short version (SWEMWBS) in a Danish general population sample, and compare Denmark scores with scores representative of three other European settings

Study Authors	Year	Study Title	Total number of Participants	Description of Study
Kwan, B , Rickwood, D J , & Telford, N R	2018	Development and validation of MyLifeTracker: A routine outcome measure for youth mental health	62447	To assess a brief mental health outcome measure in young people in Australia
Lang, G & Bachinger, A	2017	Validation of the German Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) in a community-based sample of adults in Austria: a bi-factor modelling approach	625	To assess the validity of the German version of the WEMWBS in a community-based sample of adults living in Vienna, Austria
Liebenberg, L & Moore, J C	2018	A Social Ecological Measure of Resilience for Adults: The RRC-ARM	105	To explore the validity and reliability of the adapted Child and Youth Resilience Measure for use with an Irish Clerical abuse survivors
Lloyd, K & Devine, P	2012	Psychometric properties of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) in Northern Ireland	3355	To assess the wellbeing in the general population of Northern Ireland using the WEMWBS
Lopez, M A , Gabilondo, A , Codony, M , Garcia-Forero, C , Vilagut, G , Castellvi, P , Ferrer, M & Alonso, J	2013	Adaptation into Spanish of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) and preliminary validation in a student sample	148	To explore the psychometric properties of a Spanish translated version of the WEMWBS, using students at a Spanish University
Martin, F , Clyne, W , Pearce, G , & Turner, A	2019	Self-management support intervention for parents of children with developmental disorders: The role of gratitude and hope	108	To explore any changes in anxiety, depression, wellbeing, hope and gratitude, and to assess for any associations between changes in anxiety and depression and changes in gratitude and hope in parents of children with developmental disabilities
McKay, M T & Andretta, J R	2017	Evidence for the Psychometric Validity, Internal Consistency and Measurement Invariance of Warwick Edinburgh Mental Well-being Scale Scores in Scottish and Irish Adolescents	206	To assess the psychometric properties of the WEMWBS with adolescents in Scotland and Northern Ireland
Moksnes, U K & Espnes, G A	2020	Sense of Coherence in Association with Stress Experience and Health in Adolescents	1233	To investigate the associations between sex, age, socio-economic status, stress, sense of coherence, and health in Norwegian adolescents
Moksnes, U K & Reidunsdatter, R J	2019	Self-esteem and mental health in adolescents - level and stability during a school year	702	To investigate gender differences as well as the level, stability and predictive role of mental health and self-esteem in adolescents during a school year in Norway
Musharraf, S & Anis-Ul-Haque, M	2018	Impact of Cyber Aggression and Cyber Victimization on Mental Health and Well-Being of Pakistani Young Adults: The Moderating Role of Gender	508	To explore the impact of cyber aggression and cyber victimization on the mental health and well-being of young adults at various Universities of Rawalpindi and Islamabad, Pakistan
Odou, N & Vella-Brodrick, D A	2013	The Efficacy of Positive Psychology Interventions to Increase Well-Being and the Role of Mental Imagery Ability	210	To assess the effects of mental imagery ability on the efficacy of two positive psychology interventions to enhance wellbeing in Australian adults
Orgeta, V , Lo Sterzo, E & Orrell, M	2013	Assessing mental well-being in family carers of people with dementia using the Warwick-Edinburgh Mental Well-Being Scale	170	To use the WEMWBS to identify predictors of positive mental health in a convenience sample of family carers of people with dementia in the UK
Ringdal, R , Bradley Eilertsen, M E , Bjornsen, H N , Espnes, G A , & Moksnes, U K	2018	Validation of two versions of the Warwick-Edinburgh Mental Well-Being Scale among Norwegian adolescents	1814	To validate the WEMWBS and 7-item SWEMWBS in Norwegian adolescents
Saavedra, J , Perez, E , Crawford, P & Arias, S	2018	Recovery and creative practices in people with severe mental illness: evaluating well-being and social inclusion	31	To explore the impact of an artistic workshop on a group of Spanish service users with severe mental illness

Study Authors	Year	Study Title	Total number of Participants	Description of Study
Shaheed, R , Shukla, S , Acharya, S , Gopal, U & Acharya, N	2019	Journey from Fighters to Survivors: Quality of Life and Mental Status in Cancer Patients in a Rural Tertiary Care Hospital	42	To assess quality of life and mental status in cancer patients in India going through cancer treatment
Smith, O R F , Alves, D E , Knapstad, M , Haug, E & Aaro, L E	2017	Measuring mental well-being in Norway: validation of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS)	1168	To assess the psychometric properties of the Norwegian version of the WEMWBS and SWEMWBS in a sample of primary health care patients who participated in a Norwegian mental health care program aimed to increase access to treatment for anxiety and depression
Stafford, M , Ben-Shlomo, Y , Cooper, C , Gale, C , Gardner, M P , Geoffroy, M C , Power, C , Kuh, D & Cooper, R	2017	Diurnal cortisol and mental well-being in middle and older age: evidence from four cohort studies	8920	A UK study which completed an individual participant meta-analysis of older adults to test the hypothesis that cortisol patterns indicative of dysregulated hypothalamic-pituitary-adrenal axis functioning would be prospectively associated with poorer well-being at follow-up
Stewart-Brown, S , Tennant, A , Tennant, R , Platt, S , Parkinson, J , Weich, S	2009	Internal construct validity of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS): a Rasch analysis using data from the Scottish Health Education Population Survey	779	Used a Rasch measurement model to report the internal construct validity of WEMWBS
Taggart, F , Friede, T , Weich, S , Clarke, A , Johnson, M & Stewart-Brown, S	2013	Cross cultural evaluation of the Warwick-Edinburgh mental well-being scale (WEMWBS) -a mixed methods study	335	To assess the validity of the WEMWBS among English speaking adults representing two of the minority ethnic groups living in the UK, self-identified as Chinese or Pakistani by background
Taylor, G , Slade, P , & Herbert, J S	2014	Infant face interest is associated with voice information and maternal psychological health	59	To explore the role of the voice in eliciting infants' interest in mother and stranger faces and in the association between infant face interest and maternal psychological health, in mothers in the UK
Tennant, R , Hiller, L , Fishwick, R , Platt, S , Joseph, S , Weich, S , Parkinson, J , Secker, J & Stewart-Brown, S	2007	The Warwick-Edinburgh mental well-being scale (WEMWBS): development and UK validation	2097	A study to describe the development and validation of the WEMWBS It was validated using a student and representative population sample in England and Scotland
Thompson, C , Fernandez de la Cruz, L , Mataix-Cols, D & Onwumere, J	2016	Development of a brief psychoeducational group intervention for carers of people with hoarding disorder: A proof-of-concept study	12	The current study evaluated the impact and acceptability of a brief psychoeducational group intervention for carers of people with hoarding disorder in the UK
Trousselard, M , Steiler, D , Dutheil, F , Claverie, D , Canini, F , Fenouillet, F , Naughton, G , Stewart-Brown, S & Franck, N	2016	Validation of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) in French psychiatric and general populations	515	To explore the validity of the French WEMWBS in healthy and chronic remitted schizophrenia populations in France
Waqas, A , Ahmad, W , Haddad, M , Taggart, F M , Muhammad, Z , Bukhari, M H , Sami, S A , Batool, S M , Najeeb, F , Hanif, A , Rizvi, Z A , Ejaz, S	2015	Measuring the well-being of health care professionals in the Punjab: a psychometric evaluation of the Warwick-Edinburgh Mental Well-being Scale in a Pakistani population	1271	To investigate the wellbeing of Pakistani healthcare professionals, and to evaluate the psychometric performance of the English version of the WEMWBS in this population
Wilson, C & Secker, J	2015	Validation of the Social Inclusion Scale with Students	103	To validate the Social Inclusion Scale in a sample of Australian university students
Winter, T , Riordan, B C , Pakpour, A H , Griffiths, M D , Mason, A , Poulgrain, J W & Scarf, D	2020	Evaluation of the English Version of the Fear of COVID-19 Scale and Its Relationship with Behavior Change and Political Beliefs	1023	The examine the psychometric assessment and validation of the English version of the FCV-19S, using a general population sample in New Zealand

Quality Ratings and Data Extraction

All data was extracted by the author. To ensure the reliability of the quality ratings, the reliability of selection processes and data extraction was cross-validated and checked by a second rater using a 10% random sample. Any disagreement was discussed and the decisions documented. However, there were no disagreements between author and the second rater. If there were outstanding issues with any of the studies, then the authors of those studies were contacted where possible to help resolve problems.

Risk of Bias Assessment

A set of quality criteria were developed to assess for any risk of bias within this literature. The quality criteria were adapted from existing frameworks including The Cochrane Collaboration Risk of Bias Tool (Higgins et al., 2011) and the Risk of Bias Assessment Tool for Nonrandomised Studies (RoBANS) (Kim et al., 2013). The framework assessed risk of bias in five domains: Selection Bias, Measurement Fidelity, Statistical Bias, Reporting Bias, and Generalisability (see Table 3).

Table 3.

Risk of Bias Assessment

Domain	Details	Risk of Bias
Selection Bias	The study sample is representative of that for which the WEMWBS was designed. The WEMWBS was initially developed for use in the UK, from surveys with students and general population of Scotland and England. It was validated for use in the UK for those aged 13 years and over. However, it has now been validated amongst different	High Risk-No description of the method by which participants were selected, or characteristics of participants are not described. The sample characteristics are not representative for the scale's target population. A different demographic that the WEMWBS has yet to be validated for. Any group or demographic characteristic that is likely to impact upon the internal reliability of the measure.

	populations and languages world-wide, and these other validated versions are listed on the WEMWBS website.	Unclear Risk-The characteristics of the study population are not clearly reported. This includes age range, education years, socioeconomic status, ethnicity, where participants were recruited from and how. The study is with any group or demographic characteristic that marks the population as unusual, and that has the possibility of affecting the internal reliability of the measure and creates a confidence issue. Low Risk-The characteristics of the study population are clearly described and are representative of the population for which the scale was developed. The study is with any group of individuals for whom the WEMWBS was originally targeted, and for those the WEMWBS has been validated for.
Measurement Fidelity	Was the delivery of the test sufficiently well described that it could be replicated? Were procedures in place to assess the fidelity of the administration? Was the delivery of the test completed in an acceptable way as per the recommendations of the test's authors? Administration of the full questionnaire, and unchanged.	High Risk – No mention of processes used to ensure fidelity. No description of application of test. Only selected items of the scale were administered; the scale's developer had not approved the version, or the administration protocol was not adhered to. Alterations to the test, including wording and/or scoring matrix. Combined with or amalgamated with a different test. Unclear Risk – Unclear if protocol was followed. This included where the procedure wasn't reported, e.g. when it is not clear how the test was administered. Low Risk - Test delivery and completion described and adequate adherence to the test author's recommendations demonstrated. The full version of the scale is used, or the validated 7-tem version, and either the original version is used or a version approved by the scale's developer (e.g. language variant). Test

		administered and scored following the recommended scoring.
Statistical Bias	Bias resulting from the inappropriate statistical treatment of the data. The reporting of statistical information, relating to the reliability coefficient. Considers the information reported in terms of its completeness and accuracy.	High Risk- A variation or alternative value is provided in place of a Cronbach's Alpha value, which cannot be transformed directly into an alpha coefficient, or the study failed to report exact alpha values. Unclear Risk- A variation or alternative value is provided in place of a Cronbach's Alpha value, which can be transformed into an alpha coefficient. Low Risk- Analysis as expected to produce a Cronbach's alpha, and exact Cronbach's alpha reported
Reporting Bias	Captures the completeness of the reporting within the study, around descriptive statistics and outcomes. Are there measures that have not been reported in the results that have been mentioned in the method section? Is there evidence of selective outcome reporting?	High risk – There are either no descriptive statistics or important data is missing within the reported dataset (e.g. data they said they were going to report has not been included). Unclear risk - Descriptive statistics are reported but are only partially reported. Low risk- There is a complete account of the descriptive statistics of the population sample, with all results reported in full and appropriately.
Generalisability	Can the results be applied to other populations, groups or settings based on the sample used? Capturing the size of the sample and the ability to transfer findings to the wider population.	High risk – Small sample with or without idiosyncratic features (<20 per group). Unclear risk - Sufficient sample for generalisation but with some idiosyncratic feature (30-50 per group). Sample taken from only one population group with attempts to generalise to entire population. Low risk- Sufficient sample for generalisation and representative of target population (>50 per group)

The quality index considered risk of bias in the five areas detailed in Table 3. These areas of risk of bias were rated as low, unclear or high risk (see Figure 3). If a study contained multiple population groups, then these were reviewed as separate studies and had their own quality ratings. A study with low risk of bias was awarded with two points, a study with unclear risk was awarded one point, and a high risk of a bias was given zero points. The quality index also considered study design, and two types of study design were considered pertinent to this review; 1) studies designed to assess psychometric properties of the WEMWBS and/or had more than 50 participants (these studies were awarded five points). 2) Any other study (e.g. study reporting Cronbach's alpha but its purpose was to test a different hypothesis) and/or studies with less than 50 participants (these studies were awarded zero points). The sum of the study was the overall sum of the risk of biases and study design rating, and then expressed as a percentage of the possible total score (15 points).

Figure 3.

Summary of applied quality criteria. Red indicates high risk, amber marks an unclear risk and green is a low risk of bias.

Study.name	Year	Selection.Bias	Treatment.Fidelity	Statistical.Bias	Reporting.Bias	Generalisability	Quality.Index	Study design
Tennant, Hiller, Fishwick et al. A Students	2007	Low risk	Low risk	Low risk	Low risk	Unclear risk	93%	Psychometric n greater than 50
Tennant, Hiller, Fishwick et al. B General Pop	2007	Low risk	Low risk	Low risk	Low risk	Unclear risk	93%	Psychometric n greater than 50
Bartram, Yadegarfar, Baldwin	2009	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	53%	other study n less than 50
Stewart-Brown, Tennant, Tennant, Platt, Parkinson, Weich (14-item) (PSI)	2009	Low risk	Low risk	Unclear risk	Low risk	Low risk	93%	Psychometric n greater than 50
Bacon, Doughty, Summers, Wiifen et al.	2018	High risk	Unclear risk	Low risk	Low risk	Unclear risk	40%	other study n less than 50
Bartram, Sinclair, Baldwin (used PSI) (14-item)	2013	Unclear risk	Low risk	Unclear risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Bass, Dawking, Muncer, Vigurs, Bostock (14-item)	2016	High risk	Low risk	Low risk	Low risk	High risk	73%	Psychometric n greater than 50
Cai, Richdale, Dissanayake, Troller, Uljarevic	2018	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	53%	other study n less than 50
Castellvi, Forero, Codony et al (spanish version)	2013	Low risk	Low risk	Low risk	Low risk	Low risk	100%	Psychometric n greater than 50
Clarke, Friede, Putz, et al.	2011	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	87%	Psychometric n greater than 50
Clift, Manship, Stephens (Taken at baseline)	2017	High risk	Unclear risk	Low risk	Low risk	High risk	33%	other study n less than 50
Clift, Manship, Stephens (Taken at follow-up)	2017	High risk	Unclear risk	Low risk	Low risk	High risk	33%	other study n less than 50
Cronly, Duff, Riekart	2019	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Dong, Chen, Zhu (Chinese version)	2016	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Dong, Zhang, Zhou (chinese version)	2019	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	87%	Psychometric n greater than 50
dos Santos, da Costa (brazilian version)	2015	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Fat, Scholes, Boniface (14-item)	2017	Low risk	Low risk	Low risk	Low risk	Low risk	100%	Psychometric n greater than 50
Faudzi, Armitage, Bryant, Brown (Malay version)	2020	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Forero, Adroher, Stewart-Brown et al (Scottish)	2014	Low risk	Low risk	Low risk	Low risk	Low risk	100%	Psychometric n greater than 50
Forero, Adroher, Stewart-Brown et al (Catalonian)	2014	Low risk	Low risk	Low risk	Low risk	Low risk	100%	Psychometric n greater than 50
Fung	2019	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Gatt (English version)	2020	Unclear risk	Low risk	Unclear risk	Low risk	High risk	40%	other study n less than 50
Gatt (Mandarin version)	2020	Unclear risk	Low risk	Unclear risk	Low risk	High risk	40%	other study n less than 50
Geldhof, Larsen, Urke et al	2019	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Goh et al	2018	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Houghton, Hattie, Carroll et al	2016	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	53%	other study n less than 50
Houghton, Wood, Marais	2015	Low risk	Low risk	Low risk	Low risk	Low risk	100%	Psychometric n greater than 50
Hull, Mandy et al (autistic pop)	2018	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	53%	other study n less than 50
Hunter, Houghton, Wood	2015	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	87%	Psychometric n greater than 50
Karpaviciute	2016	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Koushede, Lasgaard et al	2019	Low risk	Unclear risk	Low risk	Low risk	Low risk	93%	Psychometric n greater than 50
Kwan, Rickwood, Telford	2018	High risk	Low risk	Low risk	Low risk	High risk	40%	other study n less than 50
Lang, Bachinger	2017	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Leibenberg, Moore	2018	Unclear risk	Unclear risk	Low risk	Low risk	High risk	40%	other study n less than 50
Lloyd, Devine	2012	Low risk	Low risk	Low risk	Low risk	Low risk	100%	Psychometric n greater than 50
Lopez et al	2013	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Martin. Clyne et al	2019	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
McKay & Andretta (Scottish sample 14-item)	2017	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	87%	Psychometric n greater than 50
McKay & Andretta (N.Irish sample 14-item)	2017	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	87%	Psychometric n greater than 50
Moksnes & Espnes	2020	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Moksnes & Reidunsdatter (first data collection)	2019	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Moksnes & Reidunsdatter (seconds data collection)	2019	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Musharraf & Haque	2018	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Odou, Vella-Brodrick	2013	Low risk	Unclear risk	Low risk	Low risk	Low risk	60%	other study n less than 50
Orgeta et al	2013	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Ringdal et al (14-item)	2018	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	87%	Psychometric n greater than 50
Saavedra et al	2018	High risk	Unclear risk	Low risk	Low risk	High risk	33%	other study n less than 50
Shaheed et al	2019	High risk	Unclear risk	Low risk	Low risk	High risk	33%	other study n less than 50
Smith et al (14-item)	2017	Unclear risk	Unclear risk	Low risk	Low risk	High risk	73%	Psychometric n greater than 50
Stafford et al (HCS)	2017	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Stafford et al (CaPS)	2017	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Stafford et al (NSHD)	2017	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Stafford et al (NCDS)	2017	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Taggart, Friede et al (Chinese)	2013	Low risk	Low risk	Low risk	Low risk	Unclear risk	93%	Psychometric n greater than 50
Taggart, Friede et al (Pakistani)	2013	Low risk	Low risk	Low risk	Low risk	Unclear risk	93%	Psychometric n greater than 50
Taylor, Salde, Herbert	2014	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	53%	other study n less than 50
Thompson et al	2016	Unclear risk	Unclear risk	Low risk	Low risk	High risk	40%	other study n less than 50
Trousselard (students)	2016	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Trousselard (workers)	2016	Unclear risk	Unclear risk	Low risk	Low risk	Low risk	87%	Psychometric n greater than 50
Trousselard (psychiatric pop)	2016	High risk	Unclear risk	Low risk	Low risk	High risk	67%	Psychometric n greater than 50
Waqas	2015	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	80%	Psychometric n greater than 50
Wilson & Secker	2015	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	53%	other study n less than 50
Winter	2020	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Francis	2019	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk	47%	other study n less than 50
Hoffman, Rueda, Lambert	2019	Low risk	Unclear risk	Unclear risk	Low risk	Unclear risk	80%	Psychometric n greater than 50

Selection Bias

Selection bias was one of the largest causes of risk, with eight studies demonstrating high risk, and 43 unclear risk. This was because the WEMWBS had be completed with populations which the scale was not yet validated for, or because the population characteristics has not been clearly reported. For example, seven studies recruited participants from mental health services (Bacon et al., 2018; Bass et al., 2016; Clift et al., 2017; Kwan et al., 2018; Smith et al., 2017; Trousselard et al., 2016) some with participants described as having severe mental illness (Saavedra et al., 2018). Although the scale has been used amongst a range of different populations, it was felt that mental health status of participants would be particularly likely to have an influence on the reliability of a wellbeing scale.

Measurement Fidelity

Overall, 37 of the studies included demonstrated an unclear risk of measurement fidelity. If studies did not have a well-defined procedure to ensure measurement fidelity, they were regarded as being an unclear risk of bias in this domain. The majority of these studies demonstrating unclear risk did not describe the administration procedure of the WEMWBS or adequately e.g. where the administration of the scale took place, or whether it had been self-administered by participants.

Statistical Bias

Only five of the studies demonstrated unclear risk for statistical bias. Of these studies, two reported Person Separation Index (PSI) instead of Cronbach's alpha (Bartram et al., 2013; Stewart-Brown et al., 2009). The PSI is an estimation of the proportion of the true, or

error free variance, relative to the total variation, and is therefore equivalent to the Cronbach's alpha (RUMM Laboratory, 2014). The study by Hoffman et al. (2019) reported coefficient omega instead of Cronbach's alpha. This study noted that omega is also a ratio of true score variance to total variance and is scaled in a similar way to Cronbach's alpha. Therefore, it was treated the omega coefficient and Cronbach's alpha as equivalent. Finally, Cronbach's alpha for the study by Gatt et al. (2020) had to be recalculated for the two populations in the study, as the total Cronbach's alpha that was reported included different language versions, so the Cronbach's alpha for the Chinese version of the scale was separated from that of the English.

Reporting Bias

Overall, the full reporting within the studies was considered to be generally good, with studies reporting the descriptive statistics they claimed they would report, and all results being reported appropriately.

Generalisability

For many of the studies there was high risk (*n=12*) and unclear risk (*n=43*) for bias in how generalisable the studies were, as the studies often would only use samples from one population group, or had idiosyncratic features. Hence it was felt that these studies were not necessarily able to be generalised to the general population.

Summary

Overall, the levels of bias across studies were mixed. There were only five studies that did not report any bias in all domains (Castellvi et al. 2013; Fat, Scholes & Boniface,

2017; Forero et al. 2014; Houghton et al. 2017; Lloyd & Devine, 2012). Studies with medium to high risk of bias were included in the meta-analysis, so results of this meta-analysis should be interpreted with caution. However, the studies included are felt to be a representative summary of the research literature as it stands currently.

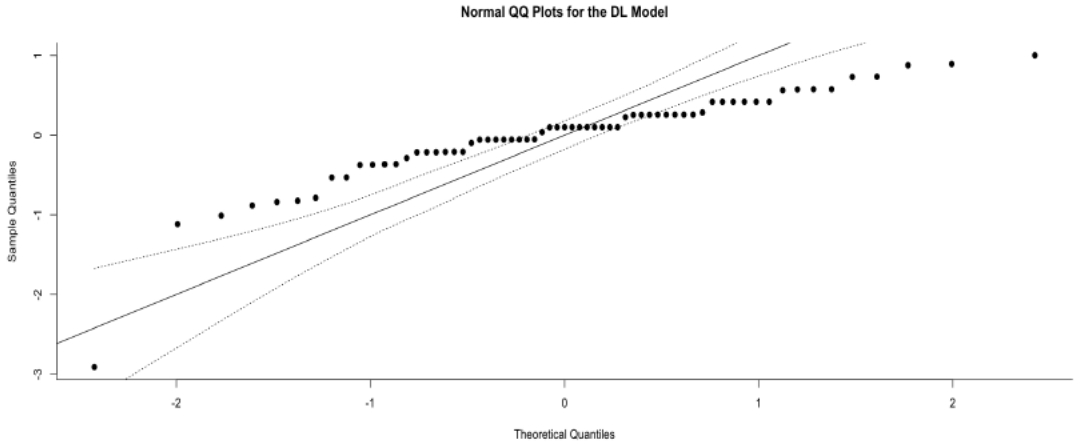
RESULTS

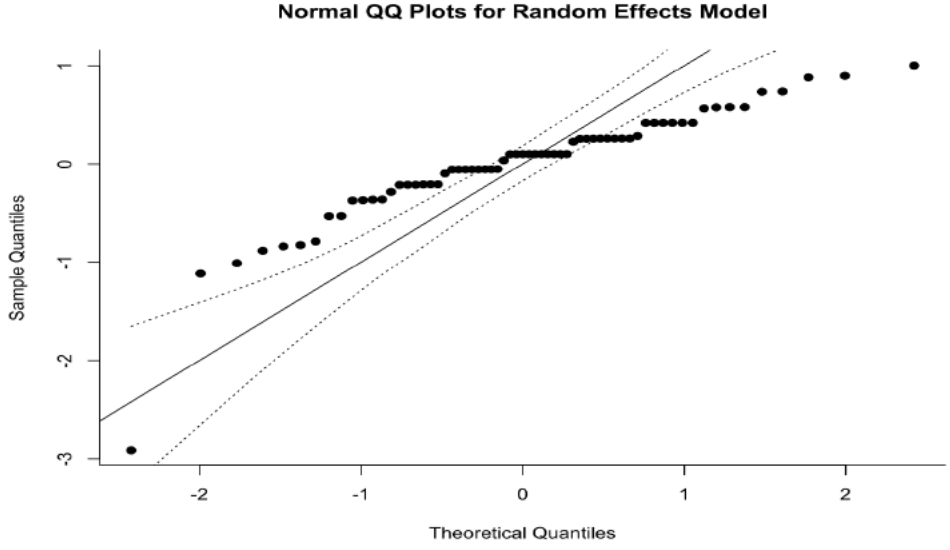
Selection of the Meta- Analytical Model

The distribution of primary study effects are shown in Figure 4. The variance of the true effect (tau^2) was calculated using the DerSimonian and Laird estimator (DerSimonian & Laird, 1986).

Figure 4.

QQ plot of the distribution of effect type within the primary studies. The first graph uses the DerSimonian and Laird estimator and the graph below uses the Restricted Maximum Likelihood estimator.





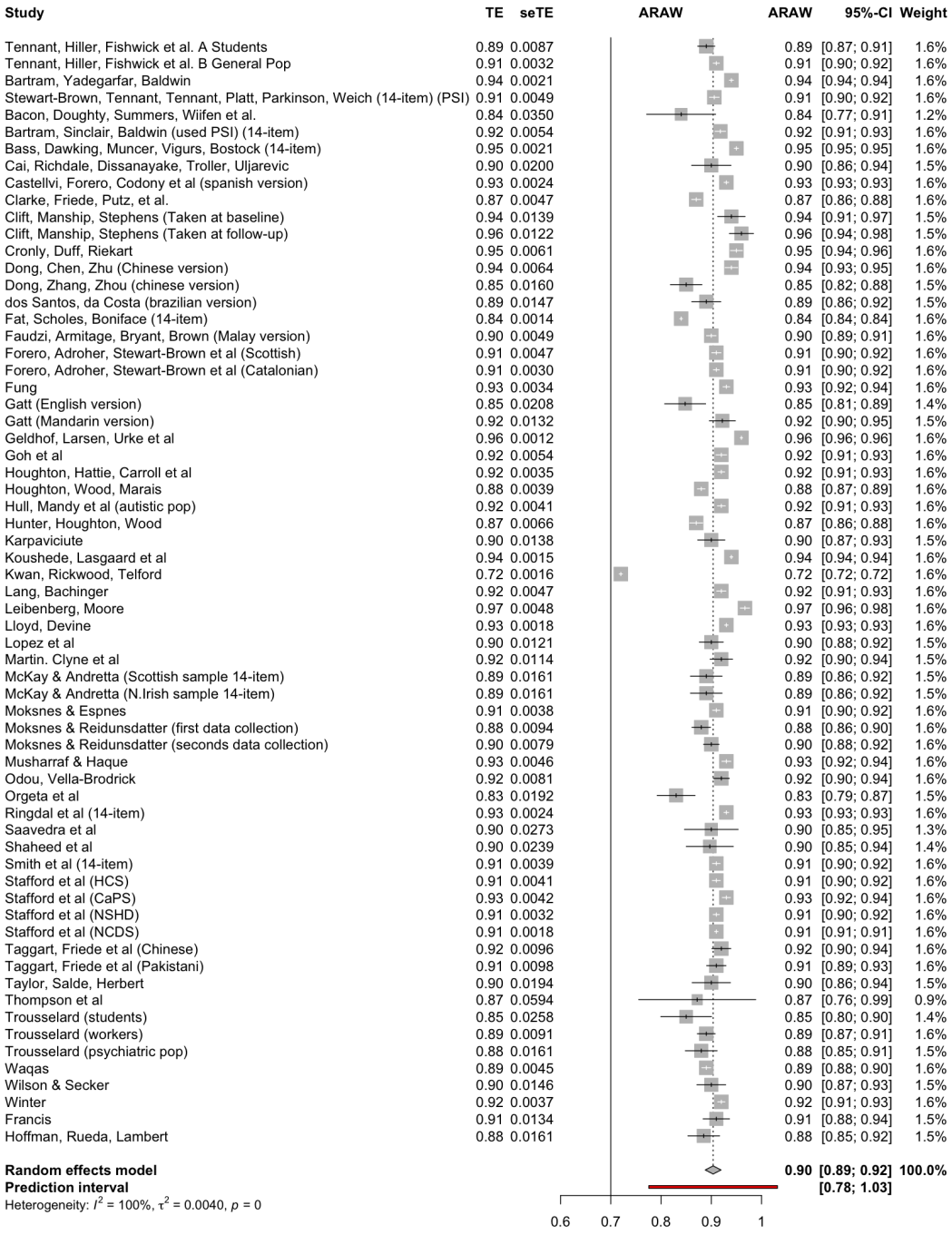
As can be seen from Figure 4, there is clear evidence of non-normality in the distribution of alpha coefficients within the primary studies. This non-normality suggests the use of the Restricted Maximum Likelihood Estimator as the appropriate method for the calculation of the between studies variation, as this estimator has been shown to be relatively robust to deviations from normality (Banks, Mao, & Walters, 1985).

The Omnibus Test

There were 65 studies using the WEMWBS 14-item scale, reporting a total of 138, 635 participants. Participants in these studies were selected from a range of populations around the world. A random effects models was calculated using the generic inverse variance method. The random effects model suggested a weighted average internal reliability coefficient of alpha = 0.904 ($z = 112.52$, $p<0.001$) and a 95% confidence interval of between 0.89 to 0.92 (see Figure 5).

Figure 5.

Forest plot of internal reliability coefficients



An unacceptable level of heterogeneity in the primary studies was observed (tau^2 = 0.004, Higgin's I^2 = 99.7%; Q = 19186.86, p<0.001), suggesting that the estimates of internal reliability in the primary studies may be biased by the presence of uncontrolled or

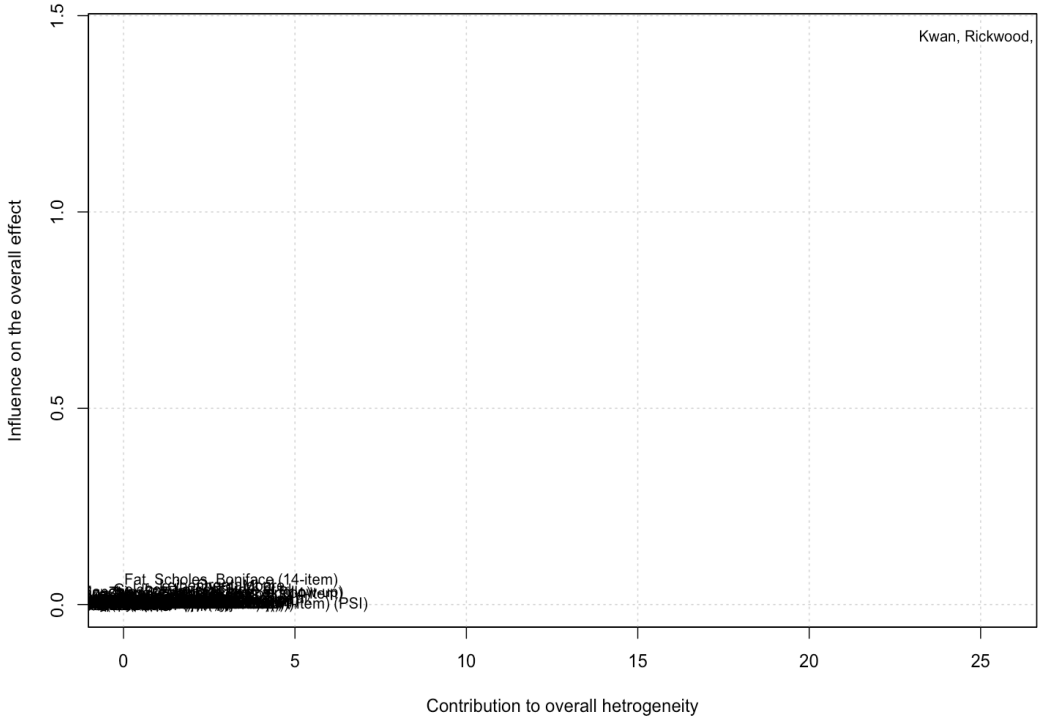
confounding factors. Therefore, the focus of the subsequent analyses will be upon the identification of the sources of heterogeneity between the estimates of alpha in the primary studies.

The Impact of Influential Primary Studies

The impact of disproportionately influential studies was assessed using a 'leave-one-out' analysis, in which the random effects model was calculated with each of the primary studies removed in turn and change in weighted average effect size (i.e., influence) and the change in heterogeneity (i.e., discrepancy) was recorded. The result of this 'leave-one-out' analysis is presented on the Baujat plot (Baujat, Pignon, & Hill, 2002) in Figure 6.

Figure 6.

Baujat diagnostic plot of sources of heterogeneity. The vertical axis reports the influence of the study on the overall effect and the horizontal axis reports the discrepancy of the study with the rest of the literature.



As can be seen in the top-right corner of Figure 6, one study (Kwan, Rickwood, & Telford, 2018) was identified as both influential upon the overall meta-analytic summary and discrepant from the rest of the literature. This study was re-examined for risk of bias that may prompt its exclusion from the analysis, however no bias was identified that would result it in being removed. When this study was removed from the dataset and the overall meta-analytic synthesis was recalculated, and the random effects model was alpha = 0.9089 (95% CI 0.9020 to 0.9158). Therefore, the omission of this study resulted in less than a 1% reduction in the alpha relative to the original estimate and heterogeneity was slightly reduced by remained substantial (Higgins $i^2 = 98.8$). As the study had a minimal impact on the overall synthesis and no risks of bias could be removed identified then it was retained within the meta-analysis.

The Effect of Risk of Bias in the Primary Studies

In order to assess the impact of study-level risk of bias upon heterogeneity, a series of subgroup analysis were conducted on the study level alpha coefficients for the differences between the risk of bias ratings of ‘low risk’ and ‘any risk’ (i.e., unclear risk and high risk of bias combined) for each of the five types of methodological bias (see Table 4). However, this could not be completed for reporting bias, as there were no unclear or high risk of bias identified in the studies.

Table 4.

Risk of bias in the primary studies

	Low Risk			**Any Risk**				
	Effect	*95% CI*	*k*	*Effect*	*95% CI*	*k*	**X^2**	**P**
Selection bias	0.9047	0.8888; 0.9206	12	0.9045	0.8936; 0.9155	53	0.00	0.9879
Measurement Fidelity	0.8956	0.8666; 0.9246	28	0.9133	0.9047; 0.9220	37	1.31	0.2522
Statistical bias	0.9042	0.8877; 0.9208	60	0.9032	0.8872; 0.9191	5	0.01	0.9278
Reporting bias	0.9037	0.8879; 0.9194	65	-	-	0	0	-
Generalisability bias	0.9056	0.8768; 0.9344	10	0.9031	0.8835; 0.9227	55	0.02	0.8875

There was no evidence of statistically significant differences for any risk of bias in the subgroup analysis. This means that studies with 'any risk', were not reporting alpha coefficients significantly different to that of studies with 'low risk'.

The Impact of Study Design

To further explore the impact of study level covariates upon study design a subgroup analysis was conducted. As mentioned previously, there were two types of study design considered in this review. The first was studies designed to assess psychometric properties of the WEMWBS and/or had more than 50 participants, and any other study (e.g. study reporting Cronbach's alpha but its purpose was to test a different hypothesis) and/or studies with less than 50 participants (see Table 5).

Table 5.

Risk of bias in the study design

	Level	Effect	95% CI	k	X^2	p
Study Design	Psychometric / greater than 50	0.9026	0.8887; 0.9165	32	0.02	0.8929
	Other study / less than 50	**0.9049**	**0.8747; 0.9350**	**33**		

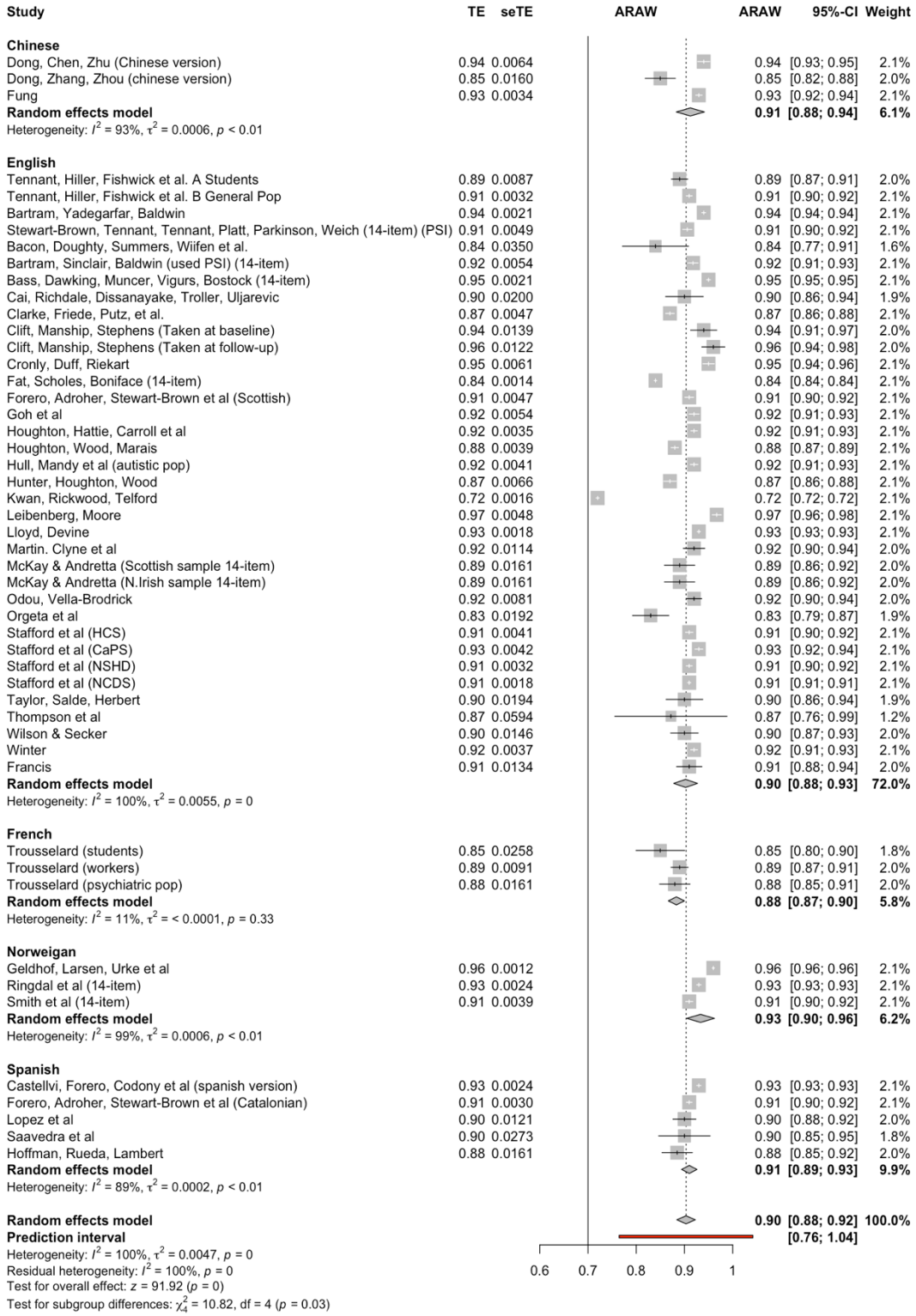
The study design did not evidence any statistically significant difference ($X^2 = 0.02$, p=0.8929) in the estimates of internal consistency between the different types of study design.

The Impact of Language Version

To further explore the impact of study level covariates upon language a series of subgroup analyses were conducted. The random effects model for the Chinese, English, French, Norwegian, and Spanish versions of the WEMWBS are shown in Figure 7. There was a significant difference in the Alpha coefficients ($X^2 = 10.82$, p=0.0287) for the different language versions of this questionnaire, suggesting a difference in internal consistency across language versions. However, all scores are within the acceptable range for internal consistency of >0.7. French language studies seemed to report the lower of the alpha coefficients (Effect= 0.8833), with the Norwegian language studies reporting higher alpha coefficients (Effect = 0.9335), and Chinese, English and Spanish studies reporting comparable alpha coefficients (see Figure 7).

Figure 7.

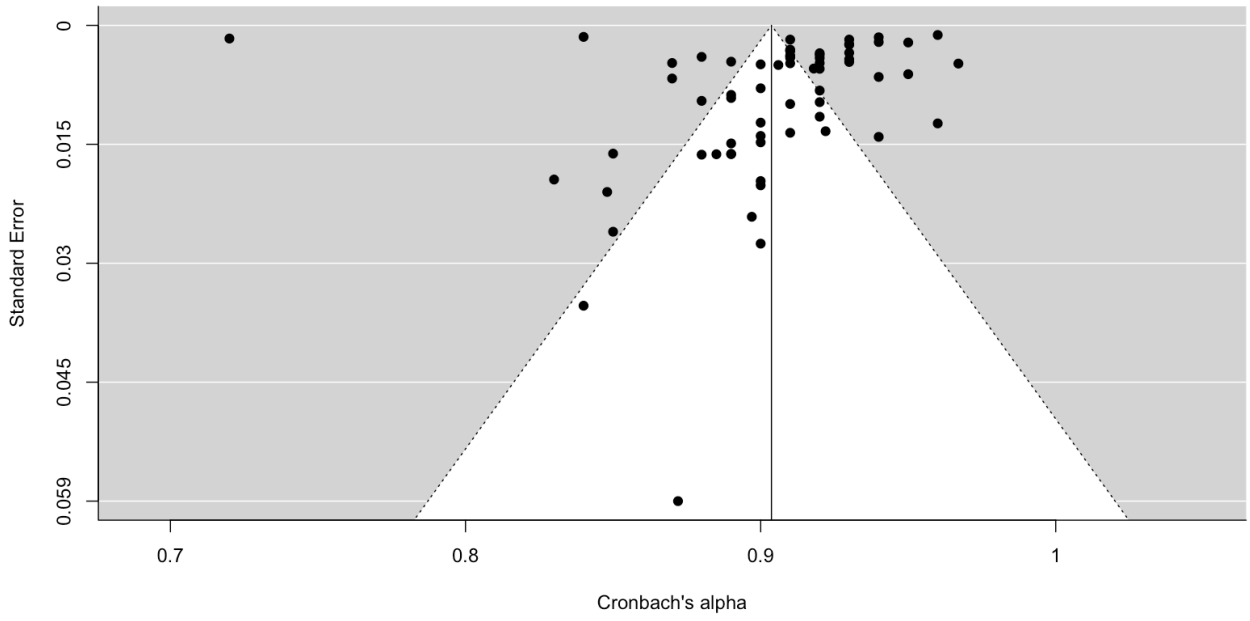
Subgroup analysis of different language versions



Publication bias is caused by the tendency for statistically significant results to be published over that of papers with null findings (Dickersin & Min, 1993). Small study bias relates to the tendency for studies with smaller sample sizes to show greater variability in their measurement of alpha coefficients than larger studies do. In order to identify these types of biases, a funnel plot can be used which plots the magnitude of the study's alpha coefficients estimate against the square root of the study's sampling variances. If there is an absence of publication bias a symmetrical funnel shape will be seen on the plot, as the effects from the studies with small sample sizes which show greater variability will scatter more widely at the bottom of the plot compared to studies with larger samples at the top which lie closer to the overall meta-analytic effect. If there is an absence of studies in the area of the plot associated with small sample sizes and non-significant results (for this meta-analysis it will be the bottom right-hand corner) then it is likely there is some publication bias leading to an overestimation of the true effect (Egger, Smith, Schneider & Minder, 1997). The funnel plot of internal consistency coefficients is presented in Figure 8.

Figure 8.

Funnel plot of the effect



As can be seen from Figure 8, there is no evidence of publication bias in the distribution of the alpha coefficients and the Egger et al. (1997) test of funnel plot asymmetry (using the R0 estimator) was not statistically significant ($t = 0.20077$, $df = 63$, $p = 0.8415$). Therefore, no simulation of and adjustment for publication bias and small study effects was undertaken.

DISCUSSION

To date there has been no meta-analysis completed for the 14-item WEMWBS, despite the use of the original and translated version across the world with a number of populations and using language translations. The advantage of completing a meta-analysis of the WEMWBS was that it provided a combined measure of internal consistency using Cronbach's alpha, that took into account a number of biases. For the measures of alpha of all the studies included, these were within a range between 0.72 - 0.97. This range is likely due to the studies being of different study designs, populations and languages for example. Despite the range, if this alpha were to be interpreted using the broad guides by Cortina (1993), George and Mallery (2003) and Nunnally (1978), then these alphas all fall with an acceptable or above acceptable level. It also worth noting, that the study by Kwan, Rickwood, & Telford (2018) was the only study to report an alpha lower than 0.80, so was discrepant from the rest of the literature. However, there was no reason found to remove this study from the meta-analysis and it was not found to have any substantial impact on the overall synthesis.

In quantifying the results, this meta-analysis suggested that the combined alpha for all studies using the 14-item scale was 0.904 (95% CI of between 0.89 to 0.92). Again, this would be suggestive of a good internal consistency of the scale if using the guidelines as discussed. Analysis showed that there was an unacceptable level of heterogeneity in the primary studies. However, when further analysis was undertaken, there was little variation noted of the alpha value when completing subgroup analysis of the quality effects, suggesting that there was no difference in reporting of alpha values between studies that were low risk of bias, compared to those with any risk of bias. Similarly, the analysis of

study design also demonstrated little variation in the alpha values between different types of study. There was also no evidence of publication bias or small study effects in this meta-analysis. Hence, these variables could not explain the unacceptable level of heterogeneity.

To further explore the impact of study level covariates upon language a series of subgroup analyses were conducted for the Chinese, English, French, Norwegian, and Spanish versions of the WEMWBS. There was a significant difference in the alpha coefficients ($X^2 = 10.82$, $p=0.029$) for the different language versions of this questionnaire, suggesting a difference in internal consistency across language versions. However, all scores are within the acceptable range for internal consistency of >0.7. French language studies seemed to report the lower of the alpha coefficients (Effect= 0.8833), with the Norwegian language studies reporting higher alpha coefficients (Effect = 0.9335), and Chinese, English and Spanish studies reporting comparable alpha coefficients.

Streiner (2003) suggested that alphas of 0.95 could be indicative of item redundancy in a scale. The alpha of 0.904 in this meta-analysis is close to this cut-off, questioning whether the items are related but measuring something different, or whether all questions are actually just rephrased versions and are not providing unique information. Statistically, an alpha of 0.904 would suggest that internal consistency of the WEMWBS is good, however, conceptually it could be questioned whether 14-items are required and could a shorter scale, like the SWEMWBS be just as reliable without potential item redundancy. Also, a shorter scale may be less of an inconvenience to those completing it as it would be quicker. Therefore, a future meta-analysis could investigate the reliability of the SWEMWBS to answer these outstanding questions.

It is important to be mindful that the WEMWBS is just one measure of wellbeing, and that there are a number of psychometric measures designed to assess for wellbeing, which use different conceptualisations of wellbeing to structure the scales (Tennant et al.,

2007). For example, the Scales of Psychological Well-being (SPWB) is a six-factor model of psychological wellbeing designed in America during the 1980s, with a number of adaptations that vary in length (Abbott, Ploubidis, Huppert, Kuh & Croudace, 2009; Ryff, 1989). The Positive and Negative Affect Schedule (PANAS) was developed in North America, and measures two dimensions of affect, with high measures of positive affect being associated with greater levels of wellbeing (Díaz-García et al., 2020; Watson, Clark & Tellegen, 1988). The Satisfaction with Life Scale was created at the University of Illinois, and is a short 5-item scale that measures cognitive judgements of a person's life satisfaction (Diener, Emmons, Larsen & Griffen, 1985). The WHO-Five Well-being Index (WHO-5) was created in 1998 Denmark as a short measure of mental wellbeing (Topp, Østergaard, Søndergaard, & Bech, 2015). Thus, there is not just one method for measuring and conceptualising wellbeing, and this review only investigates the validity of one such measure of wellbeing.

Strengths and Limitations

The strength of completing this meta-analysis is that to date, this is the first meta-analysis to be completed for the internal consistency of the WEMWBS which is a commonly used scale. This meta-analysis gave a much later sample size compare to that of the individual studies, which increased the statistical power of analysis.

As the literature search only included studies in English language, and one study that came from the search could not be translated, this means there could have been other studies available to be included in this analysis, but could not be due to the inclusion/exclusion criteria. This could have impacted on the results of the meta-analysis, particularly given that language appears to be a variable in the cause of difference in the reporting of internal consistency of the WEMWBS.

Implications for Future Research and Clinical Practice

As mentioned, completing a similar meta-analysis for the SWEMWBS may answer questions around the reliability of this scale, and whether a 14-item scale is necessary given potential redundancy of items. Further research could also look at synthesising other measures such as construct validity and test-retest reliability for example.

In terms of clinical practice, this meta-analysis provides a robust review of the internal consistency of the WEMWBS, which can help inform those who maybe looking for a reliable measure to use to measure wellbeing in the population worldwide.

Conclusion

In conclusion, the results of this meta-analysis suggested that the internal consistency of the WEMWBS was good if broad guidelines on interpreting Cronbach's alpha are consulted. There was little variation in the reporting of alpha when quality of studies, study design, publication bias and small study effects were considered. There was some evidence of difference in internal consistency across different language versions, although all these studies still reported an acceptable alpha coefficient. Given this scale has been translated to 25 languages and it is used worldwide, it is encouraging to find that internal consistency of the scale is not overly affected by subgroup analysis.

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LITERATURE PRESS RELEASE

WARWICK EDINBURGH MENTAL WELL-BEING SCALE: TRANSLATED IN OVER 25 LANGUAGES AND USED INTERNATIONALLY, BUT IS IT RELIABLE?

The promotion of wellbeing of people is not a recent concept. However, with the current Covid-19 pandemic affecting the lives of people worldwide, wellbeing has been high on the agenda. In the UK there have been a number of guidelines and agenda for supporting wellbeing amongst the population, such as those published by the NHS (e.g. Mental wellbeing whilst staying at home, 2020).

The growing interesting in strengthening wellbeing is due to wellbeing being associated with several factors, including mental health illness such as depression and anxiety (Keyes, 2005). Hence, an increase in wellbeing of the population could support a reduction on healthcare demands (Department of Health, 2014).

To be able to measure wellbeing in the general population, an instrument that can do so is required. In 2005, NHS Health Scotland funded research into developing a scale that could measure wellbeing. Previous to this, the Affectometer 2 was viewed as the most promising scale to measure wellbeing, however, it also had its limitations. This scale was used as a starting point in the development of a new scale, from research including expert panels and focus groups, the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) was created (Warwick Medical School, 2020).

The 14-item scale covers both wellbeing and psychological functioning using a 0-5 Likert scale, and is a measure of mental wellbeing in the general population, and is not a measure of mental illness. As such, the WEMWBS is positively worded as it comes from a model that is about more than the lack of any mental illness (Taggart, et al., 2015).

Despite this scale having now been translated in over 25 languages, and is used worldwide (Warwick Medical School, 2020), the researchers at the University of Birmingham found that no meta-analysis of the reliability of this scale had been conducted. Therefore, a meta-analysis of the WEMWBS was conducted by a Birmingham University team to establish a more accurate estimate of the reliability, in particular the internal consistency, of the WEMWBS.

Following a systematic literature review, 53 articles were included in the meta-analysis with a total of 65 datasets. Data that was extracted from each of these articles was a measure of internal consistency, using Cronbach's alpha (Cronbach, 1951). The synthesis of all alphas indicated that the WEMWBS had good internal consistency, and was not overly affected by subgroup analysis. However, there was some evidence of difference in internal consistency across different language versions of the WEMWBS, although all these studies still reported an acceptable alpha coefficient.

Further research could conduct a similar meta-analysis for the Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS) (Stewart-Brown et al. 2009) which could provide answers around the reliability of this scale, and whether a 14-item scale is necessary given there could be potential redundancy of items as a high alpha coefficient has been reported Streiner (2003).

For more information, please contact Rebecca Ryan, School of Psychology, University of Birmingham.

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CHAPTER TWO:

EMPIRICAL PAPER: EXPERIENCES OF MICRODOSING PSYCHEDELICS IN AN ATTEMPT TO SUPPORT WELLBEING AND MENTAL HEALTH.

ABSTRACT

Background

This study took an open and neutral stance in exploring an increasingly growing phenomenon, microdosing psychedelics drugs. The research aimed to explore the experience of microdosing psychedelics, with a particular focus on the effects on any mental health issues and/or overall sense of wellbeing

Method

Participants were recruited via websites and online forums. An anonymous internet text-based interview was conducted with 13 participants regarding their experiences of microdosing psychedelic drugs. Interpretive Phenomenological Analysis was used to analyse the transcripts.

Findings

Three superordinate themes were interpreted from the interviews which were: 1) Seeking a solution: the rationale, with the subtheme The Agency and rationale in microdosing 2) Microdosers as scientists, with the subthemes of microdosers as researchers, microdosers as experimenters, and seeking logical conclusions. Finally, 3) Microdosing is a catalyst that precipitates desirable and beneficial effects, with the subthemes microdosing acts as a catalyst and microdosing does what it sets out to do.

Conclusions

Participants approached microdosing methodically and with purpose, with an aim in mind for what they wanted to achieve by microdosing. Participants reported beneficial effects from microdosing on their mental health, as well as cognitive, physical and social improvements. By microdosing, participants had achieved what they had set out to in terms of supporting themselves, with microdosing being described as a catalyst to achieving this. This study provides exploratory knowledge and understanding of the microdosing phenomenon which can contribute to the planning of future larger investigations.

INTRODUCTION

Hallucinogens, natural or synthetic, have historically been a part of human existence cross-culturally (Sessa, 2007). After Albert Hofmann, a Swiss chemist, synthesized the drug LSD (lysergic acid diethylamide) (Grof & Grof, 2016), by the 1950s there was growing interest in the use of LSD, and well as other classic hallucinogens, such as mescaline (Carhart-Harris & Goodwin, 2017). By 1965, around 40, 0000 patients had been treated with LSD, and over 1000 research papers on this topic had been written (Sessa, 2007). Hallucinogenic drugs were considered for therapeutic benefits in the treatment of mood disorders, obsessive-compulsive disorders and addiction (Sandison, Spencer, and Whitelaw, 1954). However, by the 1970s, many western countries enforced the prohibition of psychedelic drugs due to their association as drugs of abuse and danger (Vollenweider & Kometer, 2010). Research on classic hallucinogenic drugs came to an end.

More recently, despite these substances still being illegal in most countries, research has once again recommenced in this field with a number of studies exploring the effects of psychedelics on individuals, mostly using LSD and psilocybin (or 'magic mushrooms'). Modern research has tended to use a controlled high dose of the psychedelic drugs with human participants, then explored social, psychological and biological effects, such as effects on treatment-resistant depression. For example, Carhart-Harris et al. (2017), published findings suggesting that after two oral doses of psilocybin, there were significant reductions in depressive symptoms from 20 participants, and symptom improvement remained marked six months post-treatment.

As increasing reports indicate that people are beginning to experiment with very small doses of psychedelics, this too is a new area of research. 'Microdosing' means ingesting a very low dose of a psychedelic substance, usually in a routined schedule

(Fadiman, 2011). The growing popularity of microdosing has led to comprehensive news coverage and active online communities of microdosers, with large numbers of individuals reportedly experimenting with microdosing expecting that this practice will lead to substantial psychological and wellbeing benefits (Polito & Stevenson, 2019). It is reported that in small doses, individuals do not experience a 'high' but claim to notice positive effects, such as improvement in their creativity, mood, and motivation.

Research into microdosing is still very much in the early stages. In an open label study, Prochazkova et al. (2018) found that microdosing psychedelic truffles led to increases in convergent and divergent thinking–common indicators of creativity in non-blinded participants. In a double-blind placebo-controlled study by Yanakieva et al. (2018), participants showed changes in time perception following microdosing LSD, but the study did not investigate variables related to health or wellbeing. In a controlled laboratory setting study, it was found that dose-related subjective effects were seen across three doses of LSD, and at the highest dose there were increased rating of vigour, but measures of mood, cognition and physiology were not affected (Bershad et al. 2019).

Polito and Stevenson (2019) investigated participant's experiences and attitudes towards microdosing. They found that in the short-term microdosing led to an effect across a number of psychological variables, but these effects diminished over subsequent days. In the longer term, there was evidence of improvements in mental health, altered attentional capacities and increased neuroticism. However, these variables were not necessarily the ones that participants had anticipated to change, as participants interested in microdosing held beliefs that microdosing could impact a wide range of psychological variables such as creativity, wellbeing and mindfulness, but these variables showed no evidence of change in their study (Polito & Stevenson, 2019). In a recent study by Kaertner et al. (2021), data was

collected using web-based surveys at different time points from participants who were planning on microdosing. Results showed increased psychological wellbeing, improved emotional stability, and reduction in depressive and anxious symptoms. However, the expectancy scores at baseline and then the following improvements were indicative of a placebo effect.

One online study found that the main motivation for participants to microdose was performance enhancement (37%), mood enhancement (29%) and relief of symptoms (14%) (Hutton et al. 2019a), with negative effects being of a psychological nature after having consumed the substance. A second online study showed that microdosing was more responsive in alleviating symptoms from a number of mental or physiological difficulties, compared to conventional treatments. However, the effectiveness of microdosing was less compared to that of full psychedelic doses.

A further online study found that microdosers reported reduced levels of dysfunctional attitudes and negative emotions, with increased wisdom, open-mindedness and creativity, relative to people who had never microdosed (Anderson et al., 2019b). As part of this study, Anderson et al. (2019a) developed a codebook of microdosing and noted that microdosers reported beneficial outcomes in improved mood, focus and creativity. The study suggested these constructs should be targeted in future research on this subject. In terms of challenging outcomes, physiological discomfort and increased anxiety were highlighted.

Johnstad (2018) led a series of interviews with people who microdose who described benefits to their mental health, especially on symptoms of depression and anxiety, as well as improved energy, cognition, and creativity, with few reported adverse effects. In another study by Webb, Copes and Hendricks (2019), semi-structured interviews were conducted

with 30 people who microdose. They found participants rationalised microdosing in a functional and considered manner that separated themselves and those who use drugs recreationally and hedonistically. Lea et al. (2019) completed a content analysis of microdosing discussions on Reddit (an online forum), and found that those who were involved in these discussions were motivated to microdose to improve their mental health, wellbeing and cognitive performance. It was also reported that microdosing had achieved or even exceeded expectations for those posting in the discussions, particularly in diminishing symptoms of anxiety and depression and improving healthy life practices. However, some also reported no effect or increased anxiety whilst they had been microdosing. A further online survey with 1102 respondents found that they were microdosing to help with depression (21%), anxiety (7%), other mental disorders (9%) and for substance cessation or reduction (2%) (Lea et al. 2020).

Furthermore, in a study by Carhart-Harris & Nutt (2010), users of hallucinogenic drugs of all doses reported not only experiencing long-term positive impacts on mood disorders and overall wellbeing, but also considered that they were more able to access their unconscious mind. The researchers recommended further study of the spiritual and psychodynamic phenomena of these drugs. Hence, in completing a qualitative study on microdosing psychedelics drugs, consideration could also be given as to whether these drugs have any potential in assisting psychotherapy, as had been thought prior to their prohibition. Although this will not be the aim of the current study, it will be considered in any discussion of the individuals' experiences of microdosing psychedelics.

It appears that people are seeking to self-medicate with psychedelic drugs for mental health purposes (Carhart-Harris & Nutt, 2010) alongside growing media interest and community reports of microdosing psychedelics. There remains a need to understand the

experience of microdosing psychedelics in order to understand the reasons people use these substances and the sense they make of this.

This study will take a neutral stance to the use of microdosing psychedelics – neither condoning nor condemning - so that all aspects of the experience can be explored. The research aims to explore the experience of microdosing psychedelic drugs, with a particular focus on the perceived effects on any mental health issues and/or overall sense of wellbeing.

METHOD

Ethical Approval

This research received ethical approval from The University of Birmingham's Research Ethics Committee (ERN_19-1617) (see Appendix 1).

Definitions

Microdosing means ingesting a very low dose of a psychedelic substance (Fadiman, 2011). For the purpose of this study, the review on psychedelics by Nichols (2016) was referred to for a definition of the term psychedelics. Here, psychedelics will mean the classic serotonergic hallucinogens which have a similar method of working, such as LSD, psilocybin, DMT and mescaline. It will exclude cannabinoids, dissociative substances, salvinorin A (such as ketamine) or entactogens (such as 3,4 methylenedioxymethamphetamine; MDMA).

Subjective Position Statement on the Research Topic

This piece of research aimed to take a neutral position on the topic of microdosing psychedelics substances. As this area is being newly explored, with little research having been conducted on the topic, it was the researcher's aim to gain a comprehensive understanding of the phenomenon whether it be pro, against or indifferent on the subject matter. The purpose was to explore and gain insight into a behaviour that is already occurring, which could then inform future research and drawn comparisons on research that has already been conducted on microdosing.

Whilst completing a MSc in Human Evolution and Behaviour at University College London, the researcher became interested in how humans have used natural and synthetic psychedelic substances throughout human history. This was in addition to also having an interest in psychodynamic models in psychology and curiosity in the unconscious mind, which has attempted to be studied using psychedelic substances. As such the researcher became interested in the topic of microdosing psychedelic substances when it began being discussed in the media. In order to maintain a neutral stance, the researcher ensured that reflective groups and supervision were attended so that other opinions could be gained and to highlight any biases, and a diary was kept to also consider any biases. Naturally biases occur within life, and as clinical psychologists it is important to utilise resources available such as supervision so that a more neutral and non-judgemental stance can be taken in order to understand people's decision making, the difficulties and challenges they face in life, and the impact of their decision making.

Recruitment of Participants

Purposive sampling was used to recruit participants who had experience of microdosing psychedelic drugs. Participants were recruited through discussion websites, chat forums, online blogs relating to the research subject. The internet fora used were Reddit, The Shroomery.org, and Bluelight.org, with the latter two not producing significant responses. These internet fora were chosen as they have been used in other research, such as Carhart-Harris and Nutt (2010), Johnstad (2018) and Polito and Stevenson (2019). Furthermore, they all had forum-specific messengers that could be used for participants to contact the researcher.

In order to recruit participants, the researcher made an account with these different internet fora and then posted an advert (see Appendix 2) on relevant threads and discussions, which directed potential participants to the University of Birmingham's hosted webpage specific for this study. The webpage provided further detail about the study, as well as the links to the participant information sheet and consent form (See Appendix 3 & 4). Additionally, the study was advertised on a Twitter social media account, which had been created for the purpose of this study. If an individual was then interested in participating, they could contact the researcher via the forum-specific instant messenger to say that would be interested in participating.

Inclusion and exclusion criteria are detailed in Table 1. As this study was investigating an illegal activity, it was important that participants were over 18 years of age in order to give informed consent. Due to the study exploring microdosing in terms of well-being and mental health, those who reported engaging in microdosing for any other purpose were excluded from the study. As the participants could potentially be recruited from anywhere in the world, and as the researcher's primary language was English, it was imperative that the participants could read and write confidently in English.

Table 1.

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Those aged 18 and over	If currently microdosing to cope with substance use problems/withdrawal
Those with experience of being in a regime of microdosing a classic psychedelic drug to support their mental health and/or wellbeing.	If microdosing for any other purpose e.g. recreational purposes.
Those able to confidently read and write in English.	

Anonymity and Confidentiality

Given this study involved interviewing participants about their illegal drug use via forum-specific instant messengers, potential participants were directed to the University webpage, where details of the study, limitations of anonymity, and inclusion and exclusion criteria were clearly stated. It was a prerequisite of the study that if an individual was to give informed consent, then they had to use a username which was not linked to their real name nor identity. They were not asked any identifiable information, and only minimal demographic information including age, gender, education and occupation were collected. The option to opt-out of answering these questions was also offered, although no participants did so.

The literature was consulted on the use of a text-based interview method for this study. This method has been used in previous research, such as that by Polito and Stevenson (2019) who interviewed participants via anonymous email accounts, and there is also guidance on this method, such as that by Berenson, Meena and Glazer (2017). As an added precaution for anonymity purposes, participants were given the option to sign up to an end-to-end encrypted online instant messenger service for the interview, called Wickr Me. This meant that the online interview details could only be seen between researcher and participant and no other body. This method appeared preferable to participants, and had the added value that the interview would be destroyed by Wickr Me once a certain time had passed.

Once the interview was completed, the data was saved using a made-up identifier and a data key was created to enable participants to have their data deleted if requested during the two-week period following the interview. No participants in the study opted-out. The key was deleted after the two weeks, and there was no record kept of the participant's username, hence the link between participant username and interview data was broken.

Consent

As this study was anonymous, participants were unable to sign a consent form as it would identify them. Gaining consent in this manner had its limitations but participants were given sufficient information so that that they could make an informed decision about whether they wished to participate in the study. Participants were asked on a least two occasions to read the participant information sheet and consent form. At the commencement of the interview, they were asked to clarify that they had read this information, understood it and give their consent to participate. They were also asked to explicitly confirm that they were over 18 years old before the commencement of the interview.

Participants

Table 2 provides an overview of each participant. In total 13 participants were recruited for the study. It is recommended by Smith, Flowers and Larkin (2009) that around four to 10 interviews should be enough for Interpretative Phenomenological Analysis (IPA). However, given the quick response and interest of the study, it was felt that 13 interviews would be manageable within the timeframe and allow for a rigorous and complete analysis using IPA.

Out of the 13 participants, 10 were male and three were female, with an average age of 34.9 years old. All participants had been educated to college level or above, with over 50% of participants having gone on to complete an undergraduate degree or postgraduate degree. All participants except one were in employment. The majority of participants used LSD to microdose, with one using both LSD and psilocybin.

Table 2.

Participant Overview

Participant Pseudonym	Age	Gender	Education	Occupation	Psychedelic used to microdose
Adam	20	male	College	Working at a fast-food restaurant	Psilocybin
Ben	38	male	College	Engineer	Psilocybin
Callum	30	male	University	Audio engineer/musician	Psilocybin & LSD
Daniel	38	male	College	Online retail business owner	LSD
Evan	52	male	College/some university level courses	Customer service attendant in transport	Psilocybin
Francesca	27	female	Master's degree	Research assistant/data scientist	LSD
Gary	23	male	Undergraduate degree	Hospitality	LSD
Harris	51	male	Master's degree	IT systems manager	Psilocybin
Isaac	32	male	Undergraduate degree	IT systems admin	Psilocybin
Jonah	26	male	Undergraduate degree	UI/UX Designer	LSD
Kim	51	female	Undergraduate degree	Postgraduate student	LSD
Leo	45	male	School diploma and attended University but did not finish	Vice President of an engineering company	LSD
Mia	21	female	College and re-taking A Levels	Currently unemployed	LSD

Smith et al. (2009) argue that in studies using IPA, participants are selected because they are able to provide a particular perspective of a phenomena. In the case of this study,

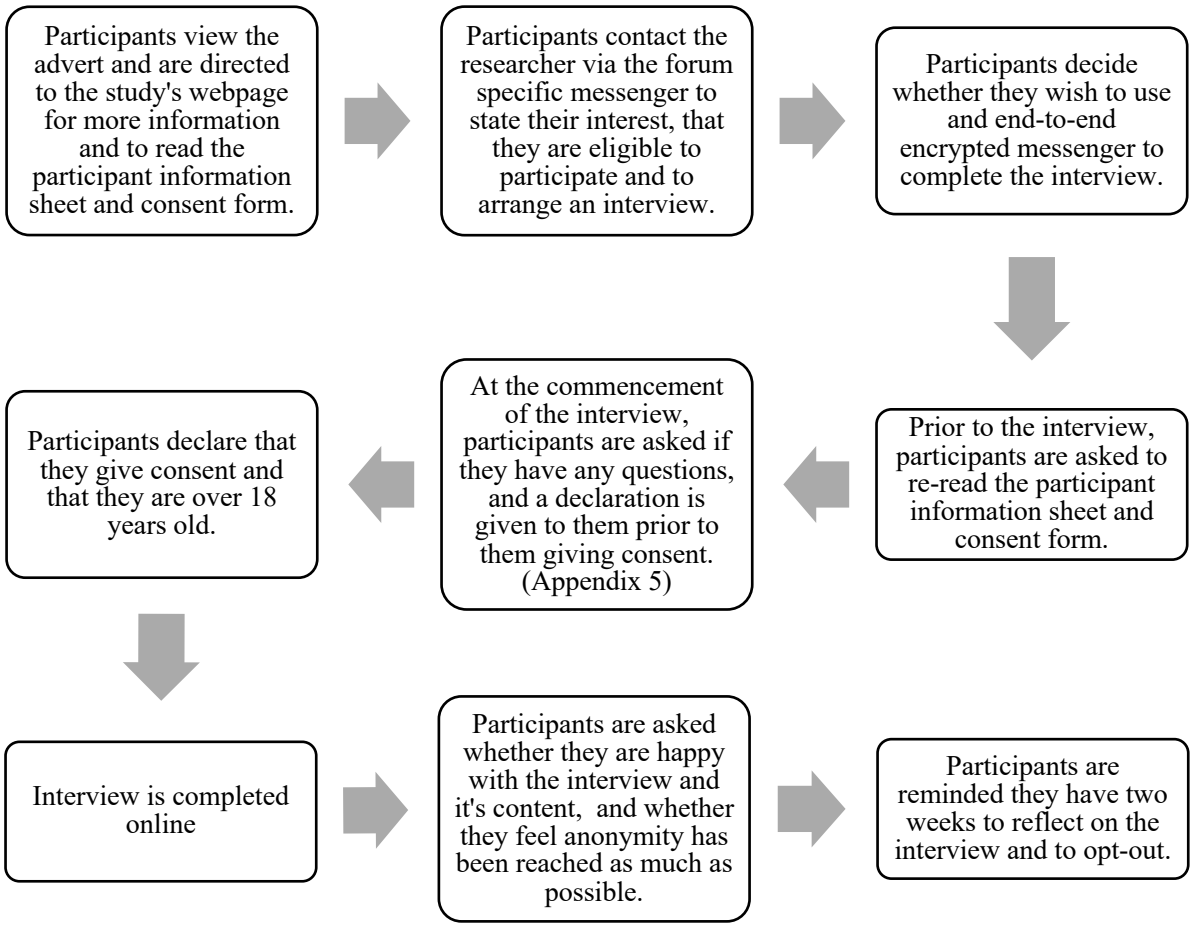
participants were recruited based on their experience of microdosing. However, it is also important to note that although the internet is becoming more accessible, it should still be considered that participants who have access to the internet may be more likely to have greater economic resources (for example see Scheerder, van Dursen van Dijk, 2017). As can be seen, it appears all participants were of a similar level of education, and it could be hypothesised that this could be reflective of their economic status, and ability to access the internet.

Procedure

Figure 1 below details the procedure for this study.

Figure 1.

Procedure for the study.



Conducting the Interviews

In order for this study to be exploratory and to gather participants' true opinions on the topic, the interview was semi-structured (see Appendix 6 for the interview schedule) so that the participants were not completely led by the questions and could discuss what was important to them (Smith et al., 2009). A number of potential questions were designed, as it was noted that the interviews would give textual data and embodied cognition may have been missed, so this was balanced in the questions to be able to gain a fuller understanding of participants' sense making. Participants were aware that the interviews would last at least an hour, and this was especially important to highlight when internet connectivity issues could cause the interview to slow. The interview commenced with a question which allowed the participant to give a descriptive account of their experience, with more analytical and narrative questions being asked once they had become more comfortable with the interview.

Once the interview was completed, the participants were asked whether they were happy and comfortable with the interview and its content, so that they could exclude any parts of the interview that they were unhappy with. If it was felt that participants were over-disclosing (compromising anonymity) during the interview, then this was brought to their attention so that these parts could be removed. During the interview, no participants requested for anything to be excluded and all were happy with the content of the interviews and the level of anonymity achieved.

Interpretative Phenomenological Analysis

This is a new and growing area of research. Hence, this study wished to explore why microdosing is occurring, what it happening when people microdose, and the reasons and

experiences of the people doing it. As such, IPA was chosen as a method to analyse the data, as it is a phenomenological approach that explores how people make sense of their lived experiences. The approach is also informed by hermeneutics, in that the participant will attempt to make sense of their experience, with the researcher then interpreting this to gain a deeper understanding of the experiential world of the participant. Furthermore, IPA is also idiographic, as it seeks to understand the personal experience of the individual from their perspective. Hence, this approach was chosen as it would provide a detailed exploration of the unique experience of the participants and how they make sense of microdosing psychedelic drugs.

Although this study only gathered textual data, the interview was completed live in the moment, so the interview was an interactive process between the interviewer and participant. Because of this interactive process, the researcher was still able to enter the lifeworld of the participant through the text, and a sufficient number of questions also supported this. Hence, this approach offered a meticulous exploration of a phenomenon that is yet to be fully understood.

Analysis

As interviews were already typed, they did not require transcription. The IPA followed the process suggested by Smith et al. (2009), by starting with re-reading of the transcripts so that these were familiar to the analyst. Then initial noting occurred with the coding of the transcripts with descriptive, linguistic and conceptual comments. The transcripts were then reviewed again, and developing themes were noted. Following this, the patterns and connectedness amongst the themes was searched for, and then this was extended

to looking across participants and cross-analysing themes. To do so, transcript quotes and extracts were compiled together under developing themes. Given the number of participants, reoccurrence across cases was also important to consider. From this process, superordinate themes and subthemes were identified (see Appendix 7 and 8).

To reduce any potential bias in interpretations of the data, the codes and themes were discussed in supervision and in an IPA support group. A reflective diary was also kept by the researcher, so that any thoughts or judgements regarding the interviews could be considered in analysis as a method to manage bias and support 'bracketing' (Smith et al., 2009).

RESULTS

The themes that are discussed in this section are shown in Table 3.

Table 3.

An Overview of Group Themes

Superordinate Themes	Subtheme	Contributing Participants
Seeking a solution: The rationale	The Agency and Rationale in Microdosing	All
Microdosers as scientists	Microdosers as researchers	All – although Adam and Gary not to the same extent as others.
	Microdosers as experimenters	All
	Seeking logical conclusions	10
Microdosing is a catalyst that precipitates desirable and beneficial effects	Microdosing acts as a catalyst	9
	Microdosing does what it sets out to do	All

As the interviews were completed online, there was no need for transcription. Hence, any quotes that have been used are direct from the typed interviews, and may contain spelling mistakes and grammatical errors. In line with guidance by Smith et al. (2009), in order to condense and illustrate the themes of a large sample, a limited number of extracts will be used from the data to reflect the participants' experience.

Table 4.

Key of Symbols used in the Analysis

Symbol	Description
…	This indicates that quotes from the same participant have been brought together to form one.
[ ]	Square brackets indicate that text has been inserted by the author to give explanation and/or context.

Theme 1: Seeking a Solution: The Rationale

This theme describes a narrative of all participants having an agency in regards to, and rationale for, microdosing which seemed important for them to convey. All participants reported that they were actively looking to help themselves with a particular complaint(s), and they could provide a clear rationale for why they wanted to microdose psychedelics, which felt different to recreational drug use.

The Agency and Rationale in Microdosing

Microdosing psychedelic drugs was something all participants had come to hear about, and it had intrigued them in how it could be beneficial to themselves. All participants, except Leo, had been wanting to help themselves with something in particular, whether it be mental health, relationships, cognition, or overall wellbeing. There seemed to be an agency to their microdosing, in that they were making an active choice, and there was a sense of

importance that this was not 'just' recreational drug use. In their agency, there also appeared to be a clear rationale for why they wanted to microdose.

Ben stated that he had been actively looking for something to support him with relationships, whereas others were looking for support with their mental health, such as Jonah who wanted support with anxiety and *"personal insecurities"*. Daniel described having a *"long-term anxiety disorder"* and depression and was self-medicating with alcohol and tobacco. Similarly, Evan "*had suffered from depression, ruminating thoughts, destructive thought-patterns and social anxiety… I have either just dealt with it or used, primarily alcohol, to deal with them…I wanted something that wasn't going to impair me"*.

Issac described how he was suffering with depression after a 'driving under the influence' (DUI) incident, he stated:

> *"I became depressed after a dui involving alcohol. I started smoking a lot of weed to pass the time because I couldn't go anywhere. The weed habit, I feel, worsened my depression and started to amplify anxiety created during social situations…I had some issues with anxiety in social situations, but it never caused me to avoid those situations as severely as after. And I would not consider myself as depressed prior [to the dui]"*. (Isaac).

As well as supporting with mental health, some participants talked about looking for additional support with their cognitive functioning. Francesca explained *"I've read that it [microdosing] helps people focus and stimulates positive mood, and those are things I wished to improve."* Kim also mentioned cognition, stating:

> *"I had received a head injury in an accident – it really affected me and I felt like I had lost the ability to think. I was in the final year of my degree and so*

> *stressed ... I got to a point where I thought that if I had lost cognition, there was no point in living any more, because that is what defines me. I have always had un-diagnosed mental issues (un-diagnosed because I was absolutely paranoid about anybody in authority getting hold of data ... sorry this is branching out a bit ... my father's side of the family have all suffered from schizophrenia and I was terrified of being locked up and the key being thrown away."* (Kim).

Additionally, Callum added that creativity was something he had been looking for support with, stating *"To support creative and productivity…Creativity*… I guess the well being was a strong factor as well'*, which was in addition to sourcing support for *"mild depression".*

Participants appeared to be looking for something to support themselves with and there was a sense that this was important to them in understanding their experience of microdosing. This is highlighted by Adam, who stated *"Even then I micro dosed my self"* in his descriptions of his microdosing regime. This use of language (*"my self")* is again indicative of agency, that he was doing this to himself, for himself.

There were five participants who spoke about their agency by describing how they had thought about, or sought, alternative methods of support. Harris spoke about how he had tried conventional treatments for his mental health prior to having microdosed. He stated that he had *"Multiple attempts at conventional treatment, therapy, self-help…Very little help from pharmaceuticals. Therapy and self-help provided some tools & understanding which have helped".* Similarly, Evan explained that he had also been looking for alternative support for his mental health, reporting that *"After 5 employment-provided sessions with a counsellor I felt I needed something but I didn't want to get on anti-depressants as I had a*

bad experience when I came off them…" and added that *"I feel more aligned to psilocybin as it is an organic substance, it has an amazing history and I personally feel more inclined to view it as a traditional medicine"* when comparing to LSD.

Daniel too was averse to taking pharmaceutical medication, and explained why he had gone down a more 'natural' route, stating:

> *"The Dr recommended anti depressants but after a weeks trial at half strength and the loss of a family member due to suicide, thought to be a side effect of the pharmaceutical option I went down the cannabis, natural option [prior to microdosing]."* (Daniel).

Mia spoke about her experience of getting support, explaining that she was "*in a pretty dark place with depression, anxiety, and substance abuse and couldn't get professional help from the NHS fast enough so I guess that was my easy escape*." Similarly, Jonah had also been looking for support with his mental health prior to microdosing, noting "*I was considering seeing a therapist and even was in the process of signing up for mental counselling."*

Leo was perhaps an exception in showing any agency to microdosing. However, although Leo wasn't actively looking for support for a particular complaint, he still had a clear rational for starting microdosing. Leo explained:

> *"there wasn't really a reason, other than having recently established a level of comfort with psychedelics – I had reminders about the perceived benefits of microdosing from the reading I had recently done, and so I just thought I'd try it, since I wasn't as concerned about the dangers of psychedelics anymore…no, I had no issues that I felt needed any attention, prior to*

> *microdosing. I've always felt very fortunate to have never really experienced significant depression or anxiety."* (Leo).

All participants described a rationale for them microdosing, a justification for why they were doing an activity that was potentially illegal. There was a sense that rationale was important to the participants, and that microdosing had been carefully considered. Jonah explained:

> *"I started psychedelics this year. There's a podcast I listen to pretty often while I work and it was on psychedelics and I was mind blown and super fascinated by it. After doing a couple of full trips, I read on microdosing being a thing on Reddit and read on the benefits of microdosing….To be honest, my motivation for wanting to microdose was frequency. I can confidently say that psychedelics have changed my life pretty dramatically in terms of outlook of life, religion/spirituality, relationships, intimacy, and what I find important. They have definitely benefited me in a very positive way, and I felt dosing more frequently could help continue benefiting me more."* (Jonah).

All participants except for Kim and Isaac had used psychedelic drugs in macrodoses previously. Like Jonah, Adam's previous experience of drugs was part of the rationale for him starting microdosing: *"I usually do a full trip* [with psilocybin] *and after I find my self improving and growing in a lot of different ways. But the trip it self gets long and overwhelming….When I first micro dozed I realized that I get the same benefits without having to go thru intense experience."* This experience was not too dissimilar to that of Ben who stated *"I had taken a macro dose with an underground guide…And I thought it was very positive and was then much more interested in psychedelics."* Daniel had also used psilocybin in the past and had used cannabis to help with his mental health, stating:

> *"A friend who suffers with social anxiety recommended trying them* [microdosing]. *I regularly use cannabis as a medicine to combat anxiety and depression without pharmaceuticals but still struggle sociabially especially as I don't drink alcohol. I'd experimented recreationally with mushrooms in my early 20s so using the same logic as I'd put to cannabis the fact I'd used in the past recreationally with no I'll harms trying medically was worth considering trying out."* (Daniel).

Although Isaac had been looking for support with his mental health, his rationale for microdosing was to support him in getting a new job. He explained:

> *"I decided to start microdosing when I started searching for a new job. I found it difficult to put in the energy in my normal job and the new job search… a feeling of not being good enough to present myself as a worthy candidate to future potential employers. I wanted to move closer to family but wasn't sure about moving 4 hours away. I felt it difficult to justify leaving a "safe" job, one that I knew I had a future with but was unhappy with, to something with uncertainty. I knew it was something I should do but was not able to break out of my routine… I had goals that I wanted to achieve and felt that micro dosing kickstarted me towards achieving those goals."* (Isaac).

Even though Isaac did not mention having used psychedelic drugs previously, he does mention using cannabis. There was a sense that previous drug use had been part of the rationale in choosing to microdose an illegal substance. For Gary, his experience of microdosing has actually made him sceptical of microdosing, as he noted:

> *"I was familiar with Macrodosing psychedelic substances, which made me a bit skeptical about the workings of microdosing…This made me want to see and feel the effects of microdosing for myself…Since the promised effects seemed beneficial for me"*. (Gary).

In summary this theme shows that participants were actively looking for something to support themselves with and they were able to provide a clear rational for why they decided to microdose to support them with their difficulties.

Theme 2: Microdosers as Scientists

There was a sense from all participants, that similar to how they had agency and rationale for microdosing, that microdosing was not a haphazard decision for them. Indeed, it had been important for participants to investigate microdosing, as they went about their microdosing journey in a regimented and scientific manner and came to their conclusions logically.

Microdosers as researchers

The majority of participants spoke about how they had conducted reading and research into microdosing, for example, reading a book by Michael Pollan like Ben and Evan, or articles and using online resources like Reddit. Callum spoke about his reading prior to microdosing, stating:

> *"I approached it with knowledge rather than just for sake of it…I guess reading into psychedelics based on what was available back then and reading people's use and reports…Really helped me to be better pilot…".* (Callum).

From this quote there was a sense that for Callum his experience of microdosing was about being skilful and technical like a pilot, which enabled him to navigate and be in the driver's seat of his experience of microdosing. For Kim, research was something that she too noted was important to her stating *"I had done some research* [on microdosing] *(are you sensing a theme here?!)".* Leo describes how his research had changed his opinion on drugs:

> *"it was during research i was doing to acquaint myself with regular psychedelic use i had read about it occasionally as i was looking things up, and remembering having heard about it about 10 years ago, when it was surging in popularity in silicon valley in the US…i had been raised to think "drugs are bad", but as i was researching psychedelics, i began to realize that we had been lied to about many many things…so all of this research and discussion was softening my stance on what i used to consider "hard drugs"'.* (Leo).

Although Gary and Adam did not explicitly state they had conducted any official research into microdosing, they both described watching YouTube videos on microdosing. For Adam, felt the idea of microdosing came *"to my head out of no where and i started doing it",* aside from having conducted his own research by trying macrodoses of mushrooms previously and noticing the effects. This was similar to Daniel, who had heard about microdosing through a friend, and applied the same *"logic"* as he had used for when self-medicating with cannabis to microdosing psilocybin.

Microdosers as experimenters

Common across all participants was a language and description of experiences that was scientific, and implied that participants were experimenters in microdosing. For example, Gary used a diary so that he could record his microdosing regime and any effects it had on him, and referred to his diary during the interview for clarification and accuracy of his answers. All participants spoke about their regime for microdosing, and as much as some participants had described copying a regime from elsewhere, they appeared to experiment with this so that it was tailored to their needs. Callum described starting his microdosing regime with the *"Hoffman schedule"*, but then created his own schedule stating *"I was the rabbit in lab doing experiments on my brain"*. He completed experiments, for example *"I started with psilocybin and then included LSD just to see the differences which were vivid at least to me",* and he plans to continue experimenting with the longer use of microdosing to *"See if prolong experience* [of microdosing] *can end up in different result"*.

There was a sense that participants were in tune with microdosing and in tune with themselves, being able to understand the effects of microdosing through their research and experimentation and then apply it their personal requirements, in a balanced relationship between the two. Francesca noted this in her description of experimenting with her regime, stating *"It's* [microdosing] *a combination of user experience reports I found online and what works for me personally. I want to be more productive at work so I dose during the work week."* Daniel explained his personal experience as:

> *"I usually take* [microdose LSD] *in the morning unless there is something coming up that day I think I'll be more anxious about I'll take later so I'm*

benefiting more at the right time….If I'm having to deal with a busy day outvwith [out with] *big crowds and lots going on in the city I may stagger the microdosing so say take 3 x 0.5 g through out the day for example but this is rare. This is a situation though where I'd be more anxious as usual".* (Daniel).

This was similar to Evan's experience, as he noted that :

"It took a few experiments with finding a dose that didn't leave me feeling the dose directly…I started with 1 gram to determine the strength of the psilocybin I had obtained…I used ground up version and measure out my dose daily on a microgram scale I purchased specifically for microdosing".

Ben notes how he started off with a regime, but then *"I came up with that on my own over the past few weeks… But then I noticed how fast the tolerance increases throughout the week…So I came up with the increasing dose scheme".* As Ben noted, there was also an impression of tolerance being an issue. Isaac explained:

"I did monday and Wednesday to help avoid any issues with tolerance and I didn't regularly need to feel the effects during the weekend. If something came up and I felt like I needed it, I would micro dose 4-6 hours before a social event… I never experienced any but read that your body naturally builds up a tolerance to the effects. That's why recommendation for microdosing is day on, day off or something similar". (Isaac).

Although it was only half of participants who directly mentioned tolerance, most followed a regime similar to the one described by Isaac. Adam was the only participant who seemed to follow a different regime, for which he had his own reasoning. Adam's comment

about his microdosing regime highlighted again how this was not haphazard drug use. He explained:

> *"I saw that I was progressing in a not normal way when I did it* [microdosed]. *I continued taking micro doses every friday of that month…The reason why I didnt take it every day is that I should be able to improve and get better without taking a drug… There is a right way to use the substance for therapeutic use and o* [I] *think I have understood this".* (Adam)

Feeling in tune with the microdose was also apparent as all participants described a sensitivity to the immediate effects of the microdose. Participants explained that once they had microdosed there was an immediate effect that would last that day but would dimmish over the non-microdosing days. Jonah summed this up stating *"I'd say once I get the benefits, they're permanently with me since it changes my outlook, which isn't a temporary thing. But the actual effects of the dose are gone after 12ish hours."* Gary also described something similar stating:

> *"I definitely noticed effects on the day of dosing (Day 1) and also on the day after dosing (Day 2). Those effects where less evident on the second day after dosing (day 3) But I'd still say there were some effects on the second days after dosing".* (Gary)

Evan was able to differentiate the effect of microdosing psilocybin compared to that of conventional treatments, adding that:

> *"To me it's* [psilocybin] *usefulness is also tied to the fact that it is effects can be felt almost immediately compared to traditional pharmaceutical anti-depressants and even many holistic ones (e.g. St, Johns Wort)."* (Evan).

In terms of sensitivity, Adam, Ben, Kim and Leo all described a noticeable difference if they got their dosage of microdosing wrong and take too much, with Ben describing a *"fine line"* between taking a macro and a microdose. Again, this was indicative of a scientific and regimented approach to microdosing, where effects were noted and changes to regimes implemented based on these.

Seeking logical conclusions

There was a sense that participants were unable to come to solid conclusions regarding microdosing because they were logical regarding it, and didn't jump to the conclusion that microdosing was a solution before trying it. It seemed important for participants to consider whether the effects of microdosing were permanent or not. Although opinion on this differed, it again felt considered and logical.

Jonah didn't deny the impact of his previous experience with psychedelic drugs, explaining that microdosing:

> *"Definitely had an impact, which is why I'm an advocate for the use and especially the research of it. I'd say a mix of microdosing and full trips, but definitely microdosing played a part. I'd say those benefits came from a 50/50 split."* (Jonah).

Ben was also unsure of definite conclusions, stating

> *"It's obviously hard to measure* [effects of microdosing] *So it's based on my feeling and people's responses …But the problem is that since the internal perception is being altered too it's difficult to say for sure".* (Ben).

Daniel noted other variables that positively impact on his mental health, and for Evan, although he attempted to separate the effects of microdosing from the other multiple supplements he was taking alongside, he noted "*I can not tell you with 100% certainty what the effectiveness of the other supplements are".* Other participants added that microdosing could have led to healthier lifestyle behaviours, which then could have prolonged positive effects, for example Isaac stated *"I felt like it* [microdosing*] helped me break free from unhealthy routines and create healthier routines".*

Some participants were not shy of considering that microdosing could be a placebo effect. Harris stated *"Chicken/egg. When it comes to brain stuff in general I don't much care if placebo or not, as ultimately it's the mind that needed healing".* When discussing the effects of microdosing, Francesca added:

> *"I mean I can never be 100% sure without a real way to have a proper control condition to compare to, but I haven't changed anything else in my life so I'd say it's likely that the changes are a result of low levels of stress and anxiety due to microdosing…Plus I'm sure theres a placebo component".* (Francesca).

For Mia, there was a sense of her feeling particularly skilful and able from her microdosing experience. She explained:

> *"I don't know if it was a placebo effect of genuinely the MD* [microdosing] *but I felt like a ninja…. I would love to credit it all to microdosing but I'm sure it's also partly my own awareness …I don't think I would've reached it on my own, however"* (Mia).

There was an impression that participants wished to share their findings. Because of their experiments and conclusions, it appeared important that they revealed their experience for the sake of others, even if microdosing could not be fully explained as a stand-alone cure. Daniel stated:

> *"I really don't think it's a substance anywhere near as harmful as the current drug laws have it at in the world. Its a bit baffling when consider its low harm rate in comparison to. Other substances…I think it needs to be made much more easier to access and study for sensible adults".* (Daniel).

Adam felt microdosing was something *"that people should get educated or be supervised on".* Research in this field appeared important to participants, with Isaac stating:

> *"I'd much rather have a professional tell me the amount and how often I should take something but I am forced into doing my own research… I just want to share my experience so that other know there is an alternative solution for the problems they may be having. If it wasn't for people sharing their experiences with me I I be where I am."* (Isaac).

In summary, from this theme there was a sense of microdosing being considered and carefully monitored, unlike recreational or hedonistic drug use. Participants spent time researching and experimenting microdosing, so that it was understood and tailored to their needs, and there appeared to be a logic applied to their experiences.

Theme 3: Microdosing is a Catalyst that Precipitates Desirable Beneficial Effects

Participants conveyed a sense of understanding that microdosing was not a cure, but it was a catalyst that triggered beneficial effects, with few negative consequences. They spoke about how microdosing seemed to be a catalyst, or a tool, that enabled learning and elicited new behaviours that would then trigger and maintain any positive effects whilst they were microdosing. Like the previous theme, there was a sense of logic in the participants' descriptions of microdosing, and a message of a deeper understanding of microdosing and how it may function.

Microdosing acts as a catalyst

In the same way participants were logical and scientific regarding microdosing psychedelics, and did not consider it to be a miracle cure, there was an impression that participants viewed microdosing as a catalyst to trigger beneficial effects. Microdosing was described as something that was *"buffer" and a "shield"* (Evan), a *"tool"* (Leo), and a *"jumpstart"* and the brain's version of a protein shake (Isaac). Gary explained:

> *"Since I adopted more healthy behaviours, some effects could also be contributed to that…But I think it's microdosing which led me to adopt those more healthy behaviours…Sort of like a catalyst".* (Gary).

Mia described that alongside microdosing she was able to *"train"* her brain to help her with anxiety, and added *"I would love to credit it all to microdosing but I'm sure it's also partly my own awareness …I don't think I would've reached it on my own, however"*. Adam also mentioned a boost to the brain stating:

> *"With Psychedelics if someone sets their mind on achieving a personal goal they will give the boost of unlocking new parts of the brain. Not really unlocking but making the connections."* (Adam).

In a similar sense, Harris explained:

> *"It's not a magic bullet. That approach to depression (or really any health issue) is wrong-headed in my opinion, but esp mind/brain stuff. It helps. But the causes aren't solely biochemical so why would a biochemical treatment be the only thing required. I realize this is a mind/body dualism that allopathic and western science abhors but also don't think it's particularly addressed it either".* (Harris).

Callum talked about how microdosing helped him build a *"straight mind",* and it was when he stopped microdosing that he noticed this mind was harder to keep straight, and continue the positive effects he had experienced. He stated:

> *"Microdosing made me really tap in, face my own "demons" and really work on myself. I was "juiced" lack of better word to start working out… I had to stop microdosing as I was traveling for six months..And I must say it was quite hard to keep straight mind. By straight mind I mean the mind that microdosing helped to built".* (Callum).

For a few of the participants, this catalyst was described as something that discretely worked in the background, fitting with the idea that this is not like recreational drug use. Evan suggested *"There is also sometimes a doubt about the effectiveness of microdosing because you are aiming for imperceptible state".* For Harris *"the point of *micro* dosing is for the effects to be largely *sub* liminal".* Daniel suggested:

> *"The mushrooms are more calming for longer and more working in the background… but at the same time it's* [social interaction] *effortless too and flows naturally….You don't have to push yourself to make the effort you just kind of react normally and less awkward".*

Overall, this subtheme highlights an importance in understanding that microdosing psychedelics is perhaps a catalyst that can ignite other behaviours which are helpful in mental health and well-being. This is important in relation to the next theme, which is about the benefits and disadvantages that this catalyst led to.

Microdosing does what it sets out to do

Given there was agency and rationale to participants microdosing, there was also the impression that microdosing had supported participants in what they were looking for, as well as other beneficial effects. There were few negative consequences described by participants. There were a number of benefits discussed which supported participants with their mental health difficulties and overall sense of wellbeing, with some participants describing getting their life back or having a new appreciation of life. For example, Kim explained:

> *"It was so gradual [microdosing effect] - but it was like I was getting my life back … the life I had never had but which was there, somewhere, buried under years and years off* [of] *issues."* (Kim).

All participants noted that there were beneficial cognitive effects from microdosing. However, in the case of Evan this would be taken with caution, as he felt some of his supplements like Lion's Mane also contributed to better cognitive abilities, like memory

recall. Cognitive benefits included thoughts not having such a hold over them, reduction of negative thoughts, being more mindful, ability to problem solve and generate ideas. A number of participants referred to improved focus and mental sharpness. Isaac explained that "*The best way to describe it was there was always so much noise going on in my head. Microdosing helped clear the noise and allow me to focus on things."* Leo noted that:

> *"my ability to think quickly, explain the complexity of systems in ways that i wouldn't normally be able to, my ability to generate ideas, and respond to situations, was very noticeably heightened…the mental sharpness is quite positive".* (Leo).

A similar experience was voiced by Gary who stated:

> *"I was quite skeptical at first. But a few hours after my first dose, I noticed a lot of 'brainfog' had gone away which made it possible for me to focus and think a lot clearer than normal… I was able to articulate thought more clearly…Normally, I have a really busy mind which makes a lot of associations when in conversation with someone. I managed to suppress those associations and this made it easier for me to keep track of what the other said."* (Gary)

Although not an aim of this study, two participants spontaneously made mention of microdosing prompting exploration of the unconscious mind. Daniel described *"I seem to remember things long forgotten, silly things not really relevant or useful."* Callum explained:

> *"It [microdosing] helped me get hold of my thoughts in same fashion meditation helps…And really dive deeper as far as I could to sort out things*

that I didn't need anymore and basically understand myself from a fundamental stand point…In sense I was a psychologist to myself…Free consultation whenever unneeded :)…I needed…Tapping into my own "demons" was a rewarding experience. It took a significant chunk of last two years."* (Callum).

In terms of consequences, Daniel mentioned a cognitive disadvantage of microdosing suggesting:

"The only disadvantage I've had is there is no off switch as such on the mushrooms. If I take a microdose say 6pm instead of the morning. I may feel my brains more active say mid night still and I can't sleep because I'm thinking away more than usual… You could also say the same about heavier, trip like doses. If you get the dose wrong you have to sit it out regardless". (Daniel).

Aside from Leo, all participants drew upon social benefits that they experienced alongside microdosing. Such benefits included improved relationships, listening better, having more initiative or confidence, making more social effort and reduction in social anxiety. Kim summed up her benefits of microdosing, explaining:

"*I have gained so much confidence it's crazy. I have a new career lined up. I am sociable, I am happy to speak up for myself. I don't even recognise the person that I was!... No social anxiety…For the first time ever, I feel like I can function in society and actually contribute to the greater good!...And like I said before, it kind of feels like this is the person I was always supposed to*

be - it doesn't feel like I've become somebody else, more like I'm peeling away years of crap." (Kim)

Ben applied logic to his social benefits, stating:

"I guess I'm saying the responses in the moment seems to suggest that it's been useful in conversing. People feel like I listen to them well …But, I've already been a decent listener I've been told…So it's hard to say for sure…I feel like I can listen better". (Ben)

As much as Kim mentioned social benefits, she was one participant to mention a *"mild"* disadvantage, stating *"Apart from being extra chatty on the days I take it, I can't think of any disadvantages, personally."* This was similar to Ben's experience of being *"a bit too loud or exuberant in interactions"* when he takes too higher a dose.

Over half of participants spoke about the physical benefits of microdosing. This was in terms of microdosing contributing to promotion of healthier behaviours, and reduction in other substance use (including alcohol) or the need for stimulants like coffee. Ben explained that *"I also notice less urges to use alcohol or other stimulants…Be it cannabis, snacking, etc…When microdosing I don't feel the need for other "entertainment".* When discussing whether effects of microdosing are permanent or not, Isaac stated:

"Maybe some. But no. I felt like it helped me break free from unhealthy routines and create healthier routines. Healthier physically like working out, intermittent fasting, and eating better. Healthier mentally by reducing negative feedback loops when internalizing situations." (Isaac).

There was also a sense that there was an affective benefit to microdosing, with 10 of the participants discussing this. Participants touched upon improvements such as feeling

more resistant to negativity, feeling more relaxed, less anxious, reduced depressive symptoms, improved mood, happier, a more positive outlook on life (towards themselves and others) and increased satisfaction. In his discussion of his experience of microdosing, Daniel stated that *"The mushrooms have helped more with the social anxiety but I see improvement in my anxiety in general too and also don't feel depressed either".* Mia also described the effect microdosing had on her symptoms of depression:

> *"I don't know if you know this but when you're depressed your vision actually changes colour so you see life in more of a grayscale and when I microdosed that disappeared, everything was brighter again …may have been the effects of psychedelics lol but there was also definitely a metaphor in there somewhere"* (Mia).

Jonah mentioned a number of affective benefits explaining:

> "*I'd say it's made my mental health way more happier and more content in general…I'd say I get irritated much less and am very much more in control of my emotions….I'd say that fears, stresses, and anxieties don't really exist at all for me anymore, and I'm more appreciative of life in general…. I'd say after psychedelics, I finally understood what "self love" felt like."* (Jonah)

Mia explained that a disadvantage to microdosing can be that *"very very rarely if I get the type of physical anxiety* [physical sensations of anxiety] *it will feel worse than normal …but those instances are very rare".* Gary also noted an affective disadvantage of microdosing, stating:

> "*Some days, microdosing made me feel overwhelmed by those powerful emotions…But that didn't happen often…It had both benefits and*

disadvantages…The benefits were that I understood where those emotions came from, and that they were telling me to…undertake certain actions…A disadvantage of this was that sometimes a certain emotion…doesn't have a clear cause, which made me a bit too introspective at times…With no clear solution to be found".

On a similar note, Jonah explained that:

"I'd say on both full and microdoses the only disadvantage is being very sensitive to peoples energy's…Besides that, no other disadvantages from microdosing….In hindsight…I don't really know if being sensitive to energies/emotions is an advantage now that I'm thinking about it. I think it can be unpleasant to have to feel that, but I now that I think about it, I think being sensitive to emotions are a good thing, so never mind, no disadvantages :)". (Jonah)

Although not mentioned by all participants, six participants did include creativity as a benefit to microdosing. Callum had mentioned this in his reason for microdosing, but there was a sense that this was an added benefit to others. For example, Leo explained *"i noticed later on, that there were other aspects of it that were particularly enjoyable - my appreciation for arts grows significantly when i MD* [microdose]*".* As also described previously, there appeared to be a sensitivity to the effects of microdosing, and this was described by Callum when discussing the benefits, stating:

"Regards creativity. Well as a musician I rely heavily on creativity and I noticed that lsd really helped with that…Psilocybin helped with the internal

and external…Whereas lsd helped with productivity and creativity…It was surprising to me such difference". (Callum)

There was an impression of it being hard to separate the effects, as some effects of microdosing could lead to others. In this sense, microdosing was again not clear-cut. For example, Gary explained:

> *"I noticed more joy in everyday activities, like making music or talking to friends. I also felt more confident in my social abilities. I was able to articulate thought more clearly and listen better to what others had to say. I experienced emotions more powerful, which made it more easy to make sense of those emotions. My body also felt a bit lighter, like a was able to control movements a tiny bit better."* (Gary)

There were some negative experiences that participants mentioned. Ben mentioned legal issues, which was similar to Evan who said *"Well, sometimes I do feel slightly hungover but that is rare and could also just be from stress but I feel it more acutely since I have been microdosing…. The fact that it is illegal is never far away."* Although, Evan was not sure whether the hungover feeling could also be contributed to working shifts. For Isaac illegal issues were more about accessibility of psychedelic drugs rather than repercussions stating, *"It's an illegal substance that is difficult to find… Not being able to utilize a plant, that has anti addictive properties, for medical use is bonkers".* Similar to Evan, Ben noted a "*slightly cloudy head"* could be a disadvantage, but this was in relation to him *"taking more than what I need".*

Taking too much of a dose, was something Adam and Leo also pointed out to be a disadvantage at times.

Overall, participants had rational for microdosing and had researched it, and it appeared that by microdosing they had achieved what they had set out to in terms of supporting their mental health and wellbeing, with microdosing being the catalyst to achieving this.

DISCUSSION

This study used Interpretive Phenomenological Analysis to explore the experiences of people who microdose psychedelic drugs to support their mental health and wellbeing. Three superordinate themes were interpreted from the interviews which were: 1) Seeking a solution: the rationale; 2) Microdosers as scientists; and 3) Microdosing is a catalyst that precipitates desirable and beneficial effects.

From exploring this subject, there was a sense of participants approaching microdosing methodically and with purpose, with an aim in mind for what they wanted to achieve by microdosing. This felt different to recreational drug use, with participants describing a regime of microdosing that was not haphazard or hedonistic. Whether participants were microdosing for mental health purposes such as support with depression, for cognitive purposes such as increased focus, or for social and creative purposes, for all participants there was a degree of agency and rationale to the practice of microdosing. Rationale for microdosing were similar to those reported by Hutton et al. (2019a).

In line with previous research into microdosing psychedelic drugs participants reported benefits to their overall sense of wellbeing and to their mental health including improved mood, reduction in anxiety and symptoms of depression, and a more positive feeling towards life. Cognitively, participants described experiencing improved focus, and being able to think clearer and sharper. There was a reduction in social anxieties for a number of the participants which included improved relationships, feeling more confident, as well as improvements in listening and conversing with others. Over half the participants also noted physical benefits of microdosing in promoting healthy behaviours and less temptation in the use of other substances and stimulants. Although not mentioned by all participants some did

mention creativity as a benefit to microdosing, which has also been an outcome of microdosing in other research (Anderson et al., 2019a & 2019b; Johnstad, 2018)

With this not being haphazard drug use, there was a sense of participants being scientists and exploring microdosing tentatively. They appeared to be piloting expertly through their experience, carefully observing any changes whether these were beneficial or not. They seemed sensitive to the microdose experience, making changes to their regime and keeping in mind their initial goals and what they wanted to achieve from microdosing.

The experience of those microdosing appeared to be that they were purposely looking to better themselves in a particular and controlled way. This is in contrast to theories and research of drug seeking and taking behaviours, which highlight the loss of self-control or control impairment in these behaviours (Lyvers, 2000). Automatic processing theories are suggestive of a lack of conscious decision making and intent in substance use and addiction. There are also theories around inhibition dysfunction where control in substance use is impaired (West, 2013). Some participants in this present study noted the limitations of psychedelic drugs if they were to take more than a microdose and felt too much of a dose could be undesirable. Hence, this conscious choice and differentiation of doses is different to those who start using substances and then lose control or control impairment over their use.

Although this study did not necessarily explore whether those who microdose are addicted to the substances they are microdosing, there was definitely a sense of this being a controlled behaviour with participants also talking about the ability to stop microdosing and explore whether the benefits still remained. It should also be considered that the substances the participants were using to microdose have been reported to be relatively safe with no reported risk of dependence, and there has been little documentation of adverse effects whilst

psychedelics have been used recreationally (Nichols, 2016). Therefore, it could be questioned as to whether it is the substance that allows participants to be able to navigate and control their experience, in comparison to what the experience might be if they were microdosing a more addictive substance.

Rational choice theory is also prevalent in the research around addiction. In summary, these theories refer to a process where an individual may use rationale to weigh up the costs and the benefits of their behaviour, often with the benefits of the substance use outweighing the cost (West, 2013). One such theory is that by Becker and Murphy (1988), who suggested that those who are addicted to particular substances or behaviours may actually consider the delayed effects of their addictive behaviour as well as immediate rewards. This theory highlights importance of a forward-looking aspect in using psychoactive substances which is different from other theories that may suggest drug use is less controlled. It is more in line with this current study, where those who microdosed reported using rationale and research in their decision to microdose, and did not appear to microdose in a disorganised or unplanned manner.

For all except one participant, previous drug experience allowed them to make informed decisions, as well as their research and exploration of the microdosing subject. However, even though this shows rationale and understanding prior to initiating a microdosing regime, it also brings into question whether it was actually the high doses of psychedelic drugs that the participants had took previously that had had consequential benefits in terms of their mental health and/or wellbeing. Research by Robin Carhart-Harris has suggested that one high dose of psilocybin had led to participants being in remission of depressive symptomology for six months at follow-up (Carhart-Harris et al. 2017). Similarly, following the catalyst metaphor, it could be questioned whether macrodoses of psychedelics were the

catalyst in psychological, behavioural and social changes that have led to the effects participants are now experiencing. Such questions could be the basis of future research into this area.

Similar to the study Polito and Stevenson (2019), participants in this study shared experiences around the longevity of effects, with some participants suggesting any benefit reduced over the following days, others suggesting that its effects were lasting, and others stating that the effects were lasting because the catalyst encouraged new healthy behaviours. However, unlike the Polito and Stevenson (2019) study, where variables participants expected to change prior to microdosing were not the ones that had changed following microdosing, the experience of participants in this study were that microdosing had helped them achieve what they initially aimed for in terms of their mental health and wellbeing. This finding could add potential to the findings by Kaertner et al. (2021), who found results of microdosing indicative of placebo effect. Either way, the participants reported experiencing benefits from their microdosing regime, which then then impacted upon their life in a positive way.

Strengths and Limitations

In discussing the strengths and limitations, consideration should be given to the methodology of this study, in particular the use of anonymised text-based interviewing. The researcher's reflections on this can be found in an extended reflected piece which highlights the benefits and limitations to this type of study (Appendix 9). As textual data was used as opposed to conducting the interviews in person, this means that non-verbal communication was missed which may have been important in the participants being able to communicate

their lived experience. However, a strength is that text-based interviews may be less pressured, as participants can re-read the questions and consider their answers before responding. Given interviews were online, this meant that participants from all around the world could be potentially recruited.

It was apparent in the findings of this study that participants mostly provided a positive experience of microdosing. Due to the nature of the interviews, it was not clear the intent of the participants to be involved in the study, and as such there was a limited capacity to know why participants desired to share their experiences. Anecdotally, when posting the study advert on forums, particularly those on Reddit, the researcher noticed there were people discussing their negative experiences of microdosing. Hence, it is unclear why these participants did not want to sign-up to the study and share their experiences, and why it was seemingly more attractive to those who wanted to share positive experiences. This may be addressed in future research which is less exploratory and neutral in nature, and wishes to be more specific. Additionally, as this was study was exploring the experiences of those microdosing psychedelic substance, it could be questioned whether individual's who had tried microdosing and found it to be a negative experience would still be actively microdosing, and whether they would think to sign-up to such a study.

From the descriptions of the participants in this study, it appeared that all participants were of a similar level of education, and it was questioned whether this could be reflective of their economic status and ability to access the internet. As such, there is potential for the sample in the study to be biased given that there may be a population of people who microdose but were unable to hear about this study or access it via the internet. Furthermore, it appears that the sample fit a very clear profile for example most participants were male and educated. The participants were self-selected and from a limited selection of websites.

Hence, it is likely that this sample is biased, but this study is not going to make claims that would be generalised to the rest of the population. As this is an exploratory study in a new area of interest, with the purpose of getting to understand the experiences of those who microdose and potentially inform future research that may be able to use less biased samples.

Finally, as IPA is the study of a particular group of people it is likely that their experiences may be similar and hence why commonality in themes may have appeared in this study. It was noted during the analysis that themes were identifiable to the researcher, and to balance out any potential bias, the researcher's claims were reviewed during the group and research supervision. As the themes were identifiable to the researcher, it suggested that what mattered to the participants and the meaning they made of their experience was quite similar across participants. Again, this could be due to the experiences of microdosing and the sense they made of it being mostly positive from the participants that were involved in the study.

Practical Implications and Future Research

Ideas for future research has already been drawn upon in this discussion, including potential research into any difference in effects of a macrodose of psychedelic drugs versus that of microdosing over a longer period of time. This study has explored experiences of those who microdose psychedelic drugs and therefore could assist larger randomised controlled studies by providing further exploratory knowledge and understanding of the phenomenon which can contribute to the planning of future investigations.

Microdosing psychedelics drugs is a new and growing phenomenon that is little understood. It is important as clinical psychologists that there is an understanding of human need, and what may be driving people to look to innovative ways of supporting their mental

health and wellbeing, which all participants discussed. For example, is there an area of need that is being missed by current healthcare systems, which is leading people to microdose? Psychedelic drugs still remain illegal most countries, so it is important to grasp why people may be taking a risk in accessing them to support themselves, and what the decision-making was in doing this. As clinical psychologists work with people with mental health difficulties and low wellbeing, it may be that if microdosing does continue to grow in interest and popularity, then it could be that psychologists come across service users who are microdosing in order to support themselves, and therefore it is important to understand this behaviour and to have informed discussions with clients.

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EMPIRICAL PRESS RELEASE

CAN MICRODOSING PSYCHEDELICS SUPPORT WELLBEING AND MENTAL HEALTH?

The use of hallucinogenic plants and fungi have spanned our knowledge of human existence. A new growing area of research is studying the effects of taking very low doses of psychedelic substances such as psilocybin ('magic mushrooms') or LSD (lysergic acid diethylamide), also referred to as 'microdosing' (Fadiman, 2011). There appears to be growing media coverage in relation to this phenomenon (Polito & Stevenson, 2019), and there are a number active online communities of people discussing microdosing experiences and research such as Reddit and Shroomery.org.

Following the enforced prohibition of psychedelic drugs in many western countries by the 1970s, research into psychedelics came to an end. However, research is again recommenced in this field such as that at Imperial College London, where participants have been given high doses of psilocybin to explore any potential social, psychological and biological effects (e.g. Carhart-Harris et al., 2017). However, research into microdosing is relatively novel with only a few studies having investigated microdosing psychedelics, researchers at the University of Birmingham set out to discover what people's experiences were off my microdosing psychedelics in an attempt to support wellbeing and mental health, by taking a neutral and exploratory stance.

Researchers recruited 13 participants through online forums and websites who had experience of microdosing psychedelic drugs. These participants were interviewed anonymously using text-based interview methods. All participants had either used psilocybin and/or LSD as part of their microdosing regime.

Results from this explorer tree study found that three main themes were interpreted from the interviews which were:

1) Seeking a solution: the rationale
2) Microdosers as scientists
3) Microdosing is a catalyst

It was apparent from this study that the individuals who microdose were approaching this practice methodically and with purpose. They were sensitive to the microdosing effects and were able to adapt and change their regime to suit their needs. They also had a clear aim in mind for what they wanted to achieve by microdosing and reported beneficial effects on their mental health, as well as social, physical and cognitive improvements. As participants had a clear rationale for microdosing and approached it in a scientific manner, there was a sense of this practice being different to more haphazard or hedonistic drug use. Participants experienced microdosing as a catalyst that enabled them to navigate them towards a healthier lifestyle.

The findings of this study could have implications for future research as the results can provide direction for larger studies in the area of microdosing. In particular, future research may want to explore whether there is any difference in the effects of those who have taken a less frequent high dose of psychedelic drugs, versus those who have microdosed over a longer period of time.

For more information, please contact Rebecca Ryan, School of Psychology, University of Birmingham.

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APPENDICES

VOLUME ONE: CHAPTER 1 APPENDICES

APPENDIX 1 - Data Analysis Strategy – From the Centre of Psychology Meta-Analysis Strategy (2021).

Transformation of Effects for Calculations and Back Transformation for Presentation

The event rates and relative risk estimates in primary studies were log transformed prior to numerical synthesis however, unless otherwise indicated, the values presented in tables and figures have been back-transformed to their original format for clarity of presentation.

Normalisation and Variance Stabilisation

The DerSimonian and Laird method is the simplest and most commonly used method for calculating the between studies variation (tau) for fitting the random effects model. However, the DerSimonian and Laird method assumes that the random effect is normally distributed in the population and therefore the effects sizes reported in the primary studies should also approximate a normal distribution. The log transformation of the event rates and relative risk estimates serve to normalise the distribution of effects and stabilise the variance of the estimates prior to synthesis using the DerSimonian and Laird method.

The Omnibus Test

The omnibus test can be calculated using either the fixed effects or the random effects models. Under the random-effects model the goal is not to estimate one true effect but to estimate the mean of a distribution of possible effects (which may show true variation due to the idiosyncratic characteristics of the individual or the unique circumstances of the

intervention or exposure). Since each study provides information about a different effect size, we want to be sure that all these effect sizes are represented in the summary estimate. This means that we cannot discount a small study by giving it a very small weight (the way we would in a fixed-effect analysis). The estimate provided by that study may be imprecise, but it is information about an effect that no other study has estimated. By the same logic we cannot give too much weight to a very large study (the way we might in a fixed-effect analysis). Our goal is to estimate the mean effect in a range of studies, and we do not want that overall estimate to be overly influenced by any one of them. When the researcher has gathered data from studies that had been undertaken by researchers operating independently (and will therefore show different methodological strengths and weaknesses), it would be unlikely that all the studies are functionally equivalent. Typically, the participants and/or interventions in these studies would have differed in ways that would have impacted on the results, and therefore we should not assume a common effect size. Therefore, in in the case of the current review the random-effects model is more easily justified than the fixed-effect model.

The DerSimonian and Laird method is the simplest and most commonly used method for calculating the between studies variation (tau) for fitting the random effects model.

If you have selected other than the DerSimonian and Laird method for calculating the random effects model then you should provide an explanation for your choice. ‘ReML’ is the Restricted maximum-likelihood estimator and ‘ML’ is the Maximum-likelihood estimator. Usually, the Restricted Maximum-likelihood estimator should be used in preference to the Maximum-likelihood estimator.

Handling Problematic Variance

Defining problematic variance

An effect is considered heterogeneous if it presents with variation from the meta-analysis synthesis that cannot be attributed to true variation in the distribution population effect. Heterogeneity can result from methodological variation in the studies, measurement error or uncontrolled individual difference factors within the body of literature. Higgins I^2 is a commonly used measure of heterogeneity, with greater values of I^2 indicating variation in effect that cannot be attributed to true variation in the distribution of effect in the population. As there is considerable variation in methodologies of the primary studies that was used to calculate the meta-analytic synthesis, problematic heterogeneity was defined as a Higgins I^2 value greater than 75%.

Estimation of Unexplained Variance due to Methodological Factors and Uncontrolled Covariates

If problematic heterogeneity is observed then a leave-one-out analysis will be conducted to identify primary studies that exert a disproportionately influential effect on the meta-analytic synthesis. Any such study will be reviewed with regard to the possibility of exclusion due to risk of bias.

In addition, subgroup analyses and meta-regression will be used to attempt to identify the source or sources of problematic heterogeneity and the attenuated estimate of the synthesis will be reported.

The Quality Effects Model

In the random effects model the precision of an effect is usually estimated as a function of the sample size from which the effect is derived. The quality effects model extends the random effects model by explicitly including rating of methodological quality in addition to the size of the sample in the estimation of precision. The quality effects model can be interpreted as the meta-analytic synthesis that would have been obtained had all of the studies been of the same methodological quality as the best study in the review. Accordingly, the quality effects model provides a measure of attrition attributable to methodological variation.

Identifying Influential Studies

To examine whether any particular study or studies are exerting a disproportionately high influence on the overall meta-analytic effect, a "one left out" procedure was conducted. This procedure identifies individual studies with a disproportionate influence on the quantitative synthesis, by observing the impact of removing each study in turn. If omitting a study results in an effect that lies outside of the 95% CI for the complete meta-analysis then that study is deemed to have a disproportionate influence and is remove from the omnibus test.

Identifying Publication Bias and Small Study Effects

For outcomes with a sufficient number of primary studies, publication bias and small study effects will be identified through visual and statistical inspection of the funnel plot. A

funnel plot is a scatterplot of the effects from against a measure of study precision. It is used primarily as a visual aid for detecting systematic heterogeneity.

In the absence of publication bias, it is assumed that studies with high precision will be plotted near the average (i.e., the meta-analytic synthesis), and studies with low precision will be spread evenly on both sides of the average, creating a roughly funnel-shaped distribution where the distance from the average is inversely proportionate to the precision of the study. A symmetric inverted funnel shape arises from a 'well-behaved' data set, in which publication bias is unlikely whereas deviation from this shape can indicate publication bias especially if there is an absence of studies in the region associated with small samples sizes and non-significant effects.

Planned Contrasts

Where specific a priori hypothesis made been posited, then sub-group analysis will be conducted for categorical moderators and meta-regression will be calculated for continuous moderators.

Analysis of Sub-groups

Where categorical moderators are considered then summary effects and associated heterogeneity measures will be calculated for each of the sub-groups. The significance of the difference between the sub-groups will be evaluated by comparison of their 95% confidence intervals.

Potential moderators of the effect will be explored using a series of subgroup analyses. The significance of sub-group differences will be evaluated using the Q statistic,

which may be view as an extension of analysis of variance. The Q statistic is calculated by summing the within-studies variation (the weighted sum of squares of all of the studies within a subgroup about the mean of the subgroup) across all subgroups and the subtracting this from the total variance (i.e., the weighted sum of squares between all of the studies and the overall grand mean). The resulting Q statistic therefore represents the weighted sum of squares attributable to between studies variation and conforms to a chi-squared distribution. A 95% confidence interval for each subgroup will be used to determine the significance of the pairwise differences between the sub-groups.

APPENDIX 1 - Ethics Confirmation

Dear Prof Copello,

Re: "Experiences of microdosing psychedelics in an attempt to support wellbeing and mental health."
Application for Ethical Review ERN_19-1617

Thank you for your application for ethical review for the above project, which was reviewed by the Science, Technology, Engineering and Mathematics Ethical Review Committee.

On behalf of the Committee, I confirm that this study now has full ethical approval.

I would like to remind you that any substantive changes to the nature of the study as described in the Application for Ethical Review, and/or any adverse events occurring during the study should be promptly brought to the Committee's attention by the Principal Investigator and may necessitate further ethical review.

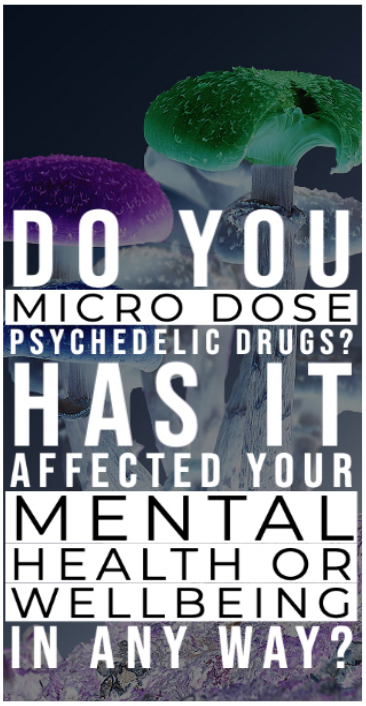
Please also ensure that the relevant requirements within the University's Code of Practice for Research and the information and guidance provided on the University's ethics webpages (available at https://intranet.birmingham.ac.uk/finance/accounting/Research-Support-Group/Research-Ethics/Links-and-Resources.aspx) are adhered to and referred to in any future applications for ethical review. It is now a requirement on the revised application form (https://intranet.birmingham.ac.uk/finance/accounting/Research-Support-Group/Research-Ethics/Ethical-Review-Forms.aspx) to confirm that this guidance has been consulted and is understood, and that it has been taken into account when completing your application for ethical review.

Please be aware that whilst Health and Safety (H&S) issues may be considered during the ethical review process, you are still required to follow the University's guidance on H&S and to ensure that H&S risk assessments have been carried out as appropriate. For further information about this, please contact your School H&S representative or the University's H&S Unit at healthandsafety@contacts.bham.ac.uk.

Kind regards,

Ms Sam Waldron
Research Ethics Officer
Research Support Group

APPENDIX 2 – Research Advert



PARTICIPANTS INVITED FOR INTERVIEW

If you fancy talking to us anonymously about your experience, thenwe would be interested in hearing your thoughts.

WHO CAN TAKE PART:

- Those aged 18 and over.
- Those with experience of being in a regime ofmicrodosing a classic psychedelic drug to support their mental health and/or wellbeing.
- Those able to confidently read and write in English.

TO GET INVOLVED VISIT:

www.birmingham.ac.uk/research/activity/psychology/microdosing-psychedelics/microdosing-psychedelics.aspx

OR contact 'UoBmicrodoseresearch' on Reddit or Bluelight.org | OR contact 'microdoseresearch' on Shroomery.org

UNIVERSITY OF BIRMINGHAM

APPENDIX 3 – Participant Information Sheet

Participant Information Sheet

Research Title

Experiences of microdosing psychedelics in an attempt to support wellbeing and mental health.

Invitation and brief summary

The aim of this research is to explore people's experiences of microdosing classic psychedelic drugs, primarily psilocybin (or 'magic mushrooms') or LSD (lysergic acid diethylamide). The study is recruiting people who have experience of being in a regime of microdosing a classic psychedelic drug to support their mental health and/or wellbeing, and invites them to share their unique experiences.

Participants who consent to take part in the study will be interviewed anonymously online. Sharing your experience of microdosing will be valuable in understanding this growing phenomenon and will support future research in this area.

Explanation: purpose of and background to the research and invitation

As microdosing appears to be a growing phenomenon, it is important to explore it in order to gain an understanding of it. This study will aim to do so in a curious and neutral manner by gathering information from people who have been microdosing classic psychedelic drugs in their daily lives.

Who can take part?

- Those aged 18 and over
- Those with experience of being in a regime of microdosing a classic psychedelic drug to support their mental health and/or wellbeing.
- Those able to confidently read and write in English.

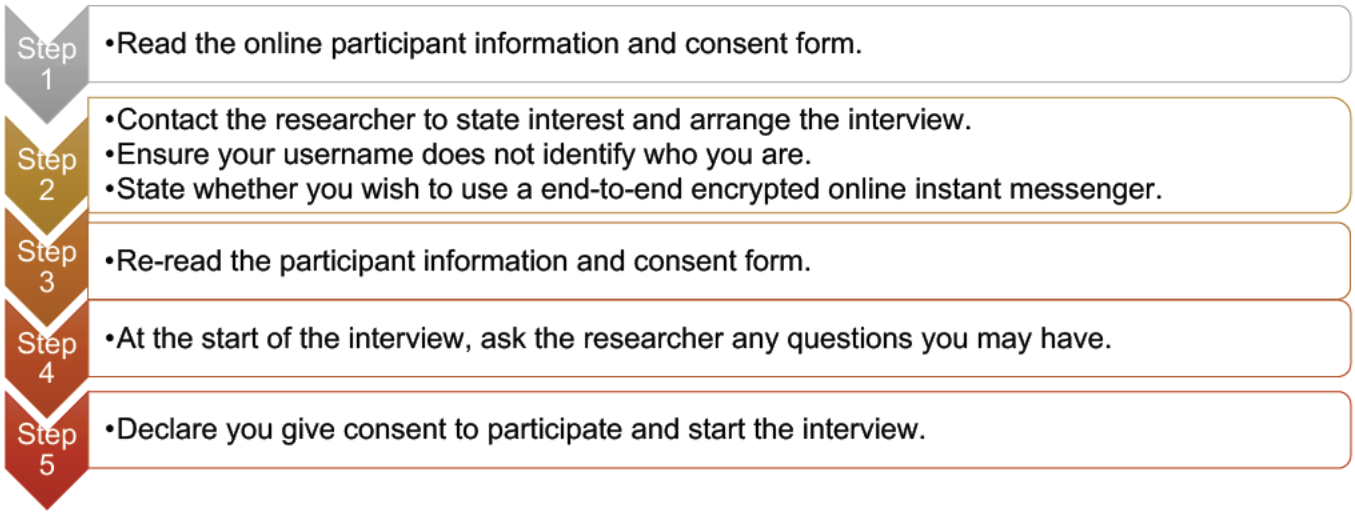
Unfortunately, you will be unable to take part in the study if you are currently microdosing to cope with substance use issues/withdrawal, or, if you use microdosing for any other purpose e.g. recreational purposes.

What would taking part involve?

If you participate, interviews will be held via the forum-specific instant messenger to the website you saw the advertisement for this study. From seeing this advert and reading this participant information form and then consent form, you can contact the researcher via the forum-specific messenger to state your interest.

You will have the option to use an end-to-end encryption instant online messenger if you wish for added security. This means that the online interview details can only be seen between researcher and participant and no other body.

If you agree to consent, the types of questions that may be asked will be around your microdosing regime and your experience of microdosing in terms of supporting your mental health and/or your overall wellbeing. No intrusive questions such as how you acquired illegal drugs will be asked, and no identifying information will be gathered from you. It is estimated that an interview may take around 1 hour, but this will depend on how the interview develops.



How will anonymity and confidentially be maintained?

As this study is investigating an illegal activity, it is important that the researcher maintains the anonymity of the participant as much as they possibly can.

When a person uses the internet there is normally an IP address attached, unless they use camouflage technology like Tor browser. An IP address (Internet Protocol address) is a unique identifier which identifies any device using the internet. This means that when a person uses the internet they run the risk that if an authority were to demand information from the website, the IP address of the person could potentially be tracked, which could then possibly identify that person.

It will be a prerequisite that if you sign up to the study, and you are going to give informed consent, then you ***must*** use a username in the study which is not linked to your real name/identity. Usernames should be carefully considered as they can infer cultural and ethical backgrounds.

It is also important you do not contact the researcher or the University of Birmingham in any other manner other than the forum-specific messenger, as this will compromise anonymity.

Additionally if you do happen to over-disclose information in the interview, the researcher will work collaboratively with you to alter certain details of this information when it is stored for analysis.

Once the interview is complete, and the two week opt-out period has passed, the interview notes will be transferred to a document for analysis. Any usernames will be immediately deleted, and a data key will be created to link the username with a random identifier, so the link between your username and the interview data will be broken.

Duty of Care

It may be possible that during an online interview with a participant they may disclose that they are having some sort of difficulty, or they or another are at risk, which may be of a concern to the researcher.

It is important to consider that this research is being conducted from the UK, and the interview will not be a forum for help or advice. This is because the research is explorative and is not being completed by a researcher whom is an expert in this field. Furthermore, as the research is being completed in the UK, this may mean there is a time delay in any communication, so the participant cannot rely on the researcher for immediate help or advice.

If the participant were to disclose some difficulty or risk during the interview, the researcher will signpost the participant to general services or suggest how the participant could look for services of support. However, the researcher and the University of Birmingham do not endorse any particular service.

What are the possible benefits and disadvantages of taking part?

Participants in this study will be able share their story and contribute their experiences and opinions on microdosing psychedelic drugs.	It is important that the participant understands that sensitive topics are likely to be discussed, such as mental health, and the use of illicit substances.
They may feel the benefit of being able to share their experiences, in order to develop public knowledge and also to guide and inform future research.	Hence it is important to take into account personal limitations and levels of distress. The researcher encourages participants to be honest in this regard.
Completing this study using a semi-structured interview will allow participants to tell their own unique story in a manner that supports openness, depth, and what really matters to them.	The participant is therefore encouraged to state whether they do not wish to answer questions, or feel distressed by the questions, without need to give reason for this.
Given that individuals are using forums to research and participate in conversations about microdosing psychedelic drugs, it is possible that the will find the experience of being in this research enjoyable.	Any sign that a participant is becoming uncomfortable or distressed by the questions will result in the interview being paused, and a discussion with the participant can be held to see whether they wish to continue.

Further supporting information

It is important to stress that the researcher does not condone the purchase and use of illegal drugs.

What are your choices about how your information is used?

Following the research interview you will have a two-week opt-out period for reflection. Within this time, you may contact the researcher on the forum-specific messenger and withdraw your interview entirely or in part, without giving any reason.

If you do not wish to carry on with the study, you can so say without reason. Data already collected with your consent would be retained and used in the study. No further data would be collected or any other research procedures carried out. At your request, you can retract all your data from the study and it will be securely destroyed.

We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you see or change the data we hold about you.

How will we use information about you and keep it confidential?

People who do not need to know who you are will not be able to see your name or contact details. Your data will have a random identifier instead.

This research project will be run in accordance with the Data Protection Act (2018).A strict data management procedure will be carried out so that your information is confidential and safe.

Once we have finished the study, we will keep some of the data so we can check the results. We will write the reports in a way that no one can work out that you took part in the study.

The anonymised data collected during this study will be looked at by the researcher and academic supervisor at the University of Birmingham to ensure that the analysis is a fair and reasonable representation of the data.

What will happen to the results of this study?

The results of the research will be written up as a doctorate thesis. Some original quotes from the interviews may be used to back-up themes from the data. No identifying information will be connected with these quotes. This research will be included in the online catalogue of professional theses at the University of Birmingham.

Further information

This research is being funded by the University of Birmingham and organised by the researcher:

Rebecca Ryan: Trainee Clinical Psychologist, School of Psychology, University of Birmingham.

Where can you find out more about how your information is used?

You can find out more about how we use your information at

https://intranet.birmingham.ac.uk/finance/RSS/Research-Support-Group/integrity-ethics-governance/Research-Governance/index.aspx

APPENDIX 4 – Consent Form

UNIVERSITY OF BIRMINGHAM

Research site: University of Birmingham
Study Number:

CONSENT FORM

Title of Project: Experiences of microdosing psychedelics in an attempt to support wellbeing and mental health.

Researcher: Rebecca Ryan (Trainee Clinical Psychologist)

Please declare in your contact with the researcher on the forum-specific instant messenger that you consent to all of the twelve following items:

1. I confirm that I have understood the participant information sheet dated ..... (version ...) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time during the research interview, without giving any reason.
3. I understand the limitations to anonymity when using the internet.
4. I understand that I am not to contact the researcher, or the University of Birmingham, in any other manner than on the forum-specific online instant messenger.
5. I understand that when signing up to this research project I must do so with a username that does not identify me, and that usernames will not be used in the report.
6. I understand that following the research interview I will have a two-week period from the end of the interview for reflection. Within this time, I may contact the researcher on the forum-specific messenger and withdraw my interview entirely or in part, without giving any reason.
7. I understand that any usernames will be immediately deleted once the interview is completed and the two week opt-out period has passed, and the username will be replaced with a made-up identifier that does not identify the participant.
8. I understand that the data collected during this study will be looked at by the researcher and academic supervisor at the University of Birmingham to ensure that the analysis is a fair and reasonable representation of the data.
9. I understand that direct quotes from my interview may be published in any write-up of the data, but that my username will not be attributed to any such quotes and that I will not be identifiable by my comments.
10. I will declare to researchers if I am currently or have recently been involved (within the last three months) in any other research
11. I agree that I meet the eligibility criteria for the research.
12. I agree to take part in the above study.

APPENDIX 5 - Declaration and Questions at the Start of an Interview

At the commencement of contact with the participant via the online instant messenger, the following was outlined to the participants:

Thank you for participating in the research today. Can I just confirm that you have re-read the participant information sheet and consent form?

1. You are in contact with the me today as you are being invited to participate in a research project exploring the microdosing of psychedelic drugs. This is voluntary and you have the right to withdraw and request your data to be securely destroyed at any point during, and up to two weeks after the end of the interview, without having to provide a reason.
2. It is imperative that you have read and understood the participant information sheet before consenting to partake in the study. If you have any questions you are free to ask them.
3. It is important that the you meet the eligibility criteria as stated in the participant information sheet.
4. The types of questions that will be asked are around microdosing of psychedelic substances. These will be exploratory in nature. You will not be asked any questions that will identify you, or that are intrusive, such as where you purchased drugs. You can refuse to answer a question without reason.
5. The study is not condoning illegal drug use. It wants to explore a phenomenon that is already occurring, and get to understand it with a balanced view.
6. As stated in the participant information sheet, you are advised not to give away any identifying information, and pseudonyms will be employed in the interview but deleted and not used for the research report in order to break the link between pseudonym and the data collected.

Can you state that you give consent to participant please?
Can you confirm that you are over 18 years of age?
Do you have any questions before we start?

APPENDIX 6 – Interview Schedule

Example questions are as follows:

1. When did you first try microdosing, and what was that like?
2. Can you tell me about what classic psychedelic drugs you have used to microdose? How are you using them to microdose?
3. Currently what is it like to microdose these drugs? What have been your experiences of microdosing them?
4. Can you tell me your reasons for microdosing psychedelics?
5. I'd like to know some more about your decision to microdose psychedelics. Can you tell me how you came to use them? (If not already answered)
6. Can you tell me about your mental health/wellbeing experiences / experiences of feeling low / sad / anxiety (using their words which they have described).
7. How are things now you are using microdosing psychedelics? Are things the same/different?
8. Do you feel that microdosing has had any benefit or disadvantage to the psychological/wellbeing difficulties you described experiencing?
9. What do you think is the importance of these benefits or disadvantages?
10. How long do you notice any effect for?
11. Do you feel microdosing psychedelics has changed things for you in any particular way? Please tell me more about that.

Is there anything else you would like to add?
Can I just check whether you feel anonymity has been reached as much as possible today?
Do you feel comfortable and happy with the interview and its content?

APPENDIX 7 – Example of Initial Note Taking and Development of Emerging Themes

Emerging Themes	Line	Interview PPT 10	Exploratory Comments
			Descriptive *Conceptual* Linguistic
	34	UoBmicrodoseresearch	
	35	oh right, so what fascinated you about them	
	36	exactly?	
	37		
	38	Participant10	
	39	The podcast outlined how effective	They listened to the podcast
Researching/reading	40	psychedelics were against mental illnesses	and changed their view on
about it – rational, not	41	like PTSD without any harsh side effects	psychedelic drugs. They had
just taking it for the	42	like with pharmaceuticals used to treat those	always been judgemental
sake of it – previously	43	same mental illnesses. It also fascinated me	against drugs.
had a different view	44	that it's a good way to "work things out",	*It was so mind blowing that*
of drugs	45	since they told several anecdotal stories of	*they changed their opinion*
	46	how people used it to figure out things in	*and tried a full dose.*
	47	life and get a better sense of direction.	
Rational for doing it –	48		
alternative to	49	UoBmicrodoseresearch	
pharmaceuticals	50	ah ok, so what were your reasons for	
	51	deciding to microdose?	
	52		
	53	Participant10	*They heard things about*
Tolerance is an issue	54	I've definitely benefited from full trips but	*psychedelics that were*
and needs to be	55	after doing some research online I found that	*interesting to them,*
considered	56	it takes about 2 weeks for your brain to fully	*potentially resonated to their*
	57	reset the tolerance. Otherwise, the amount of	*needs?*
	58	dosing you have to take increases	Outlined that psychedelics are
	59	exponentially. With microdosing, it seems 4	different to pharmaceutical
Researching/reading	60	days seems to be the general consensus of a	drugs because they do not
about it – rational, not	61	tolerance reset, so being able to dose more	have 'harsh' side effects.
just taking it for the	62	often in hopes to gain the same benefits	Anecdotal stories – these
sake of it.	63	from full trips and more frequently without	were personal stories to
Regimented – there's	64	the crazy visuals seemed appealing.	people, not research, stories
a science to it	65		of how people were able to
	66		work their life out.
	67		
	68		*They had noticed benefits*
	69		*from full trips, but tolerance*
	70		*was a hinderance, they don't*
	71		*want to have to keep*
	72		*increasing the dose.*
	73		They were researching it, *not*
	74		*just taking it carelessly.*
	75		Microdosing was an
	76		alternative to having to do full
	77	UoBmicrodoseresearch	doses and becoming tolerant.
	78	ok thanks, and which psychedelic did you	They had benefitted from the
	79	chose to microdose?	full trips so were hoping to
	80		achieve the same with regular
	81	Participant10	microdosing, whilst also
	82	LSD	considering tolerance being
	83		an issue, and 'crazy visuals'.
	84		'Crazy' – *unlike what they*
	85		*have experience before,*
	86		*weird? It was appealing to*
	87	UoBmicrodoseresearch	*have the other benefits*
	88	and you've mentioned a bit of your regime	*without the visual, they didn't*
	89	there, but I just wondered if you could tell	*want them?*

APPENDIX 8 – Example of Collation of Themes and Participant Quotes

Microdosing is a catalyst that precipitates desirable beneficial effects - Microdosing acts as a catalyst - Microdosing does what it sets out to do - *Cognitive* - *Affective* - *Creative* - *Physical* - *Social*	Line 114: I have noticed that psilocybin has slightly different effect when it comes to creativity…LSD produced greater effect when it came to creativity and productivity (and cognitive) Line 406: Regards creativity. Well as a musician I rely heavily on creativity and I noticed that lsd really helped with that…Psilocybin helped with the internal and external…Whereas lsd helped with productivity and creativity…It was surprising to me such difference Line 298: Microdosing improved not only relationship with myself but with people around me…Becoming conscious of my own actions, thoughts. In return I become resistant to negativity, triggers both external and internal, increase of kindness if I may say. Line 327: I would say pretty stable and good. I had to stop microdosing as I was traveling for six months. And I must say it was quite hard to keep straight mind. By straight mind I mean the mind that microdosing helped to built…Guess if I microdosed longer I would have stronger hold of my own mind though it is something I am going to experiment next…See if prolong experience can end up in different result **Daniel PPT 4:** Line 79: I tend to be a lot more relaxed and focused at this peak time Line 122: I seem to remember things long forgotten, silly things not really relevant or useful. Line 233: The mushrooms are more calming for longer and more working in the background. Line 370: Yes definitely, but at the same time it's effortless too and flows naturally…. You don't have to push yourself to make the effort you just kind of react normally and less awkward Line 239: It's always clear headed on the mushrooms Line 119: Conversations with people, making eye contact, smiling more much more positive Line 248: I feel a lot more better and I have been more active and making an effort socially more but that's kind of also gone a bit backwards now too due to this year's covid situation. Line 338: The easiest way to explain the situation socially on the mushrooms would be similar in how I would use alcohol in the same situation years ago when drank…I'd find there was a stage where after a small amount of drinks people would loosen up a bit and start to relax and unwind. I'd though find I'd need to keep topping up on alcohol and eventually get very drunk…I would say the mushrooms on a microdose at a similar event socially would be a little similar to that first relaxing sensation, less anxious and more open…Its nor really an accurate comparison as the effects of alcohol and psilocybin are not the same but its the closest experience I can use to describe the feeling /situation Line 178: The mushrooms have helped more with the social anxiety but I see improvement in my anxiety in general too and also don't feel depressed either

APPENDIX 9 - Researcher's Reflections and Methodological Considerations

In terms of completing this study, the method had both its benefits and limitations. At first, I found the interviews quiet anxiety provoking, as this was a novel way of conducting research and it was also on a current, but illegal topic, and as such I wondered what would come up during the interviews. Furthermore, I was conscious that in considering my responses to the participants answers, I needed to demonstrate a neutral stance and ensure my questions were not leading or endorsing an illegal activity. For example, when participants told me of their experience, I did not want to say something such as 'oh interesting, that sounds really good'. However, I equally did not want to sound robotic and lose the human element of conversation whilst participants were conveying what was important to their experience. When completing face-to-face interviews, it can perhaps feel easier to show interest and empathy without being leading, but in text, this element is lost. At first this felt like a balancing act. However, over time and as my confidence grew, I was able to find the balance and I felt that this method of interviewing allowed participants to open up about something illegal, and perhaps be less guarded about their experiences than face-to-face interviewing may allow for. In a similar sense, it also felt harder to build rapport, and this was noted by Ben, although he was understanding of why that may be and also valued the interview being anonymous. I therefore made a conscious effort to be engaging and understanding, whilst not being leading or biased.