

UNIVERSITY OF
OXFORD

Liam Alexander MacKenzie Myles

Thesis submitted in partial fulfilment of the degree of Doctor of Clinical Psychology (DClinPsych)

St Cross College

University of Oxford

Word Count

Systematic Review: 6990

Service Improvement Project: 5026

Theory Driven Research Project: 5061

Executive Summary: 818

Connecting Reflective Narrative: 989

Contents

Word Count 3

Contents 5

Systematic Literature Review Abstract 11

Service Improvement Project Abstract 13

Theory Driven Research Project Abstract 15

Systematic Review and Meta-Analysis Examining the Effect of Obsessive-Compulsive Disorder on Associative Learning 17

- Abstract 19
- Introduction 21
  - Rationale 21
  - Objectives 24
- Method 25
  - Eligibility Criteria 25
  - Information Sources 25
  - Search Strategy 26
  - Selection Process 27
  - Data Collection 28
  - Data Items 28
  - Risk of Bias Assessment 33
  - Effect Measures 34
  - Synthesis Methods 34
  - Reporting Bias Assessment 37
  - Certainty Assessment 38
- Results 39
  - Study Selection 39
  - Study Characteristics 40
  - Risk of Bias 56
  - Results of Individual Studies, Syntheses and Reporting Bias Assessments 68
  - Certainty of Evidence 84
- Discussion 87
  - Limitations 90
  - Implications 91
  - Future Research 91

Conclusion 92
References 93
Optimising Psychological Therapy Waitlists: Evaluating and Updating DIALOG+ 115
Abstract 117
Introduction 119
Method 123
Participants 123
Materials 123
Design 124
Patient and Public Involvement 125
Procedure 125
Epistemology 126
Qualitative Analysis 126
Quantitative Analysis 127
Thematic Analysis 129
Improving Memory and Practice of Coping Skills 134
Connecting with Understanding Others 134
Cultivating Flexible and Predictable Check in Calls 135
Empowerment to Cultivate Progress 136
Service Improvement Initiative 137
Results 143
Discussion 149
Limitations 151
Implications 152
Future Research 152
Conclusions 153
References 155
The Role of Aberrant Salience of Internal Representations in Hallucinations 165
Abstract 167
Introduction 169
Methods 173
Participants 173
Design 174
Measures and Materials 174
Procedure 178
Statistical Analysis 179

Results ... 181
Demographic and Clinical Information ... 181
Correlations Between SPEQ Subdimensions and Stimuli ... 189
The Effect of Group and Stimuli on Reaction Times ... 191
Discussion ... 195
Latent Inhibition and Mediated Latent Inhibition ... 195
Hallucinations and Aberrant Salience of Internal Representations ... 196
Psychosis and Aberrant Salience ... 197
Psychosis and Associative Learning ... 199
Limitations ... 199
Future Research ... 201
Conclusion ... 201
References ... 203
Executive Summary ... 219
Connecting Reflective Narrative ... 223
Acknowledgements ... 227
Appendices Contents ... 229
Appendix 1 – Database Search Terms ... 231
Appendix 2 – Data Extraction Tool ... 235
Appendix 3 – Meta-Analysis Data Selection and Extraction Procedures ... 236
Appendix 4 – Data Extracted from Articles ... 247
Appendix 5 - Kmet et al.'s (2004) Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields ... 251
Appendix 6 - Inter-Rater Reliability of the Risk of Bias Assessment ... 261
Appendix 7 – Sensitivity Analyses ... 264
Associative Learning ... 264
Avoidance Learning ... 268
Extinction ... 269
Outcome Devaluation ... 270
Reversal Learning ... 271
Appendix 8 - Grading of Recommendations Assessment, Development and Evaluation ... 272
Appendix 9 – Study Summary Statistics for Each Meta-Analysis ... 274
Associative Learning ... 274
Avoidance Learning ... 278
Extinction ... 279
Generalisation ... 280

Latent Inhibition 281
Outcome Devaluation 282
Pavlovian-to-Instrumental Transfer 283
Reversal Learning 284
Appendix 10 – Clinical Psychology Review Author Guidelines 286
Appendix 11 – DIALOG+ 320
Appendix 12 – Phase A Questionnaire 321
Appendix 13 – Phase B Questionnaire 323
Appendix 14 – Patient and Public Informed Questionnaire Development 326
Appendix 15 – Telephone Call Protocol 328
Appendix 16 – Reflections on Thematic Analysis 334
Appendix 17 – Additional Themes and Subthemes 336
Appendix 18 – Participant Suggestions and Corresponding Actions 338
Appendix 19 – Skill of the Month Email Template 349
Appendix 20 – Skill of the Month Emails 350
Appendix 21 – Accessing Extra Support Email Template 362
Appendix 22 – Accessing Extra Support Emails 363
Appendix 23 – Service Improvement Project Supplementary Analyses 365
Supplementary Analysis 1 – Tests of Assumptions of Tests Examining Demographic Differences Between Groups 365
Supplementary Analysis 2 – Tests of Assumptions of Tests Examining the Effect of Phase on Questionnaire Scores 366
Supplementary Analysis 3 – ANCOVAs Examining the Effect of Phase on Questionnaire Scores Whilst Controlling for Time Since Completing the Psychoeducation Groups 366
Supplementary Analysis 4 – Examining the Effect of Practicing a Coping Skill on Questionnaire Scores 367
Appendix 24 – Journal Guidelines 369
Appendix 25 – Lay Summary 394
Appendix 26 – Milton Keynes Community Mental Health Team Response to the Service Improvement Project 396
Appendix 27 – Recruitment Locations 397
Appendix 28 - Specific Psychotic Experiences Questionnaire (Ronald et al., 2014) 399
Appendix 29 – Participant Information Sheet 405
Appendix 30 – Participant Consent Form 414
Appendix 31 – Bot Check 417
Appendix 32 – Participant Debrief Sheet 418
Appendix 33 – Theory Driven Research Project Supplementary Analyses 421

Supplementary Analysis 1 – Tests of Assumptions of Statistical Tests Examining Group Differences in Demographic and Clinical Information 421
Supplementary Analysis 2 – Quantile-Quantile Plot for The Effect of Group and Stimuli on Reaction Times 424
Supplementary Analysis 3 – The Effect of Group and Stimuli on Reaction Times When Controlling for Smoking and Alcohol Consumption 425
Supplementary Analysis 4 - Post-Hoc Tests Examining the Effect of Stimuli on Reaction Times 427
Supplementary Analysis 5 – Corrected Pairwise Comparisons Between Reaction Times to Stimuli 428
Supplementary Analysis 6 - Post-Hoc Tests Examining the Effect of Group on Reaction Times for Each Stimulus 430
Supplementary Analysis 7 – Additional Power Analyses 431
Supplementary Analysis 8 – Cronbach's (1951) Alpha Coefficients for Specific Psychotic Experiences Questionnaire Dimensions 432
Appendix 34 – Schizophrenia Bulletin Author Guidelines 433

Systematic Literature Review Abstract

Background

This systematic review and meta-analysis evaluated whether people with obsessive-compulsive disorder (OCD) exhibit differences in associative learning.

Methods

CINAHL, Cochrane Library, EMBASE, PsycINFO, PubMed, Scopus and Web of Science were searched for published peer-reviewed studies in English quantitatively examining the relationship between OCD and associative phenomena in humans. 5508 titles, 124 abstracts and 55 full texts were reviewed; citation searching identified 15 records. Sixty-six studies were included. Risk of bias was assessed and random-effects meta-analysis synthesised results.

Results

Obsessive-compulsive disorder was associated with differences in extinction ($g = .37$, $p < .001$, $k = 15$) and mediated associative learning ($k = 1$), but not associative learning ($g = -.12$, $p = .26$, $k = 49$), avoidance learning ($g = 1.5$, $p = .13$, $k = 4$), blocking ($k = 1$), generalisation ($g = -.2$, $p = .16$, $k = 3$), latent inhibition ($g = .45$, $p = .39$, $k = 3$), outcome devaluation ($g = .26$, $p = .33$, $k = 7$), Pavlovian-to-instrumental transfer ($g = -.24$, $p = .22$, $k = 2$) or reversal learning ($g = .16$, $p = .36$, $k = 10$). The quality of evidence was moderate for reversal learning, low for associative learning, extinction, generalisation, latent inhibition and Pavlovian-to-instrumental transfer, and very low for avoidance learning and outcome devaluation.

Conclusion

Low quality evidence suggests people with OCD learn that stimuli no longer predict negatively valanced outcomes slower than healthy controls. Future research must elucidate the cause of attenuated extinction and its specificity to OCD.

Keywords: Obsessive-Compulsive Disorder, Associative Learning, Extinction, Mediated Associative Learning, Meta-Analysis

Service Improvement Project Abstract

Background

Milton Keynes Community Mental Health Team uses DIALOG+ to support individuals on therapy waitlists. This study aimed to evaluate clients' and clinicians' experiences of DIALOG+-informed check-in calls and improve clients' competence and confidence using coping skills, clients' empowerment to achieve goals and the helpfulness of DIALOG+.

Method

Forty-one clients rated their memory of and confidence using coping skills, their empowerment to achieve goals whilst on therapy waitlists and the helpfulness of DIALOG+; clinicians also rated the helpfulness of DIALOG+. Clients and clinicians were asked for suggestions to improve each dimension. After implementing a service improvement initiative based on these suggestions, 34 clients completed the same measures.

Qualitative Results

Clients wanted to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists.

Service Improvement Initiative

Clients were invited to revise coping skills during check-in calls, sent monthly emails outlining coping skills, offered copies of psychoeducation materials, sent emails regarding the referral processes for services where they could seek extra support, encouraged to seek support from friends and/or family, offered face-to-face check-in appointments, invited to collaboratively set agendas for check-in calls and offered the opportunity to opt-out of check-in calls. Clinicians

arranged check-in calls two weeks in advance and reframed the ‘waitlist’ as the ‘pre-therapy list.’

Quantitative Results

Following the service improvement initiative, there were no differences in clients’ memory of and confidence using coping skills, clients’ perceived ability to progress towards goals or the perceived helpfulness of check-in calls by both clients and staff.

Discussion

Whilst clients wanted to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists, the service improvement initiative failed to produce measurable changes in clients’ memory of and confidence using coping skills, clients’ perceived ability to progress towards goals or the helpfulness of check-in calls. Explanations for these findings, study limitations and clinical and research implications are discussed.

Keywords: DIALOG+, Community Mental Health Team, Therapy Waitlists, Check-In Calls, Coping Skills

Theory Driven Research Project Abstract

Background and Hypotheses

The salience hypothesis posits that aberrant salience of stimuli contributes to unusual beliefs in people with psychosis. Specifically, this theory argues that people with psychosis afford an exaggerated prominence to redundant, unimportant objects. The salience hypothesis also suggests that hallucinations in people with psychosis stem from aberrant salience of 'internal representations' (i.e., thoughts, mental images or memories). The current study investigated whether people with psychosis who hallucinate exhibit aberrant salience of internal representations and whether people with psychosis, irrespective of whether they hallucinate, show aberrant salience of external stimuli.

Study Design

One hundred and eleven adults were recruited, with equal numbers of participants without psychosis ('controls'), with psychosis who hallucinate ('hallucinators') and with psychosis who do not hallucinate ('non-hallucinators'). To assess symptoms of psychosis, participants completed the Specific Psychotic Experiences Questionnaire, which measures paranoia, hallucinatory experiences, cognitive disorganisation, grandiosity and anhedonia. Participants also completed paradigms examining latent inhibition, to examine whether people with psychosis show aberrant salience of external stimuli, and 'mediated latent inhibition,' to determine whether hallucinators exhibit aberrant salience of internal representations.

Results

Participants in all groups exhibited both latent inhibition and mediated latent inhibition, but no differences were observed between controls, hallucinators and non-hallucinators.

Conclusions

Contrary to the predictions of the salience hypothesis, these findings suggest that people with psychosis who currently hallucinate do not exhibit aberrant salience of internal representations and that people with psychosis, irrespective of whether they hallucinate, do not demonstrate aberrant salience of external stimuli.

Keywords: Psychosis, Hallucinations, Aberrant Salience, Mediated Latent Inhibition, Latent Inhibition, Associative Learning



UNIVERSITY OF OXFORD

Systematic Review and Meta-Analysis Examining the Effect of Obsessive-Compulsive Disorder on Associative Learning

Liam Alexander MacKenzie Myles

St Cross College, University of Oxford

Email address: liam.myles@psy.ox.ac.uk

Contact Number: 07530 659 997

Date of Submission: 10/03/2025

Supervisors: Professor Paul Salkovskis and Dr Matthew Hotton

Collaborators: Francis Madden

Word Count: 6979

Student Number: 1455838

Journal: Clinical Psychology Review

Abstract

Background

This systematic review and meta-analysis evaluated whether people with obsessive-compulsive disorder (OCD) exhibit differences in associative learning.

Methods

CINAHL, Cochrane Library, EMBASE, PsycINFO, PubMed, Scopus and Web of Science were searched for published peer-reviewed studies in English quantitatively examining the relationship between OCD and associative phenomena in humans. 5508 titles, 124 abstracts and 55 full texts were reviewed; citation searching identified 15 records. Sixty-six studies were included. Risk of bias was assessed and random-effects meta-analysis synthesised results.

Results

Obsessive-compulsive disorder was associated with differences in extinction ($g = .37$, $p < .001$, $k = 15$) and mediated associative learning ($k = 1$), but not associative learning ($g = -.12$, $p = .26$, $k = 49$), avoidance learning ($g = 1.5$, $p = .13$, $k = 4$), blocking ($k = 1$), generalisation ($g = -.2$, $p = .16$, $k = 3$), latent inhibition ($g = .45$, $p = .39$, $k = 3$), outcome devaluation ($g = .26$, $p = .33$, $k = 7$), Pavlovian-to-instrumental transfer ($g = -.24$, $p = .22$, $k = 2$) or reversal learning ($g = .16$, $p = .36$, $k = 10$). The quality of evidence was moderate for reversal learning, low for associative learning, extinction, generalisation, latent inhibition and Pavlovian-to-instrumental transfer, and very low for avoidance learning and outcome devaluation.

Conclusion

Low quality evidence suggests people with OCD learn that stimuli no longer predict negatively valanced outcomes slower than healthy controls. Future research must elucidate the cause of attenuated extinction and its specificity to OCD.

Keywords: Obsessive-Compulsive Disorder, Associative Learning, Extinction, Mediated Associative Learning, Meta-Analysis

Introduction

Obsessive-compulsive disorder (OCD) is characterised by obsessions (recurrent and persistent intrusive thoughts, mental images and/or impulses) and/or compulsions (repetitive mental/physical behaviours). These are typically time consuming, distressing and/or impair daily functioning (APA, 2013). Meta-analyses suggest lifetime prevalence rates of 1.3% (Fawcett et al., 2020), with estimates ranging from 0.4%-8% across cultures (Angst et al., 2004; Fontenelle et al., 2006; Horwath & Weissman, 2000; Sasson et al., 1997). Obsessive-compulsive disorder is associated with reduced quality of life (Macy et al., 2013), relationship problems (Abbey et al., 2007) and emotion regulation difficulties (Yap et al., 2018), and costs Britain over five billion pounds each year in treatment and employment absenteeism (Kochar et al., 2023). These findings underscore the importance of accurate theoretical conceptualisations of OCD alongside effective and efficient interventions.

Rationale

Several theories have implicated aberrant associative/avoidance learning in the development of OCD. Rachman (1971) posited that obsessions are intrusive thoughts which have become associated with anxiety through classical conditioning, to which those with OCD become increasingly sensitised due to this association (Groves & Thompson, 1970). Compulsions, Rachman (1971) argued, represent attempts to avoid/escape these obsessions, maintained by operant conditioning. The termination of obsessions and their accompanying anxiety negatively reinforces compulsions, preventing extinction. Also, it has been argued that impaired extinction (learning that a stimulus that previously predicted an outcome no longer

predicts the outcome) in people with OCD leads to persistent obsession-compulsion associations (Cooper & Dunsmoor, 2021). For example, an individual with anxiety-provoking thoughts of infection (obsession) may repeatedly wash (compulsion). Washing may engender relief, through stopping the obsession and producing a perceived reduction in the risk of infection, reinforcing washing as a response to this obsession (Mowrer, 1939). Furthermore, the noxious quality of this obsession may increase the salience of subsequent thoughts about infection, increasing the likelihood relief will subsequently be sought through washing.

Researchers subsequently distinguished between goal-directed behaviour, where a response is intended to elicit an outcome, and habitual behaviour, where a stimulus elicits a response (Dickinson & Weiskrantz, 1997). Graybiel & Rauch (2000) argued that individuals with OCD exhibit a bias towards habitual behaviour at the expense of goal-directed behaviour. This theory is typically examined using outcome devaluation procedures (see **Table 2** for explanation). However, it is unclear whether this originates from deficits in goal-directed behaviour, excessive habitual behaviour, impairments in a system controlling the relative contribution of goal-directed and habitual learning to behaviour (Gillan & Robbins, 2014) or more rapid transitions from goal-directed to habitual behaviour (Anderson, 1982). More recently, Gillan and Robbins (2014) argued that people with OCD experience irresistible urges to perform habitual compulsions and that obsessions, rather than precipitating compulsions (e.g., Salkovskis, 1985), reflect post-hoc, threat-based explanations of compulsive behaviour that reduce cognitive dissonance (Festinger, 1962). They suggested the avoidant nature of compulsions precludes exposure to information disconfirming these explanations, perpetuating obsessions.

Several other theories posit that people with OCD exhibit aberrations in associative learning. Some argued people with OCD generalise associative learning more readily, culminating in unrelated stimuli/contexts triggering obsessions and compulsions (Krypotos & Engelhard,

2020; Lissek et al., 2005). This proposition has been examined using generalisation, mediated associative learning and Pavlovian-to-instrumental transfer (PIT) procedures (see **Table 2** for explanations). Others have suggested people with OCD struggle to attend to irrelevant information (Enright & Beech, 1993) and to now-relevant, but previously irrelevant, information (Elsner et al., 2022); these theories have been studied using latent inhibition (LI) and reversal learning paradigms, respectively (see **Table 2** for explanations). Finally, it has been argued that inhibitory learning (learning that a stimulus predicts the absence of an outcome) is attenuated in people with OCD (Craske et al., 2014); however, various associative mechanisms may underpin inhibitory learning (Bouton, 1993; Rescorla & Wagner, 1972) and research has not examined whether these mechanisms are affected.

Systematic reviews find mixed evidence that OCD is associated with aberrant associative learning. Reviewing 12 studies, Cooper and Dunsmoor (2021) tentatively concluded people with OCD show enhanced fear conditioning (learning that a stimulus is associated with a feared outcome) and attenuated extinction relative to healthy controls. Reviewing 11 studies, Steuber and McGuire (2022) argued that people with OCD exhibit attenuated extinction and diminished differential learning (differentiating between stimuli that predict threatening and safe outcomes) relative to healthy controls. Unlike Cooper and Dunsmoor (2021), however, they did not identify evidence of enhanced fear conditioning. These reviews did not include studies examining the relationship between OCD and other associative phenomena or those comparing the effects of OCD on associative phenomena to other anxiety disorders; the latter is important because any relationship between OCD and associative learning may be due to confounding elevations in anxiety.

Objectives

This systematic review and meta-analysis aimed to evaluate whether people with OCD exhibit abnormalities in associative phenomena, including associative learning, avoidance learning, blocking, extinction, generalisation, LI, mediated associative learning, outcome devaluation, PIT and reversal learning (see **Table 2** for explanations). As there are few published reports, studies comparing people with high and low OCD symptoms, irrespective of whether they had an OCD diagnosis, were included. Studies comparing the effects of OCD on associative phenomena to other anxiety disorders were particularly important, as these address whether aberrations are specific to OCD.

Method

This review was pre-registered (see osf.io/zn24a & Prospero ID: CRD42024503260) and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Page et al., 2021a, 2021b).

Eligibility Criteria

All included studies 1) examined whether associative phenomena varied between people with and without OCD and/or with greater and fewer OCD symptoms, 2) used either quantitative or mixed methodology and 3) were published in a peer-reviewed journal, to minimise the inclusion of low-quality studies. Studies were excluded if they 1) included participants with learning disabilities and/or neurodegenerative disorders, due to their confounding effects on learning, 2) used only neuroimaging measures, due to their limited validity and reliability (Poldrack et al., 2017), 3) lacked extractable data, 4) were not published in English and 5) were published in non-transparent predatory journals that publish misleading/false information (Grudniewicz et al., 2019); to avoid predatory journals, only studies published in journals with an impact factor were included.

Information Sources

On 28/01/2024, CINAHL (via EBSCOhost), the Cochrane Library, the Cochrane Central Register of Controlled Trials, EMBASE (via Ovid), PsycINFO (via Ovid), PubMed, Scopus

and Web of Science were searched for relevant studies. On 27/06/2024, additional relevant studies were identified through searching reference lists of (i.e., backward searching) and using Google Scholar to identify studies citing (i.e., forward searching) all studies identified through databases. These searches were re-run on 10/03/2025 to identify additional relevant studies.

Search Strategy

Titles, abstracts and keywords were searched for the keywords in **Table 1**. As previous reviews discussed differences in associative learning, extinction and PIT (Cooper & Dunsmoor, 2021; Steuber & McGuire, 2022), these keywords were included under the concept, 'associative learning.' Other keywords pertaining to associative learning, including 'operant,' 'classical' and 'Pavlovian conditioning,' were included to broaden results.

Table 1

Search Concepts and Keywords

Number	Concept	Keywords
1	Obsessive-Compulsive Disorder	"Obsessive Compulsive Disorder" OR "Obsessive-Compulsive Disorder" OR OCD
2	Associative Learning	"Associat* Learning" OR Extinction OR Conditioning OR Conditioned OR Classical OR Pavlovian OR Acquisition OR Instrumental OR Operant OR "Pavlovian-to-Instrumental Transfer" OR "Pavlovian to Instrumental Transfer"
3	Search	Concept 1 AND Concept 2

Keywords were peer-reviewed using the Peer Review of Electronic Search Strategies checklist (McGowan et al., 2016). To validate the search strategy (Lefebvre et al., 2019), keywords were entered into EMBASE and PsycINFO to confirm they identified all studies included in previous reviews. Variations in searches required by databases are detailed in **Appendix 1**. No restrictions were applied.

Selection Process

To improve reliability (Waffenschmidt et al., 2019; Wang et al., 2020), titles, abstracts and articles were screened by two independent reviewers. After removing duplicate articles, 5508

titles were screened for abstract review by LM, with 20% (1101) screened by FM. The reviewers exhibited 99.3% agreement and 'almost perfect' (McHugh, 2012) inter-rater reliability, $k = .822$, $p < .001$ (Cohen, 1960). LM reviewed all 124 abstracts for full article review, with 20% (25) screened by FM. The reviewers exhibited 92% agreement and almost perfect inter-rater reliability, $k = .839$, $p < .001$. LM reviewed all 55 articles for inclusion in the review, with 25% (14) screened by FM. The reviewers exhibited 100% agreement and perfect inter-rater reliability, $k = 1$, $p < .001$. When disagreements arose, consensus was reached through discussion; however, search criteria were not changed. Backward and forward searching revealed an additional six and 10 relevant studies, respectively, which were reviewed by LM.

Data Collection

All data was extracted by LM (see **Appendix 2**). LM and FM independently extracted sample sizes, means and standard deviations (SDs) from all 66 studies and exhibited 100% agreement. When data was missing, it was requested from authors via email a maximum of three times. Of the 43 studies where additional data was requested, 24 provided the data, eight were unable to provide the data and 11 did not respond (see **Appendix 3**).

Data Items

Relevant associative phenomena are defined in **Table 2**.

Table 2

Associative Phenomena

Associative Phenomenon	Definition
Associative Learning	Learning that a stimulus predicts an outcome.
Avoidance Learning	Learning to escape a stimulus that predicts an aversive outcome.
Blocking	The phenomenon that individuals learn that an outcome follows a stimulus less readily if the stimulus is presented concurrently with other stimuli that are already known to predict the outcome.
Contingency Degradation	A procedure in which the contingency between a stimulus and an outcome reduces.
Differential Learning	A procedure in which individuals learn to differentiate between two stimuli that predict different outcomes.
Extinction	A procedure in which a stimulus that previously predicted an outcome no longer predicts the outcome.
Generalisation	The phenomenon that learning about a stimulus-outcome relationship is applied to other stimuli similar to the conditioned stimulus (CS).

Associative Phenomenon	Definition
Inhibitory Learning	Learning that a stimulus predicts the absence of an outcome.
Instrumental/Operant Learning	Learning that actions produce outcomes.
Latent Inhibition	The phenomenon that learning that a stimulus predicts an outcome is impeded if the stimulus was previously presented in the absence of the outcome.
Mediated Associative Learning	The phenomenon that individuals learn that a stimulus (CS1), which is associated with another stimulus (CS2), predicts an outcome, by virtue of an association between CS2 and the outcome.
Outcome Devaluation	A procedure in which the value of a reward with which a stimulus is associated is reduced.

Associative Phenomenon	Definition
Pavlovian-to-Instrumental Transfer	The phenomenon that a stimulus that has been classically conditioned to a reward can influence responding to an operant stimulus that has been instrumentally conditioned to the same reward. For example, if a tone (Pavlovian CS) is associated with money (a reward) before individuals learn that pressing a button (operant CS) leads to money, individuals are subsequently more likely to press the button in the presence, as compared to the absence, of the tone.
Renewal	A procedure in which individuals learn that a stimulus that previously underwent extinction subsequently predicts the outcome with which it was originally associated.
Reversal Learning	A procedure in which individuals learn that a stimulus that previously did or did not predict an outcome subsequently does not or does predict an outcome, respectively.

All measures of associative phenomena operationalised in included studies are defined in **Table 3**. Where studies reported multiple relevant results, only one was included in each meta-analysis, to preserve assumptions of independence between results. Where studies had multiple

dependent variables (DVs), the 'primary DV,' as identified by the study's authors, was included in the meta-analysis (Page et al., 2021); where authors did not identify a primary DV, it was inferred. Due to the absence of a theoretical, evidential or methodological basis for favouring one DV or calculation method, all DVs were considered sufficiently homogeneous for inclusion in the meta-analyses.

Table 3

Dependent Variables

Dependent Variable	**Definition**
Accuracy	The percentage and/or number of correct and/or incorrect responses.
Anxiety Ratings	Self-report ratings of anxiety when in the presence and/or anticipating the delivery of unconditioned aversive stimuli.
Model Fit	The degree to which data conform to distributions predicted by equations.
Contingency Estimations	Self-report estimations of the strength of the relationship between the stimulus and outcome.
Pupillometry	A measure of the diameter of the pupil.
Reaction Time	The latency to respond to a stimulus.
Skin Conductance Response	A measure of the skin's electrical conductance.

Dependent Variable	Definition
Startle Response	The responsiveness of the muscles (e.g., the eye) to stimulation (e.g., a puff of air).
Unconditioned Stimulus Arousal	Self-report ratings of anxiety and/or fear evoked by aversive unconditioned stimuli.
Unconditioned Stimulus Expectancy	Self-report estimates of the likelihood of the unconditioned stimulus being presented.
Unconditioned Stimulus Occurrence	The frequency with which the US is delivered in instrumental designs.

The study name, associative phenomenon, group sample sizes, excluded sample size, type of control, OCD symptom assessment, comorbidities, medications, mean, SD and range of the age of the groups, gender distribution, ethnicity distribution, design, nature of conditioning (i.e., instrumental or Pavlovian), CS, unconditioned stimulus (US), CS-US contingency, DV, results, effect size, standard error, inclusion and exclusion criteria, pre-registration status and adherence, limitations and strengths were extracted (see **Appendix 4** for definitions). Missing data were logged in the extraction tool (see **Appendix 2**).

Risk of Bias Assessment

Kmet et al.'s (2004) quality assessment criteria (see **Appendix 5**) were used to evaluate each study's risk of bias. A three-point Likert scale was used to rate whether studies met, partially met or did not meet each criterion; items could also be rated 'not applicable' (NA). To ensure

reliability, 25% (14) of the 55 articles included in the review were rated by two independent reviewers. Kappa coefficients and percentage agreement between reviewers ranged from 0.8-1 and 91.7%-100%, respectively, indicating almost perfect inter-rater reliability across all dimensions (see **Appendix 6**). When disagreements arose, consensus was reached through discussion; however, criteria were not changed. Several additional criteria were assessed to determine risk of bias (see **Appendix 4**).

Effect Measures

Hedges' (1981) g was used to interpret the magnitude of effect sizes. Cohen (1988) posited that effect sizes of .2, .5 and .8 should be interpreted as small, medium and large effect sizes, respectively. Associative theory predicts that the effects of aberrations in learning are incremental (Haselgrove & Hogarth, 2013), entailing increasingly large effects on OCD over time. Therefore, 'small,' but statistically significant, effects would be consistent with the theory that aberrations in associative learning contribute to OCD (Rachman, 1971).

Synthesis Methods

Synthesis Eligibility

Separate meta-analyses examined the relationship between OCD and each associative phenomenon. Where studies examined multiple associative phenomena, they were included in all relevant meta-analyses. Studies were excluded from meta-analyses, but not narrative

syntheses, if they did not report or provide the data necessary to calculate effect sizes or lacked a control group.

Data Preparation

To calculate effect sizes, the sample sizes, means and SDs of both the OCD and control groups were extracted from studies. Where possible, means and SDs were estimated (with WebPlotDigitizer) using relevant graphs, if authors did not provide relevant data.

Displaying Results

Forest plots displayed meta-analytic effect size estimates and confidence intervals, in addition to effect sizes and CIs of individual studies. Funnel plots with contour lines indicating 95% CIs depicted effect size estimates of studies relative to their standard error to elucidate whether publication bias may have influenced meta-analyses.

Statistical Synthesis

Jamovi (2022) was used to meta-analyse the relationship between OCD and each associative phenomenon. Random-effects models were used to estimate meta-analytic effect sizes, standard errors (SEs), p values and 95% CIs because effect sizes likely vary across studies due to methodological and clinical variation. The restricted maximum-likelihood estimator was

used because it provides a relatively unbiased heterogeneity estimate and performs well with small samples (Borenstein et al., 2021; Viechtbauer, 2005). Where only two studies investigated a phenomenon, it was not possible to conduct a random-effects meta-analysis because the number of parameters exceeded the number of data points. Therefore, a fixed-effects meta-analysis was conducted because meta-analytic effect size estimates are more precise than those of single studies (Valentine et al., 2010). The significance threshold was .05. Narrative synthesis summarised the results and described potential sources of heterogeneity in studies excluded from meta-analyses.

Heterogeneity was assessed using I-squared (I^2), Tau-squared (T^2) and the Q statistic (Cooper et al., 2019); several indices were reported to aid transparency and provide a holistic overview of heterogeneity. Higgins and Thompson (2002) suggested I^2 values of 25%, 50% and 75% evidence small, moderate and large heterogeneity, respectively. Larger T^2 values indicate greater heterogeneity. Statistically significant Q tests indicate heterogeneity beyond that expected from sampling error. In meta-analyses including few studies, these tests may have had low power, inflating the risk of falsely concluding effect sizes were homogenous (Hedges & Pigott, 2001). Therefore, irrespective of whether there was 'statistically significant' heterogeneity, subgroup analyses investigated potential sources of heterogeneity.

Subgroup Analyses

Exploratory subgroup analyses were conducted using Q tests. All analyses used study-level variables, with each study included in only one subgroup. The effect of the type of conditioning procedure (i.e., Pavlovian or instrumental), US valence (e.g., rewarding, neutral, punishing or rewarding and punishing) and means of distinguishing between the OCD and control group

(i.e., whether the 'OCD group' was defined diagnostically or psychometrically) on the magnitude of effect size estimates was examined, unless insufficient variation in moderator variables prevented subgroup analyses. These analyses were conducted because previous research suggests these variables may moderate the effect of OCD on associative phenomena (Cooper & Dunsmoor, 2021; Steuber & McGuire, 2022).

Sensitivity Analyses

Where meta-analyses included more than three studies, they were iteratively re-calculated whilst excluding single studies, to determine the robustness of the results (see **Appendix 7**).

Reporting Bias Assessment

For each meta-analysis, a funnel plot, Egger et al.'s (1997) test and Fail-Safe N were used to evaluate the likelihood of missing studies (Page et al., 2019; Rosenthal, 1979). Asymmetry or skew in the funnel plot distribution, a statistically significant Egger's test and a relatively small Fail-Safe N was indicative of heterogeneity between studies and/or publication bias (Sterne et al., 2011). It was not possible to examine bias through comparing studies' methods to pre-registered protocols because no study was pre-registered.

Certainty Assessment

Where at least two studies examined the effect of OCD on an associative phenomenon, the Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria (Balshem et al., 2011) were used to examine the certainty of evidence (see **Appendix 8**). These criteria determine whether a group of studies provides 'high,' 'moderate,' 'low' or 'very low' evidence that meta-analytic effect size estimates are correct. LM and FM independently rated the GRADE criteria and exhibited 100% agreement.

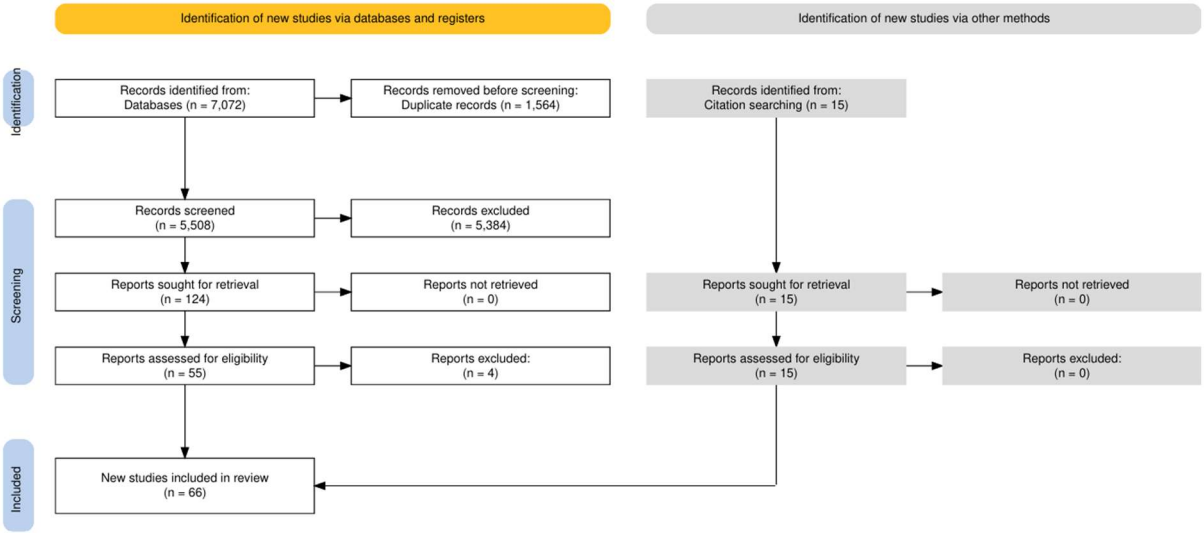
Results

Study Selection

As shown in **Figure 1** (Haddaway et al., 2022), database searches identified 7072 records, with 5508 titles remaining after de-duplication. One hundred twenty-four abstracts were reviewed, from which 55 papers were reviewed. Sixty-six papers were included in the review, with 15 identified through forward and backward searching and two identified when searches were re-run. Studies were predominantly excluded for not using associative procedures.

Figure 1

Study Selection



Study Characteristics

The characteristics of each study, studies excluded from meta-analyses and justifications for excluding studies are detailed in **Table 4**. In total, 1932 and 1974 participants with and without OCD, respectively, were included.

Table 4

Study Characteristics

Study	Associative Phenomenon	OCD Sample	Control Sample	OCD Age	Control Age	OCD Gender	Control Gender	Included in Meta-Analysis?	Results
Angelakis & Austin (2018)	Avoidance Learning	15	17	26.5 (5.1)	25.9 (5.0)	F: 46.7 M: 53.3	F: 58.8 M: 41.2	Yes	Compared to controls, people with OCD exhibited greater avoidance behaviour.
Apergis-Schoute et al. (2017)	Associative Learning	43	35	39.2 (13.2)	37.8 (13.7)	NR	NR	Yes	Compared to controls, people with OCD exhibited attenuated differential associative learning.

	Reversal Learning								Compared to controls, people with OCD exhibited attenuated differential reversal learning.
Armstrong & Olatunji (2017)	Associative Learning Extinction	32	30	20.2 (1.3)	20.4 (1.0)	F: 66.7 M: 33.3	F: 65.6 M: 34.4	Yes	Compared to controls, people with OCD exhibited no differences in associative learning. Compared to controls, people with OCD exhibited attenuated extinction, as measured by disgust towards and expectancy of the US.
Banca et al. (2024)	Associative Learning Outcome Devaluation	32	33	39.3 (12.5)	40.2 (11.7)	F: 59.4 M: 40.6	F: 57.6 M: 42.4	Yes	Compared to controls, people with OCD exhibited no differences in associative learning. Compared to controls, people with OCD responded in a more habitual than goal-directed manner.
Borelli et al. (2015)	Associative Learning	18	63	10.0 (1.6)	F: 44 M: 56	NA	NA	Yes	Compared to controls, people with OCD exhibited attenuated differential associative learning.

Bucci et al. (2007)	Associative Learning	30	30	25.7 (6.6)	25.6 (5.5)	F: 53.0 M: 47.0	NR	Yes	Compared to controls, people with OCD exhibited attenuated associative learning.
Cano et al. (2021)	Associative Learning Extinction	18	18	40.6 (11.9)	35.6 (10.0)	F: 61.1 M: 38.9	F: 44.4 M: 55.6	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in extinction.
De Kleine et al. (2023)	Associative Learning Avoidance Learning	33	47	35.2 (14.5)	38.3 (14.2)	F: 57.6 M: 42.4	F: 53.2 M: 46.8	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD attenuated avoidance learning.
Diniz et al. (2023)	Associative Learning Extinction	32	25	34.6 (9.6)	35.6 (13.1)	F: 56.7 M: 43.3	F: 62.5 M: 37.5	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in extinction.
Elsner et al. (2022)	Associative Learning	41	32	29.9 (8.5)	29.0 (7.5)	F: 61.0 M: 39.0	F: 53.1 M: 46.9	Yes	Compared to controls, people with OCD exhibited attenuated associative learning.

	Reversal Learning								Compared to controls, people with OCD did not exhibit differences in reversal learning.
Endrass et al. (2011)	Associative Learning	18	18	32.8 (8.9)	31.3 (9.4)	F: 50.0 M: 50.0	F: 50.0 M: 50.0	Yes	Compared to controls, people with OCD exhibited attenuated associative learning.
	Avoidance Learning								Compared to controls, people with OCD exhibited superior avoidance learning.
Ersche et al. (2011)	Associative Learning	19	19	35.4 (9.8)	32.7 (6.9)	F: 61.6 M: 38.9	F: 16.7 M: 83.3	No (1)	This study did not report whether associative learning varied between people with OCD and controls.
Exner et al. (2014) and Zetsche et al. (2015a; 2015b)	Associative Learning	30	30	29.2 (8.8)	29.0 (7.4)	F: 53.0 M: 47.0	F: 57.0 M: 43.0	Yes	Compared to controls, people with OCD exhibited attenuated associative learning on an epidemic, but not a weather, prediction associative learning task.
Foa et al. (1991)	Associative Learning	10	10	NR	NR	NR	NR	No (2)	Compared to controls, people with OCD did not exhibit differences in associative learning.

	Extinction								Compared to controls, people with OCD did not exhibit differences in extinction.
Fyer et al. (2020)	Associative Learning	41	64	29.0 (6.0)	28.0 (6.0)	F: 47.5 M: 52.5	F: 53.1 M: 46.9	No (2)	Compared to controls, people with OCD did not exhibit differences in differential learning.
	Extinction								Compared to controls, people with OCD did not exhibit differences in extinction.
	Renewal								Compared to controls, people with OCD exhibited superior renewal.
Geller et al. (2017)	Associative Learning	39	41	14.2 (2.3)	13.9 (2.7)	F: 54.0 M: 46.0	F: 49.0 M: 51.0	Yes	Compared to controls, people with OCD exhibited superior associative learning.
	Extinction								Compared to controls, people with OCD exhibited attenuated extinction.
Geller et al. (2019)	Associative Learning	64	0	12.8 (2.9)	F: 53.1 M: 46.9	NA	NA	No (3)	OCD symptoms did not correlate with associative learning.
	Extinction								OCD symptoms did not correlate with extinction.

Gillan et al. (2011)	Associative Learning Outcome Devaluation	21	30	43.1 (2.5)	NR	41.8 (2.3)	NR	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in outcome devaluation.
Gillan et al. (2014)	Associative Learning Outcome Devaluation	25	25	40.6 (13.5)	41.0 (13.2)	F: 66.0 M: 44.0	F: 66.0 M: 44.0	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD exhibited superior outcome devaluation.
Gillan et al. (2015)	Outcome Devaluation	37	33	38.1 (11.5)	37.4 (12.2)	F: 51.4 M: 48.6	F: 42.4 M: 57.6	Yes	Compared to controls, people with OCD exhibited superior outcome devaluation.
Gimenez et al. (2020)	Associative Learning Extinction	17	13	40.2 (NR)	36.9 (NR)	F: 58.8 M: 42.2	F: 61.5 M: 39.5	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in extinction.
Gottwald et al. (2018)	Associative Learning	36	36	16.6 (1.9)	16.6 (2.1)	F: 69.0 M: 31.0	F: 69.0 M: 31.0	Yes	Compared to controls, people with OCD exhibited attenuated associative learning.

	Outcome Devaluation								Compared to controls, people with OCD exhibited superior outcome devaluation.
Hansmeier et al. (2018)	Associative Learning	10	10	29.7 (7.6)	29.3 (8.6)	F: 60.0 M: 40.0	F: 60.0 M: 40.0	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning.
Hassoulas et al. (2014)	Avoidance Learning	7	12	NR	NR	NR	NR	Yes	Compared to controls, people with OCD exhibited greater avoidance learning.
Hearne et al. (2023)	Associative Learning	45	45	30.0 (7.6)	32.5 (8.7)	F: 53.3 M: 46.7	F: 60.0 M: 40.0	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning.
	Reversal Learning								Compared to controls, people with OCD did not exhibit differences in reversal learning.
Hiebert et al. (2020)	Associative Learning	14	16	26.1 (1.7)	24.5 (.7)	NR	NR	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning.
Hunt et al. (2022)	Associative Learning	39	39	NR	NR	NR	NR	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning.
	Generalisation								Compared to controls, people with OCD exhibited greater generalisation.

Joel et al. (2005)	Associative Learning	18	18	32.5 (10.6)	30.0 (7.1)	F: 61.1 M: 38.9	F: 66.7 M: 33.3	No (2)	Compared to controls, people with OCD did not exhibit differences in associative learning.
Kaczkurkin & Lissek (2013)	Associative Learning Generalisation	28	31	21.3 (3.1)	20.7 (3.9)	F: 57.1 M: 42.9	F: 71.0 M: 29.0	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD exhibited greater generalisation.
Kaplan et al. (2006)	Latent Inhibition	18	18	29.1 (4.5)	29.3 (4.3)	F: 16.7 M: 83.3	F: 16.7 M: 83.3	Yes	Compared to controls, people with OCD exhibited greater LI.
Kaufmann et al. (2013)	Associative Learning	19	19	34.8 (11.0)	34.9 (11.8)	F: 57.9 M: 42.1	F: 57.9 M: 42.1	Yes	People with OCD exhibited greater learning on loss-avoidance than reward trials, whereas controls exhibited greater learning on reward than loss-avoidance trials.
Kelmendi et al. (2016)	Associative Learning	26	23	32.9 (13.5)	31.6 (12.2)	F: 46.2 M: 53.8	F: 47.8 M: 52.2	Yes	Compared to controls, people with OCD exhibited a subtle attenuation of OCD.

Krypotos & Engelhard (2020)	Pavlovian to Instrumental Transfer	28	20	NR	NR	F: 89.3 M: 10.7	F: 65.0 M: 35.0	Yes	Compared to controls, people with OCD showed reduced PIT.
Leplow et al. (2002)	Associative Learning	15	15	NR	NR	F: 47.0 M: 53.0	F: 60.0 M: 40.0	No (2)	Compared to controls, people with OCD exhibited attenuated associative learning on a neutral, but not an OCD-specific, task.
Mandali et al. (2019)	Associative Learning	32	173	34.7 (13.4)	32.4 (12.8)	F: 56.2 M: 43.8	F: 53.2 M: 46.8	No (2)	Compared to controls, people with OCD exhibited slower and less accurate associative learning.
Marzuki et al. (2021)	Associative Learning Reversal Learning	50	53	NR	NR	F: 58.0 M: 42.0	F: 57.0 M: 43.0	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD exhibited attenuated reversal learning.
Marzuki et al. (2022)	Associative Learning	27	46	16.2 (1.7)	16.6 (1.8)	F: 60.9 M: 39.1	F: 66.7 M: 33.3	Yes	Compared to controls, people with OCD exhibited greater associative learning.

McGuire et al. (2016)	Associative Learning Extinction	19	22	13.3 (3.1)	12.6 (2.2)	F: 47.0 M: 53.0	F: 45.0 M: 55.0	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in extinction.
McLaughlin et al. (2015)	Associative Learning Extinction Renewal	37	28	42.5 (11.6)	41.2 (13.6)	F: 35.5 M: 64.5	F: 46.7 M: 53.3	No (2)	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in extinction. Compared to controls, people with OCD did not exhibit differences in renewal.
Milad et al. (2013)	Associative Learning Extinction	21	21	33.8 (2.5)	26.4 (1.1)	F: 66.6 M: 33.3	F: 52.4 M: 47.6	No (2)	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in extinction.
Morein-Zamir et al. (2010)	Associative Learning	18	18	35.9 (9.8)	32.7 (6.9)	F: 38.9 M: 61.1	F: 16.7 M: 83.3	Yes	Compared to controls, people with OCD exhibited attenuated associative learning.

Murphy et al. (2004)	Associative Learning	16	16	25.1 (5.4)	25.3 (2.6)	F: 100	F: 100	No (2)	Compared to controls, people with OCD exhibited attenuated associative learning with neutral, but not individually threatening, stimuli.
Nanbu et al. (2010)	Associative Learning Extinction	39	21	29.0 (10.3)	26.1 (4.8)	F: 69.2 M: 30.8	F: 47.6 M: 52.4	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD did not exhibit differences in extinction.
Nielen et al. (2009)	Associative Learning	29	28	31.5 (11.3)	24.4 (10.4)	F: 69.0 M: 31.0	F: 71.0 M: 29.0	No (2)	Compared to controls, people with OCD exhibited attenuated associative learning in early trials.
Novara et al. (2021)	Associative Learning Reversal Learning	24	23	31.0 (11.9)	27.0 (15.0)	F: 68.2 M: 31.8	F: 60.9 M: 39.1	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning. Compared to controls, people with OCD exhibited attenuated reversal.
O'Brien et al. (2019)	Associative Learning	13	0	31.6 (12.9)	NA	F: 46.2 M: 53.8	NA	No (3)	People with OCD exhibited associative learning.

Oades et al. (1996)	Blocking	13	29	16.3 (2.9)	18.0 (3.6)	F: 31.0 M: 69.0	F: 48.3 M: 51.7	No (2)	Compared to controls, people with OCD did not exhibit differences in blocking.
Peng et al. (2022)	Pavlovian to Instrumental Transfer	30	31	25.7 (7.0)	27.2 (9.1)	F: 30.0 M: 70.0	F: 35.0 M: 65.0	Yes	Compared to controls, people with OCD exhibited some evidence of attenuated PIT.
Pertich et al. (2020)	Associative Learning	29	29	12.6 (2.7)	12.6 (2.7)	F: 42.0 M: 58.0	F: 42.0 M: 58.0	Yes	Compared to controls, people with OCD did not exhibit differences in visual, auditory or audiovisual associative learning tasks.
	Generalisation								Compared to controls, people with OCD did not exhibit differences in visual, auditory or audiovisual generalisation tasks.
Pohlchen et al. (2021)	Associative Learning	37	56	27.9 (NR)	30.0 (NR)	F: 44.4 M: 55.6	F: 41.2 M: 58.8	Yes	Compared to controls, people with OCD did not exhibit differences in associative learning.
	Extinction								Compared to controls, people with OCD did not exhibit differences in extinction.

Remijnse et al. (2009)	Reversal Learning	21	27	34.0 (NR)	32.0 (NR)	F: 75.0 M: 25.0	F: 70.4 M: 29.6	Yes	Compared to controls, people with OCD did not exhibit differences in reversal.
Rouhani et al. (2019)	Mediated Associative Learning	19	22	30.0 (4.7)	27.6 (5.7)	F: 56.0 M: 44.0	F: 62.0 M: 38.0	No (4)	Compared to controls, people with OCD exhibited attenuated mediated associative learning for rewarding, but not punishing, stimuli.
Snorrason et al. (2016)	Outcome Devaluation	93		NA	NA	NA	NA	No (2)	Symptoms of OCD were associated with attenuated outcome devaluation.
Swerdlow et al. (1996)	Latent Inhibition	107	19	32.6 (NR)	24.7 (NR)	F: 57.9 M: 42.1	F: 61.7 M: 39.3	Yes	Compared to controls, people with OCD did not exhibit differences in LI.
Swerdlow et al. (1999)	Latent Inhibition	48	63	35.4 (NR)	26.7 (NR)	F: 46.0 M: 54.0	F: 51.0 M: 49.0	Yes	Compared to controls, people with OCD exhibited greater LI.
Szabó et al. (2013)	Reversal Learning	28	30	41.2 (8.3)	41.1 (9.0)	NR	NR	Yes	Compared to controls, people with OCD did not exhibit differences in reversal.
Tracy et al. (1999)	Associative Learning	20	22	NR	NR	NR	NR	No (2)	Compared to controls, people with OCD did not exhibit differences in associative learning.

	Extinction								Compared to controls, people with OCD did not exhibit differences in associative learning.
Vaghi et al. (2019)	Associative Learning	27	27	39.5 (10.7)	40.7 (11.3)	F: 48.1 M: 51.9	F: 51.9 M: 48.1	Yes	Compared to controls, people with OCD responded in a more habitual than goal-directed manner.
Valerius et al. (2008)	Reversal Learning	20	20	29.7 (8.3)	29.3 (7.9)	F: 55.0 M: 45.0	F: 55.0 M: 45.0	Yes	Compared to controls, people with OCD did not exhibit differences in reversal learning.
Verfaillie et al. (2016)	Reversal Learning	18	0	32.0 (9.9)	NA	F: 72.2 M: 27.8	NA	No (3)	People with OCD showed reversal learning.
Voon et al. (2015a)	Associative Learning	30	53	39.5 (13.9)	38.5 (14.1)	F: 66.7 M: 33.3	F: 66.7 M: 33.3	No (2)	Compared to controls, people with OCD responded in a more habitual than goal-directed manner when outcomes were rewarding. In contrast, compared to controls, people with OCD responded in a more goal-directed than habitual manner when outcomes were aversive.

	Reversal Learning	36	72						Compared to controls, people with OCD did not exhibit differences in reversal.
Voon et al. (2015b)	Associative Learning	23	31	35.7 (12.6)	36.9 (9.1)	F: 53.1 M: 46.9	F: 53.1 M: 46.9	No (2)	Compared to controls, people with OCD responded in a more habitual than goal-directed manner.
Wang et al. (2024)	Associative Learning	41	41	20.1 (1.9)	20.9 (2.1)	F = 68.3 M = 31.7	F = 53.7 M = 46.3	Yes	Compared to those with low contamination concerns, people with high contamination concerns exhibited greater associative learning.
	Extinction								Compared to those with low contamination concerns, people with high contamination concerns displayed attenuated extinction.
Yu et al. (2024)	Associative Learning	49	38	22.9 (6.1)	21.4 (2.4)	F = 51 M = 49	F = 65.8 M = 34.2	No (2)	Compared to controls, people with OCD did not exhibit differences in associative learning.
	Outcome Devaluation								Compared to controls, people with OCD exhibited attenuated outcome devaluation.

Note. 'Age' details the mean and SD (in brackets) of the age of the groups. 'Gender' describes the percentage of people identifying as 'female' (F), 'male' (M) and 'other' (O) in the groups. Where relevant, cells indicate where information is NA or not reported (NR). The 'Included in Meta-Analysis' column details whether studies were included in meta-analyses. Codes indicate whether a study was excluded because 1) it investigated the effect of dopamine agonists and antagonists on associative learning in people with OCD, confounding learning with concurrent medication use, 2) the data required to compute effect sizes were not available in the paper or upon request from the authors, 3) it did not include a control group or 4) it was the only study investigating the associative phenomenon.

Risk of Bias

The risk of bias for each study is displayed in **Table 5**. Across phenomena, most studies adequately described objectives, participant characteristics and analyses, and derived conclusions consistent with results. However, many entailed issues regarding their design, selection of participants, outcome measures and reporting of results. For example, many failed to counterbalance stimuli and ensure that US (e.g., shock) intensity was identical between groups, rendering differences between groups attributable to differences in stimulus salience. Also, many used opportunity sampling methods, with demographic differences (e.g., medication use and socioeconomic status) between groups. Most failed to articulate evidence for the reliability and validity of measures. Many failed to report relevant statistics, including estimates of central tendency and variance, tests of the assumptions of parametric tests and the results of statistical tests with corrections applied for multiple comparisons. All but two (Marzuki et al., 2022; Wang et al., 2024) failed to report a power analysis, engendering difficulty in determining whether sample sizes were appropriate, and all studies suffered from confounds. Where relevant, risks of bias specific to each phenomenon are detailed below.

Blocking

Participants commenced the blocking phase after reaching a learning criterion (Oades et al., 1996). The authors did not report whether groups differed in the number of trials taken to reach this criterion, potentially confounding the results by differential experience of the CS-US contingency.

Extinction

Four studies neglected reporting whether groups exhibited differences in learning prior to the extinction phase (Armstrong & Olatunji, 2017; Cano et al., 2021; McGuire, 2016; Pohlchen et al., 2021), rendering results attributable to differences in prior learning affecting extinction. Also, three studies did not have a control group (Geller et al., 2019; McGuire, 2016; Nanbu et al., 2010), engendering difficulty in determining whether extinction was aberrant. Finally, two studies changed the context during extinction, perhaps resulting in participants retrospectively re-evaluating the first context or learning that the second context constitutes an occasion setter (Miller & Matzel, 1988), confounding mechanisms affecting learning.

Latent Inhibition

Designs were confounded by learned irrelevance, conditioned inhibition, negative priming and novel pop-out effects (Myles et al., 2023).

Outcome Devaluation

Three studies (Gillan et al., 2011, 2015; Yu et al., 2024) verbally instructed, rather than trained, participants that outcomes were devalued, potentially suggesting effects were non-associative (Dickinson & Balleine, 1994).

Pavlovian-to-Instrumental Transfer

Both studies neglected reporting whether groups exhibited differences in learning prior to the PIT phase, rendering results attributable to differences in prior learning affecting PIT.

Reversal Learning

Three studies (Szabó et al., 2013; Valerius et al., 2008; Verfaillie et al., 2016) did not report whether groups exhibited differences in learning prior to the reversal learning phase, rendering results attributable to differences in prior learning affecting reversal learning. Also, Verfaillie et al. (2016) did not have a control group, engendering difficulty in determining whether reversal learning was aberrant.

Table 5

Risk of Bias

	Associative Learning										
Study	**D1**	**D2**	**D3**	**D4**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**
Apergis-Schoute et al. (2017)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Partial	Partial	Partial	Yes
Armstrong & Olatunji (2017)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Banca et al. (2024)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Borelli et al. (2015)	Yes	Partial	Partial	Yes	Partial	Partial	No	Yes	Partial	Partial	Partial
Bucci et al. (2007)	Yes	No	Partial	No	Partial	Partial	Yes	Yes	Partial	Yes	Yes
Cano et al. (2021)	Partial	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Partial	Partial	Yes
De Kleine et al. (2023)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Diniz et al. (2023)	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Elsner et al. (2022)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	Yes
Endrass et al. (2011)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	No	Partial	Partial	Partial
Ersche et al. (2011)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Partial	Yes

Study	D1	D2	D3	D4	D8	D9	D10	D11	D12	D13	D14
Exner et al. (2014) and Zetsche et al. (2015a; 2015b)	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Foa et al. (1991)	Yes	Yes	Partial	No	Partial	Partial	Partial	No	Partial	Partial	Yes
Fyer et al. (2020)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Geller et al. (2017)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Geller et al. (2019)	Yes	Yes	NA	Yes	Yes	Partial	Yes	Yes	Partial	Partial	Yes
Gillan et al. (2011)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Gillan et al. (2014)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Gimenez et al. (2020)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Partial	Yes	Yes
Gottwald et al. (2018)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	Yes
Hansmeier et al. (2018)	Yes	Partial	Yes	Yes	Yes	No	Yes	Yes	Partial	Yes	Yes
Hearne et al. (2023)	Yes	Yes	Yes	Yes	Partial	Partial	Partial	No	Partial	Partial	Yes
Hiebert et al. (2020)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Hunt et al. (2022)	Yes	Yes	Yes	NA	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Joel et al. (2005)	Yes	Yes	No	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes

Study	D1	D2	D3	D4	D8	D9	D10	D11	D12	D13	D14
Kaczkurkin & Lissek (2013)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Kaufmann et al. (2013)	Yes	Partial	Partial	Yes	Partial	Partial	Yes	Partial	Partial	Partial	Yes
Kelmendi et al. (2016)	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Leplow et al. (2002)	Yes	Yes	No	Partial	Yes	Partial	Yes	No	Partial	Partial	Yes
Mandali et al. (2019)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Marzuki et al. (2021)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Marzuki et al. (2022)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial	Partial	Partial	Yes
McGuire et al. (2016)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	No	No	Partial	Yes
McLaughlin et al. (2015)	Yes	Partial	Partial	Yes	Yes	Partial	Partial	Partial	Partial	Yes	Partial
Milad et al. (2013)	Yes	Partial	Partial	Yes	Yes	Partial	Partial	No	Partial	Partial	Partial
Morein-Zamir et al. (2010)	Yes	Partial	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	Yes
Murphy et al. (2004)	Yes	Yes	Yes	Yes	No	Partial	Yes	No	Partial	Partial	Yes
Nanbu et al. (2010)	Yes	Partial	Yes	Yes	Partial	Partial	Yes	Partial	No	Yes	Partial
Nielen et al. (2009)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	No	Partial	Yes	Yes
Novara et al. (2021)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes

Study	D1	D2	D3	D4	D8	D9	D10	D11	D12	D13	D14
O'Brien et al. (2019)	Yes	Partial	Yes	Yes	Partial	Partial	Yes	Yes	No	Yes	Partial
Pertich et al. (2020)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Pohlchen et al. (2021)	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Tracy et al. (1999)	Yes	Yes	Yes	Partial	Partial	Partial	No	No	No	Partial	Partial
Vaghi et al. (2019)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Yes	Yes
Voon et al. (2015a)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Partial	Partial	Yes	Yes
Voon et al. (2015b)	Yes	Yes	Partial	Partial	Yes	Partial	Yes	Partial	Partial	Yes	Yes
Yu et al. (2024)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Yes	Yes
Wang et al. (2024)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes

Avoidance Learning

Study	D1	D2	D3	D4	D8	D9	D10	D11	D12	D13	D14
Angelakis & Austin (2018)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
De Kleine et al. (2023)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Endrass et al. (2011)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	No	Partial	Partial	Partial
Hassoulas et al. (2014)	Yes	Partial	Yes	No	Yes	Partial	Yes	No	Partial	Partial	Yes

Blocking											
Study	**D1**	**D2**	**D3**	**D4**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**
Oades et al. (1996)	Yes	Partial	Yes	Yes	Partial	Partial	Yes	No	No	Partial	Yes
Extinction											
Study	**D1**	**D2**	**D3**	**D4**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**
Armstrong & Olatunji (2017)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Cano et al. (2021)	Partial	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Partial	Partial	Yes
Diniz et al. (2023)	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Foa et al. (1991)	Yes	Yes	Partial	No	Partial	Partial	Partial	No	Partial	Partial	Yes
Fyer et al. (2020)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Geller et al. (2017)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Geller et al. (2019)	Yes	Yes	NA	Yes	Yes	Partial	Yes	Yes	Partial	Partial	Yes
Gimenez et al. (2020)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Partial	Yes	Yes
McGuire et al. (2016)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	No	No	Partial	Yes
McLaughlin et al. (2015)	Yes	Partial	Partial	Yes	Yes	Partial	Partial	Partial	Partial	Yes	Partial

Study	D1	D2	D3	D4	D8	D9	D10	D11	D12	D13	D14
Milad et al. (2013)	Yes	Partial	Partial	Yes	Yes	Partial	Partial	No	Partial	Partial	Partial
Nanbu et al. (2010)	Yes	Partial	Yes	Yes	Partial	Partial	Yes	Partial	No	Yes	Partial
Pohlchen et al. (2021)	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Tracy et al. (1999)	Yes	Yes	Yes	Partial	Partial	Partial	No	No	No	Partial	Partial
Wang et al. (2024)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes

Generalisation

Study	D1	D2	D3	D4	D8	D9	D10	D11	D12	D13	D14
Hunt et al. (2022)	Yes	Yes	Yes	NA	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Kaczkurkin & Lissek (2013)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Pertich et al. (2020)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes

Latent Inhibition

Study	D1	D2	D3	D4	D8	D9	D10	D11	D12	D13	D14
Kaplan et al. (2006)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Swerdlow et al. (1996)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	No	Partial	Partial	Yes
Swerdlow et al. (1999)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	No	Partial	Partial	Yes

Mediated Associative Learning											
Study	**D1**	**D2**	**D3**	**D4**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**
Rouhani et al. (2019)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Partial
Outcome Devaluation											
Study	**D1**	**D2**	**D3**	**D4**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**
Banca et al. (2024)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Gillan et al. (2011)	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Gillan et al. (2014)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Gillan et al. (2015)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Partial	Yes
Gottwald et al. (2018)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	Yes
Snorrason et al. (2016)	Partial	Partial	Partial	Partial	Partial	Partial	Yes	No	No	Partial	Yes
Yu et al. (2024)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Partial	Partial	Yes	Yes
Pavlovian-to-Instrumental Transfer											
Study	**D1**	**D2**	**D3**	**D4**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**
Krypotos & Engelhard (2020)	Yes	Yes	Yes	Partial	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Peng et al. (2022)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes

Reversal Learning											
Study	**D1**	**D2**	**D3**	**D4**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**
Apergis-Schoute et al. (2017)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Partial	Partial	Partial	Yes
Elsner et al. (2022)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	Yes
Hearne et al. (2023)	Yes	Yes	Yes	Yes	Partial	Partial	Partial	No	Partial	Partial	Yes
Marzuki et al. (2021)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Novara et al. (2021)	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Remijnse et al. (2009)	Yes	Partial	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	Yes
Szabó et al. (2013)	Yes	Yes	Partial	Partial	Partial	Partial	Yes	No	Partial	Partial	Yes
Valerius et al. (2008)	Partial	Yes	Partial	Yes	Yes	Partial	Partial	Yes	Partial	Yes	Yes
Verfaillie et al. (2016)	Yes	No	No	Yes	Yes	Partial	Yes	Yes	Partial	Yes	Yes
Voon et al. (2015a)	Yes	Yes	Yes	Yes	Partial	Partial	Yes	Partial	Partial	Yes	Yes

Note. Dimensions are defined below. As they were 'NA' to all included studies, dimensions five, six and seven were excluded. D1: 'Question or objective sufficiently described?'; D2: 'Design evident and appropriate to answer study question?'; D3: 'Method of subject selection (and comparison group selection, if applicable) or source of information/input variables (e.g., for decision analysis) is described and appropriate?'; D4: 'Subject (and comparison group, if applicable) characteristics or input variables/information (e.g., for decision analyses) sufficiently described?';

D8: ‘Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?’; D9: ‘Sample size appropriate?’; D10: ‘Analysis described and appropriate?’; D11: ‘Some estimate of variance (e.g., confidence intervals, standard errors) is reported for the main results/outcomes (i.e., those directly addressing the study question/objective upon which the conclusions are based)?’; D12: ‘Controlled for confounding?’; D13: ‘Results reported in sufficient detail?’; D14: ‘Do the results support the conclusions?’

Results of Individual Studies, Syntheses and Reporting Bias Assessments

The meta-analyses, subgroup analyses, range of meta-analytic effect size estimates indicated by sensitivity analyses and reporting bias assessments are described. Sample sizes, means and SDs of studies included in each analysis can be found in **Appendix 9**. All data were extracted from papers, unless otherwise specified in **Appendix 3**.

Associative Learning

Thirty-four studies, encompassing 987 and 1078 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder was not associated with statistically reliable differences in associative learning, g = -.12, SE = .10, p = .26, 95% CI [-.31, .08]. There was large heterogeneity, I^2 = 79.25%, T^2 = .27, Q(33) = 135.03, p < .001, but the meta-analytic effect size estimate was not affected by the type of conditioning procedure, g = .04, SE = .19, p = .85, 95% CI [-.33, .40], US valence, g = -.02, SE = .12, p = .89, 95% CI [-.24, .21], or means of distinguishing between the OCD and control group, g = .05, SE = .27, p = .86, 95% CI [-.47, .57]. Nevertheless, heterogeneity may stem from variation in designs, sample characteristics, sample sizes and confounds (e.g., lack of counterbalancing). Effect size estimates ranged from g = -.05 to g = -.14 in the sensitivity analyses, suggesting the results are relatively robust. The funnel plot, Egger's test, t = -3.14, p = .002, and the Fail-Safe N of 20 indicated risk of publication bias.

Fifteen studies, encompassing 434 and 555 participants with and without OCD, respectively, were excluded from the meta-analysis. Five (Leplow et al., 2002; Mandali et al., 2019; Murphy

et al., 2004; Nielen et al., 2009; Voon et al., 2015b) and ten (Ersche et al., 2011; Foa et al., 1991; Fyer et al., 2020; Geller et al., 2019; Joel et al., 2005; Leplow et al., 2002; Mandali et al., 2019; McLaughlin et al., 2015; Milad et al., 2013; Murphy et al., 2004; Nielen et al., 2009; O'Brien et al., 2019; Tracy et al., 1999; Voon et al., 2015; Yu et al., 2024) of these studies reported OCD was and was not associated with differences in associative learning, respectively. However, Nielen et al. (2009) identified differences in earlier, but not later, trials, potentially indicating learning differences are ephemeral. Also, whilst Leplow et al. (2002) and Murphy et al. (2004) concluded people with OCD exhibited reduced associative learning for neutral, but not threatening, stimuli, they did not counterbalance the tasks, with the neutral task always preceding the threatening task. Therefore, people with OCD may have learnt more slowly but achieved similar learning overall. Also, Mandali et al. (2019) and Voon et al. (2015b) used computational modelling, perhaps affording greater sensitivity in detecting associative learning differences. Finally, studies concluding OCD is associated with differences in associative learning typically conducted numerous statistical tests, often without correcting for multiple comparisons, culminating in difficulty determining the false-positive rate (Simmons et al., 2011).

Figure 2

Associative Learning Forest Plot

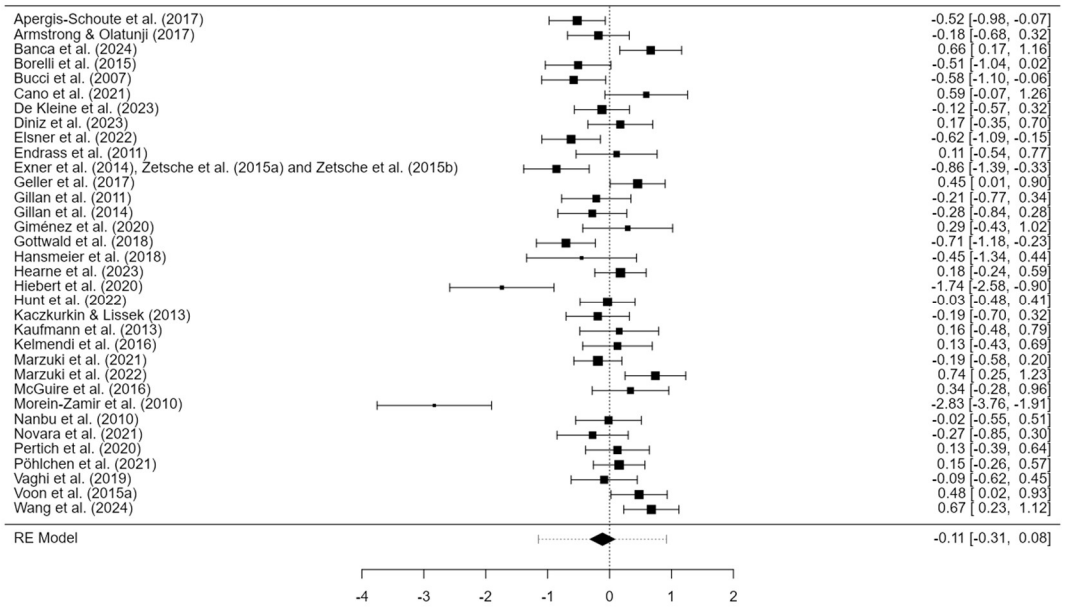
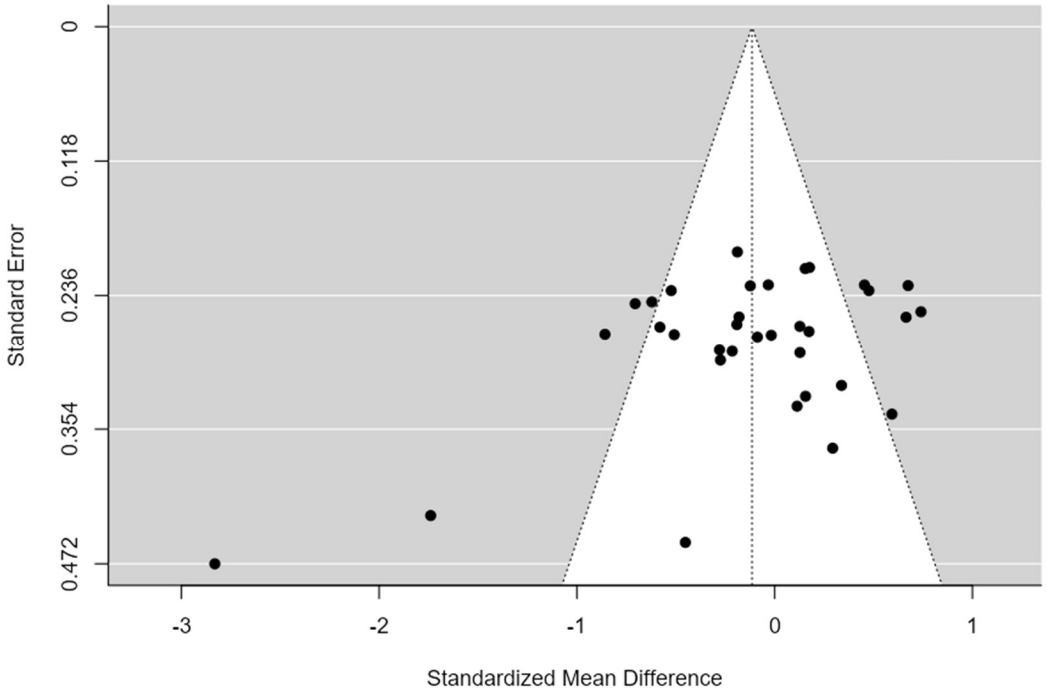


Figure 3

Associative Learning Funnel Plot



Avoidance Learning

All four studies, encompassing 73 and 94 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder was not associated with statistically reliable differences in avoidance learning, g = 1.50, SE = 1.00, p = .13, 95% CI [-.45, 3.55]. There was large heterogeneity, I^2 = 96.13%, T^2 = 3.77, Q(3) = 52.26, p < .001, but the meta-analytic effect size estimate was not affected by the means of distinguishing between the OCD and control group, g = 2.42, SE = 1.74, p = .17, 95% CI [-1.02, 5.85]. Nevertheless, heterogeneity may stem from variation in designs, sample characteristics, sample sizes and confounds. Effect size estimates ranged from g = .53 to g = 2.14 in the sensitivity analyses, suggesting results are heavily influenced by single studies. The funnel plot, Egger's test, t = 3.51, p < .001, and the Fail-Safe N of 36 indicated risk of publication bias.

Figure 4

Avoidance Learning Forest Plot

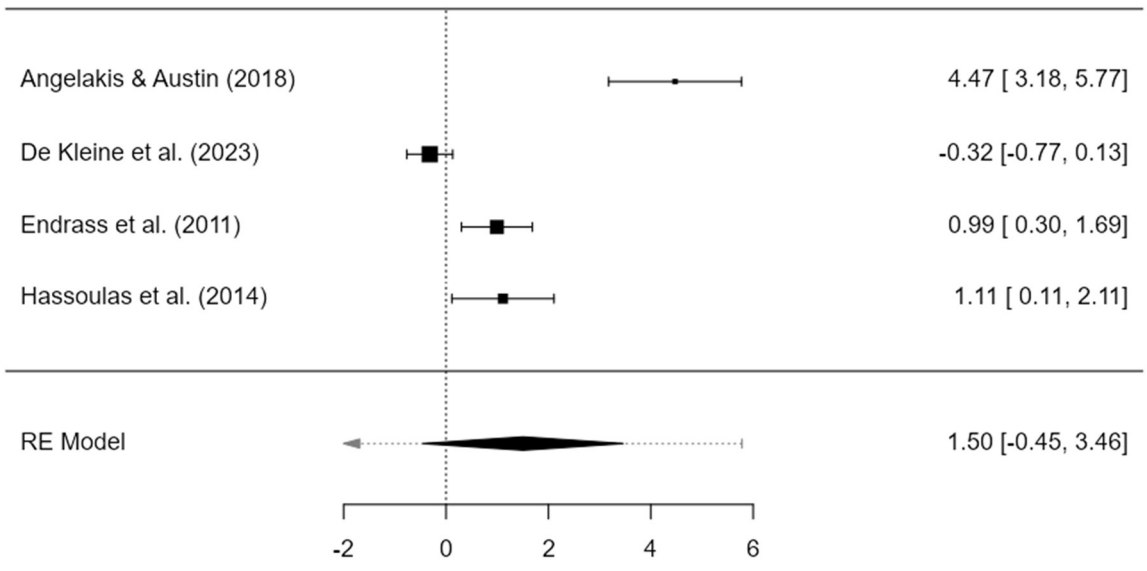
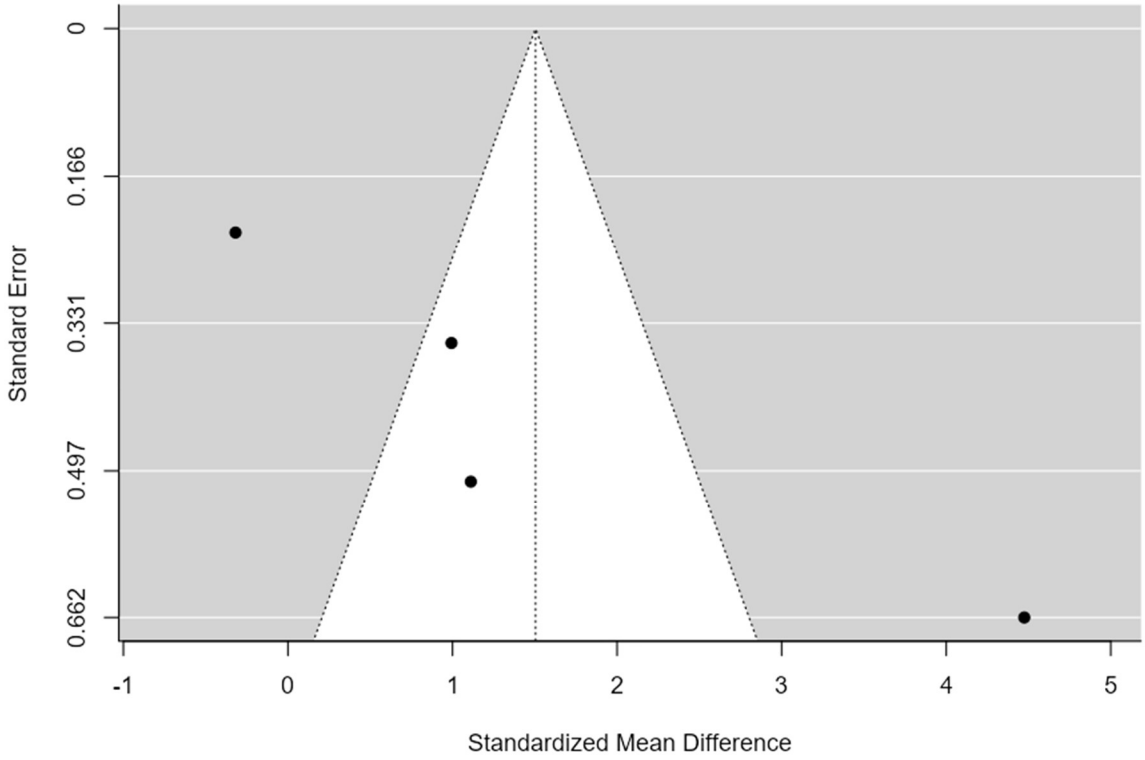


Figure 5

Avoidance Learning Funnel Plot



Blocking

One study, encompassing 13 and 29 people with and without OCD, respectively, investigated blocking (Oades et al., 1996), which indicated OCD was not associated with differences in blocking.

Extinction

Nine studies, encompassing 274 and 267 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder had a small-medium deleterious effect on extinction, $g = .37$, $SE = .09$, $p < .001$, 95% CI [.19, .54]. There was low heterogeneity, $I^2 = 0\%$, $T^2 = 0$, $Q(8) = 4.45$, $p = .82$. Effect size estimates ranged from $g = .30$ to $g = .41$ in the sensitivity analyses, suggesting the results are relatively robust. The funnel plot, Egger's test, $t = -.44$, $p = .66$, and the Fail-Safe N of 46 indicated low risk of publication bias.

Six studies (Foa et al., 1991; Fyer et al., 2020; Geller et al., 2019; McLaughlin et al., 2015; Milad et al., 2013; Tracy et al., 1999), encompassing 211 and 152 participants with and without OCD, respectively, were excluded from the meta-analysis. None found evidence that OCD is associated with differences in extinction. However, Geller et al. (2019) lacked a control group, reporting only that people with OCD exhibit extinction. Also, the risk of bias was generally higher in narratively synthesised, compared to meta-analysed, studies, suggesting they entailed greater threats to validity. Moreover, many narratively synthesised studies entailed small samples sizes, suggesting they were statistically underpowered.

Figure 6

Extinction Forest Plot

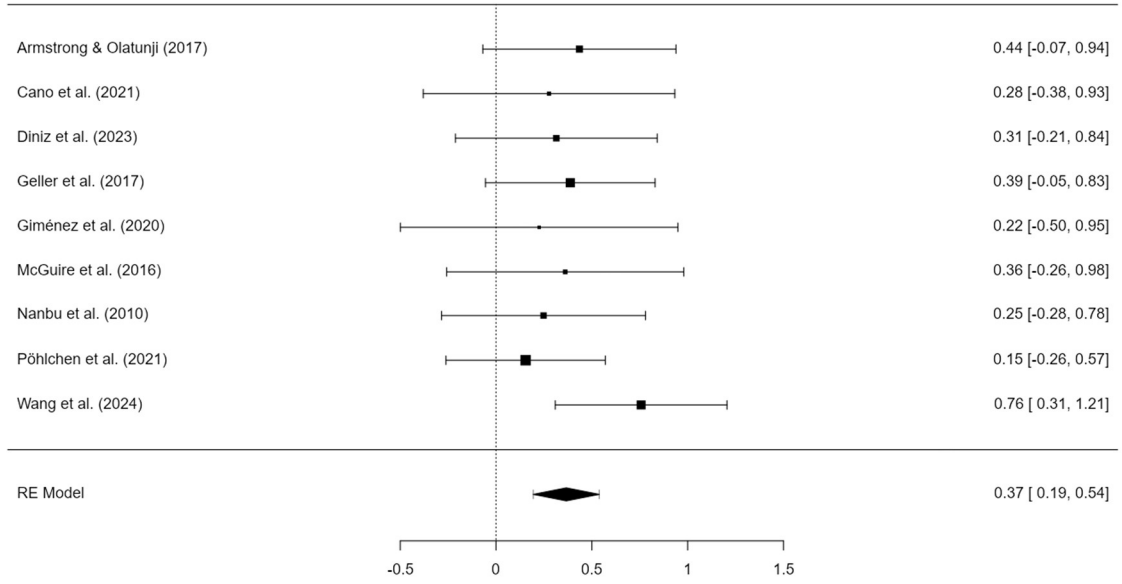
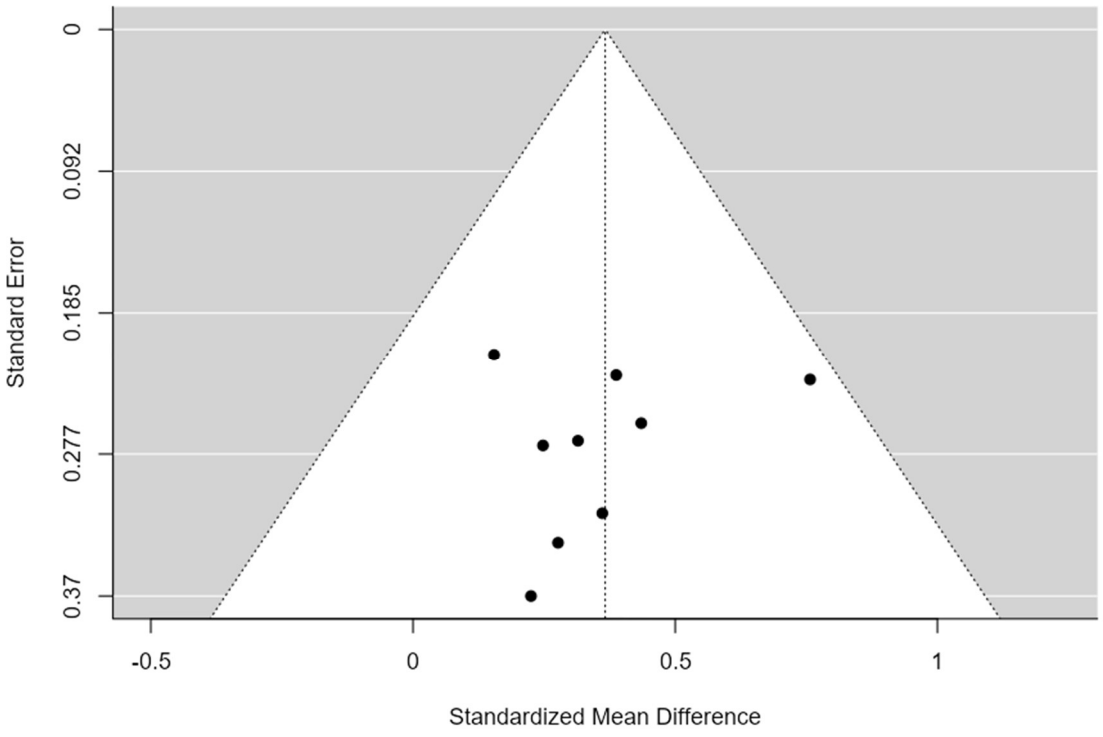


Figure 7

Extinction Funnel Plot



Generalisation

All three studies, encompassing 96 and 99 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder was not associated with statistically reliable differences in generalisation, g = -.20, SE = .14, p = .16, 95% CI [-.49, .08]. There was low heterogeneity, I^2 = 0%, T^2 = 0, Q(2) = .19, p = .91. The funnel plot, Egger's test, t = -.42, p = .67, and the Fail-Safe N of 0 indicated low risk of publication bias.

Figure 8

Generalisation Forest Plot

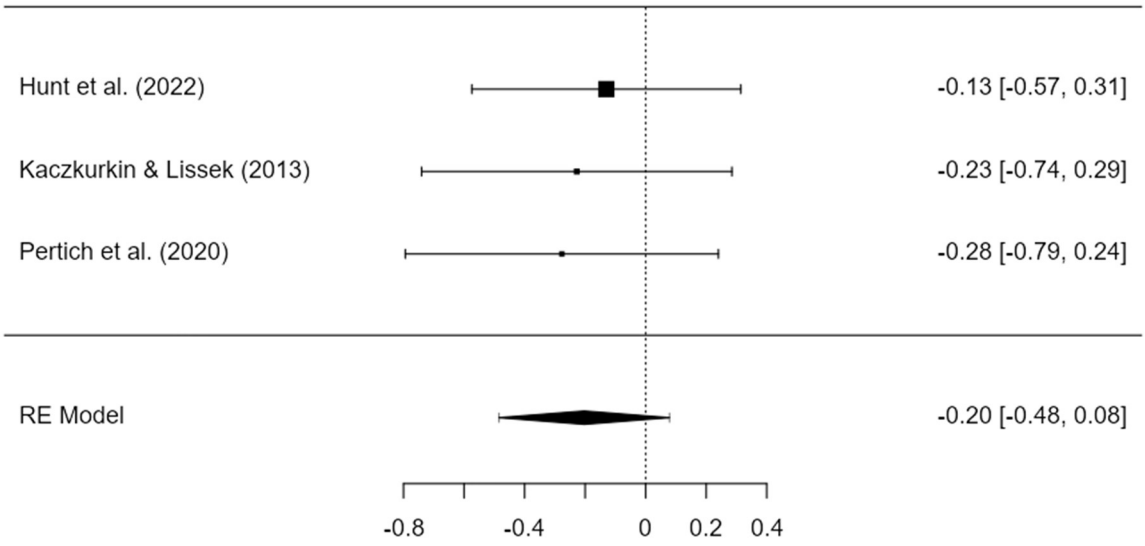
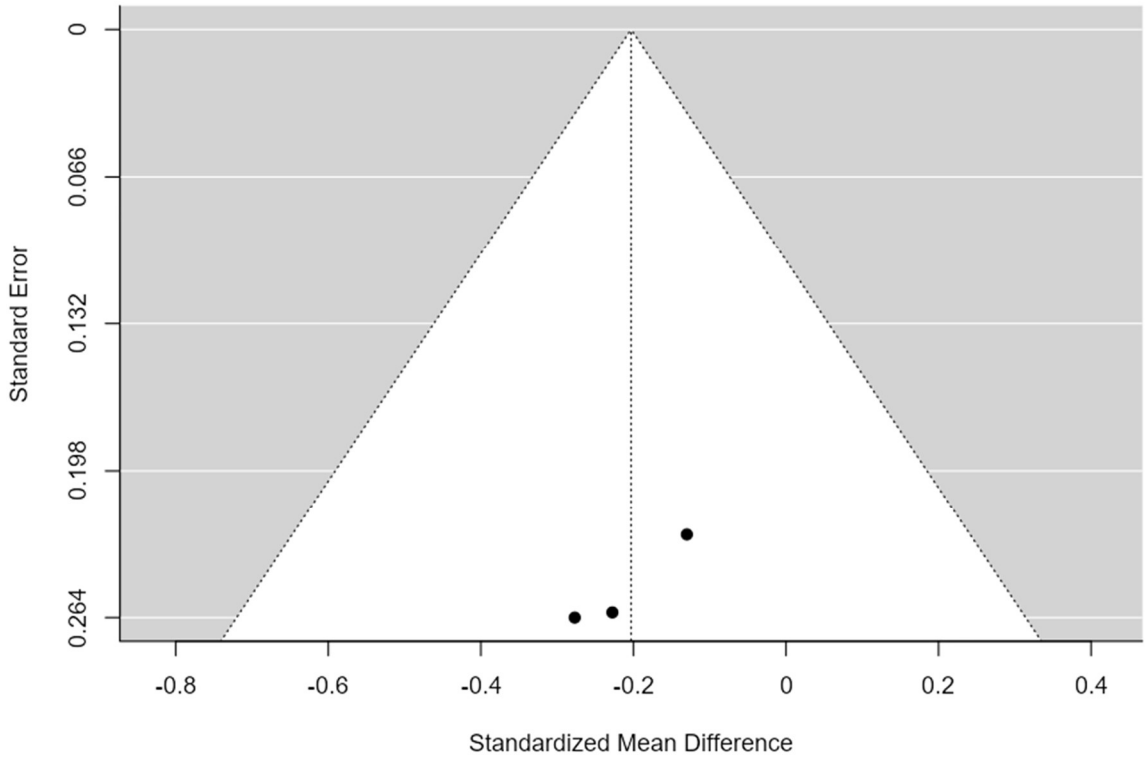


Figure 9

Generalisation Funnel Plot



Latent Inhibition

All three studies, encompassing 173 and 100 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder was not associated with statistically reliable differences in LI, g = .45, SE = .52, p = .39, 95% CI [-.57, 1.46]. There was high heterogeneity, I^2 = 91.48%, T^2 = .73, Q(2) = 27.77, p < .001, which may stem from variation in sample sizes and confounds (e.g., learned irrelevance, conditioned inhibition, negative priming and novel pop-out effects). The funnel plot, Egger's test, t = -.10, p = .92, and the Fail-Safe N of 9 indicated low risk of publication bias.

Figure 10

Latent Inhibition Forest Plot

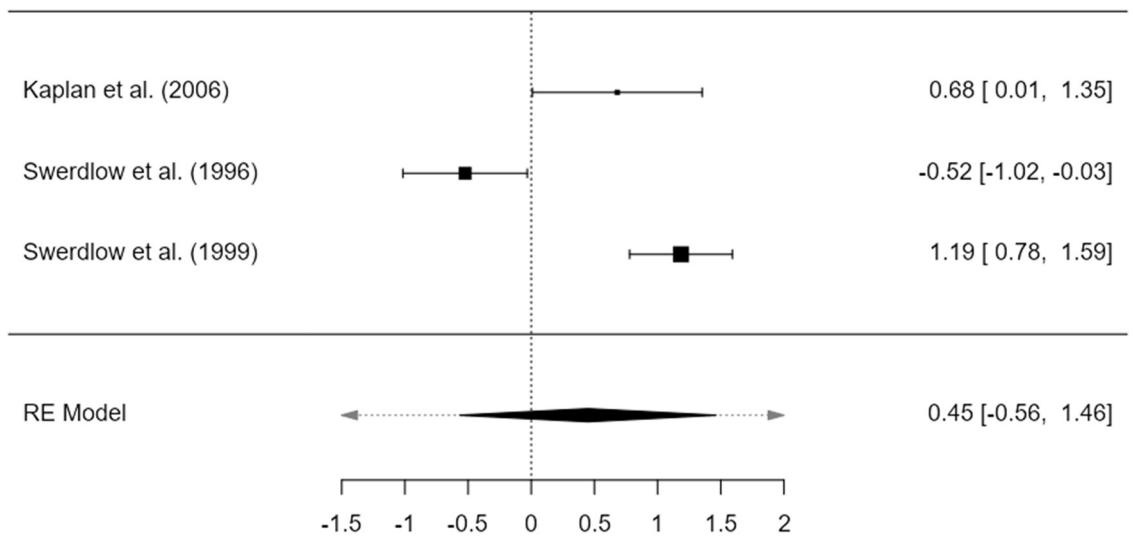
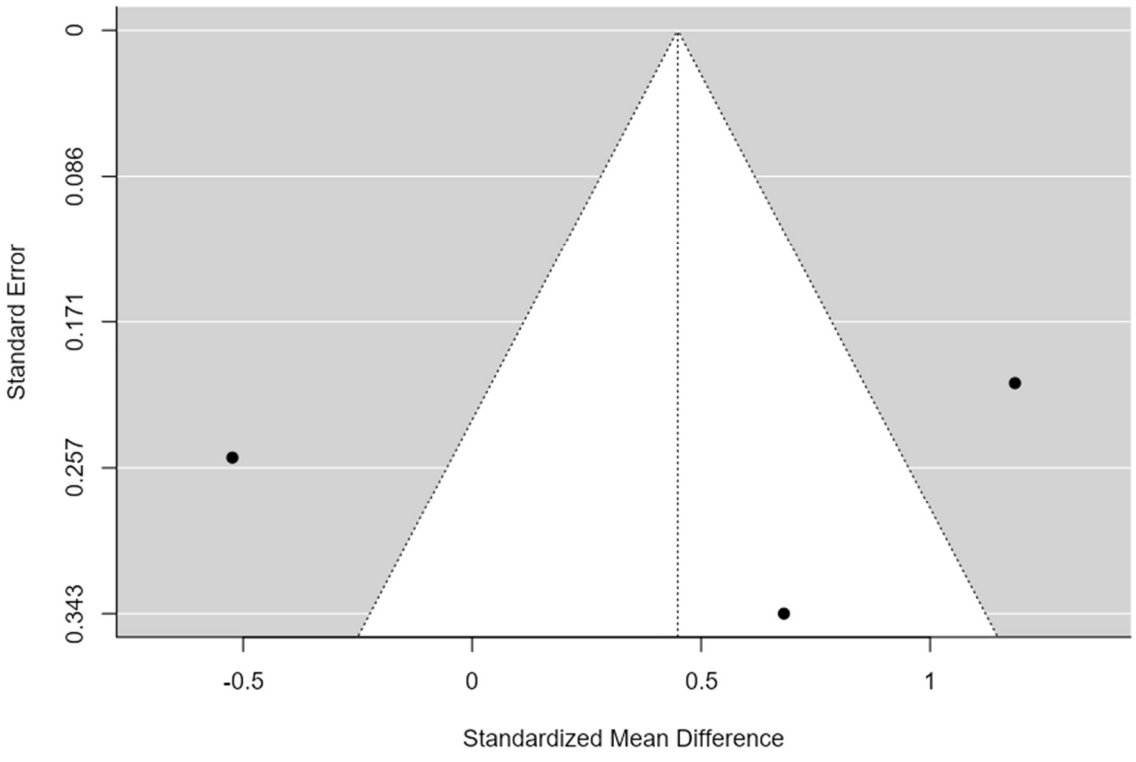


Figure 11

Latent Inhibition Funnel Plot



Mediated Associative Learning

One study (Rouhani et al., 2019), encompassing 19 and 22 people with and without OCD, respectively, suggested OCD attenuated mediated associative learning for rewarding, but not punishing, stimuli. However, these results stemmed from people with OCD performing below chance, unlike controls who performed at chance, suggesting they responded incongruently with their learning.

Outcome Devaluation

Five studies, encompassing 151 and 157 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder was not associated with statistically reliable differences in outcome devaluation, g = .26, SE = .27, p = .33, 95% CI [-.27, .79]. There was high heterogeneity, I^2 = 81.14%, T^2 = .30, Q(4) = 21.70, p < .001, but the meta-analytic effect size estimate was not affected by US valence, g =.09, SE = .41, p = .83, 95% CI [-.72, .90]. Nevertheless, heterogeneity may stem from variation in designs (e.g., verbally instructing, rather than training, outcome devaluation), sample characteristics, sample sizes and confounds. Also, some studies used computational modelling to quantify dependence on habitual and goal-directed behaviour; as this was not possible meta-analytically, alternative DV choice may have led to heterogeneous results. Effect size estimates ranged from g = .16 to g = .51 in the sensitivity analyses, suggesting the results are moderately influenced by single studies. The funnel plot, Egger's test, t = -.08, p = .93, and the Fail-Safe N of 5 indicated low risk of publication bias.

Two studies were excluded from the meta-analysis, with one encompassing 93 participants (Snorrason et al., 2016) and the other including 49 and 38 people with and without OCD (Yu et al., 2024), respectively. Contrasting meta-analytic results, Snorrason et al. (2016) and Yu et al. (2024) reported OCD symptoms and a diagnosis of OCD, respectively, were associated with reduced outcome devaluation. Removing Banca et al.'s (2024) study from the meta-analysis led to a 'statistically significant' effect (see **Appendix 7**), even after correcting for multiple comparisons. They trained participants over a month, whereas all other studies were conducted within a day. Large differences in the duration of training may indicate Banca et al.'s (2024) study was insufficiently homogeneous for meta-analysis, tentatively suggesting OCD would otherwise be associated with attenuated outcome devaluation. Alternatively, unlike all meta-analysed studies, which included OCD and control groups, Snorrason et al. (2016) correlated OCD symptoms with outcome devaluation in students without OCD, potentially producing differences between meta-analysed and narratively synthesised results.

Figure 12

Outcome Devaluation Forest Plot

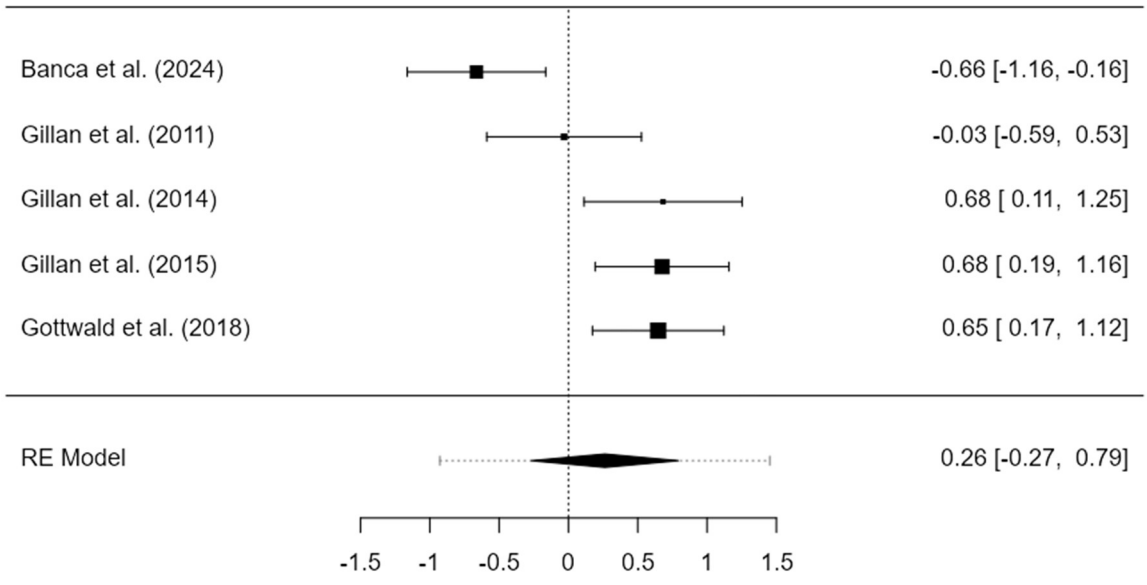
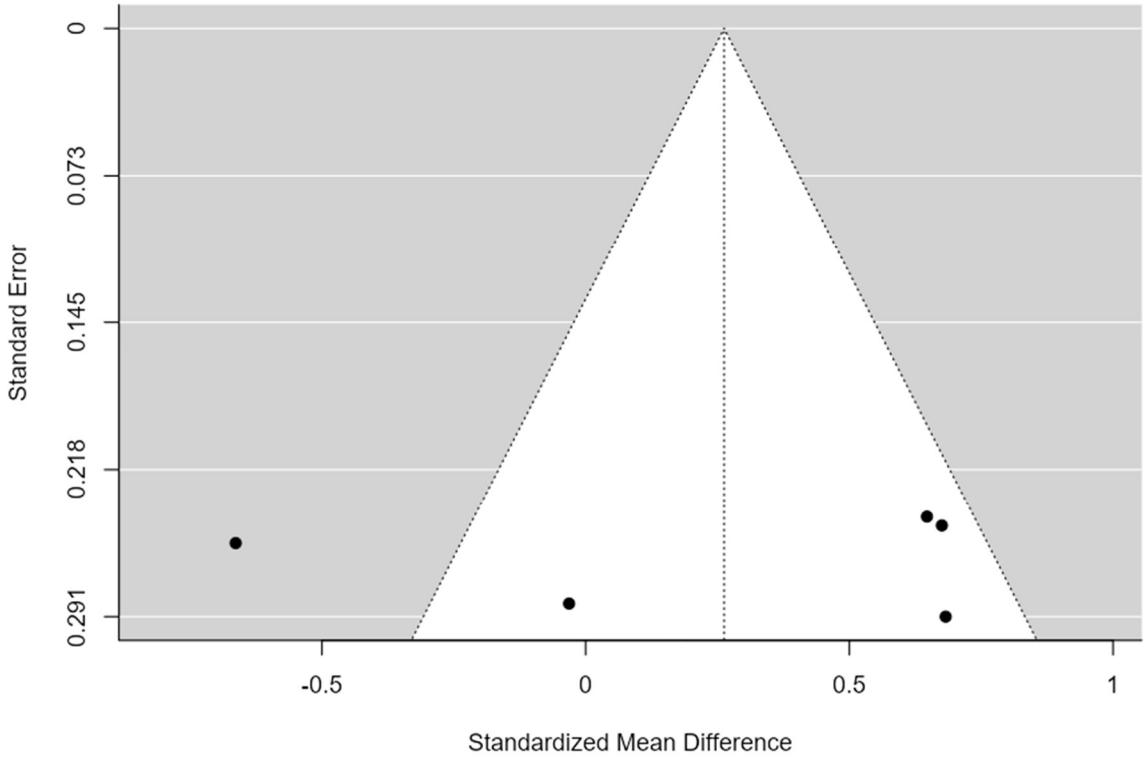


Figure 13

Outcome Devaluation Funnel Plot



Pavlovian-to-Instrumental Transfer

Two studies, encompassing 58 and 51 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder was not associated with statistically reliable differences in PIT, g = -.24, SE = .19, p = .22, 95% CI [-.62, .14]. There was moderate heterogeneity, $I^2 = 50.83\%$, $T^2 = 0$, Q(1) = 2.03, p = .15. The funnel plot, Egger's test, t = -1,43, p = .15, and the Fail-Safe N of 0 indicated low risk of publication bias.

Figure 14

Pavlovian-to-Instrumental Transfer Forest Plot

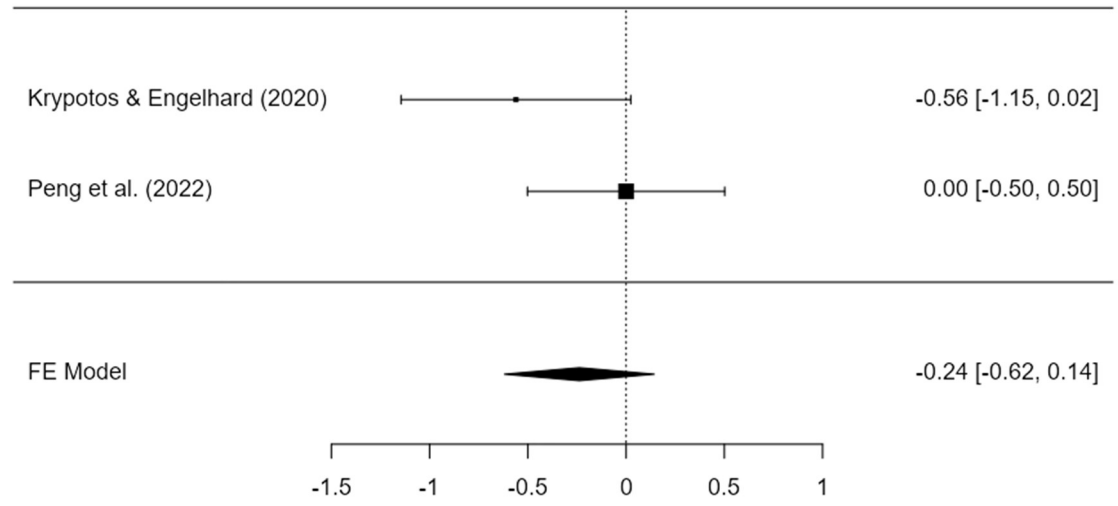
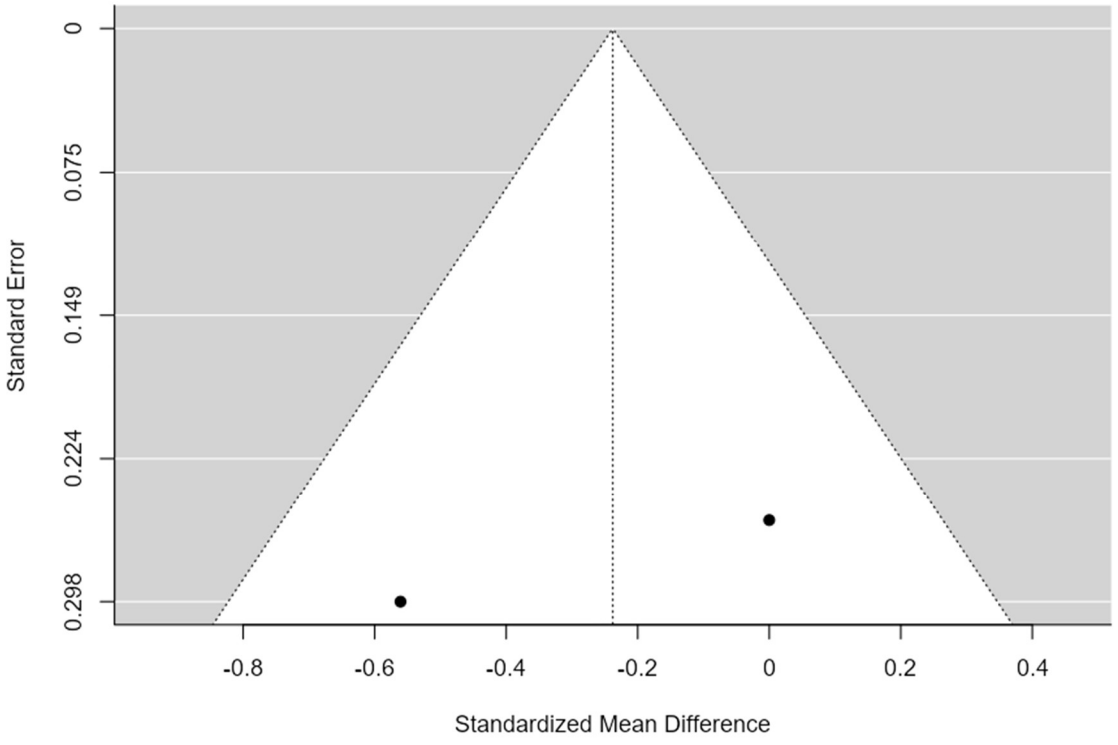


Figure 15

Pavlovian-to-Instrumental Transfer Funnel Plot



Reversal Learning

Eight studies, encompassing 272 and 265 participants with and without OCD, respectively, were included. Obsessive-compulsive disorder was not associated with statistically reliable differences in reversal learning, g = .16, SE = .18, p = .36, 95% CI [-.19, .51]. There was high heterogeneity, I^2 = 74.78%, T^2 = .19, Q(7) = 28.97, p < .001, but the meta-analytic effect size estimate was not affected by the type of conditioning procedure, g = -.01, SE = .38, p = .98, 95% CI [-.76, .75]. Nevertheless, heterogeneity may stem from variation in designs, sample characteristics, sample sizes and confounds (e.g., differences in baseline learning). Effect size estimates ranged from g = .03 to g = .27 in the sensitivity analyses, suggesting the results are moderately influenced by single studies. The funnel plot, Egger's test, t = -.75, p = .46, and the Fail-Safe N of 4 indicated low risk of publication bias.

Two studies (Verfaillie et al., 2016; Voon et al., 2015), encompassing 54 and 72 participants with and without OCD, respectively, were excluded from the meta-analysis. Consistent with meta-analytic results, both studies did not ascertain evidence that OCD significantly affects reversal learning.

Figure 16

Reversal Learning Forest Plot

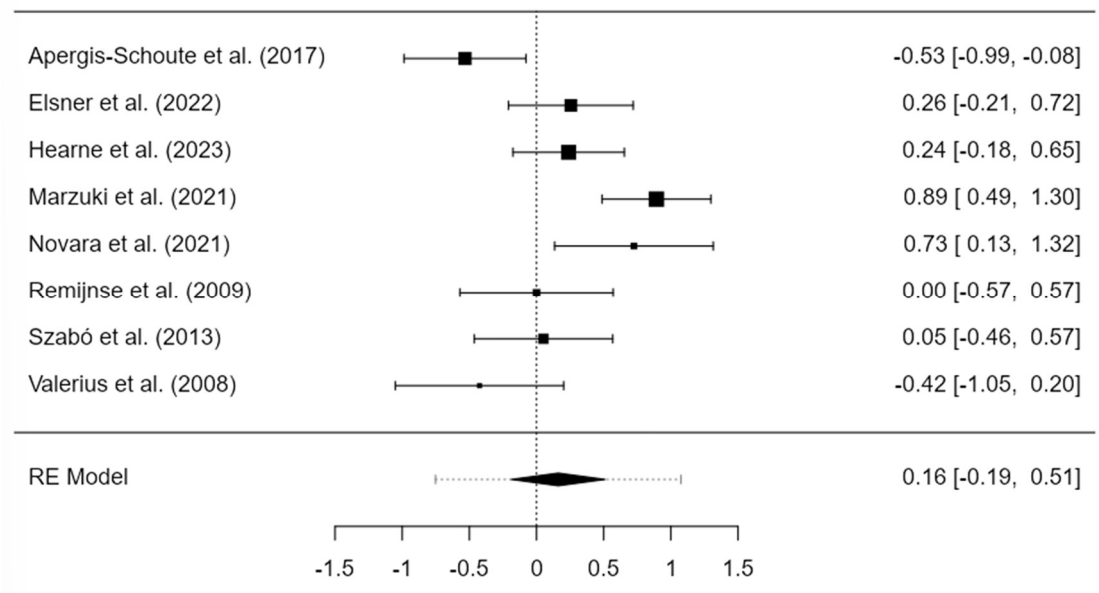
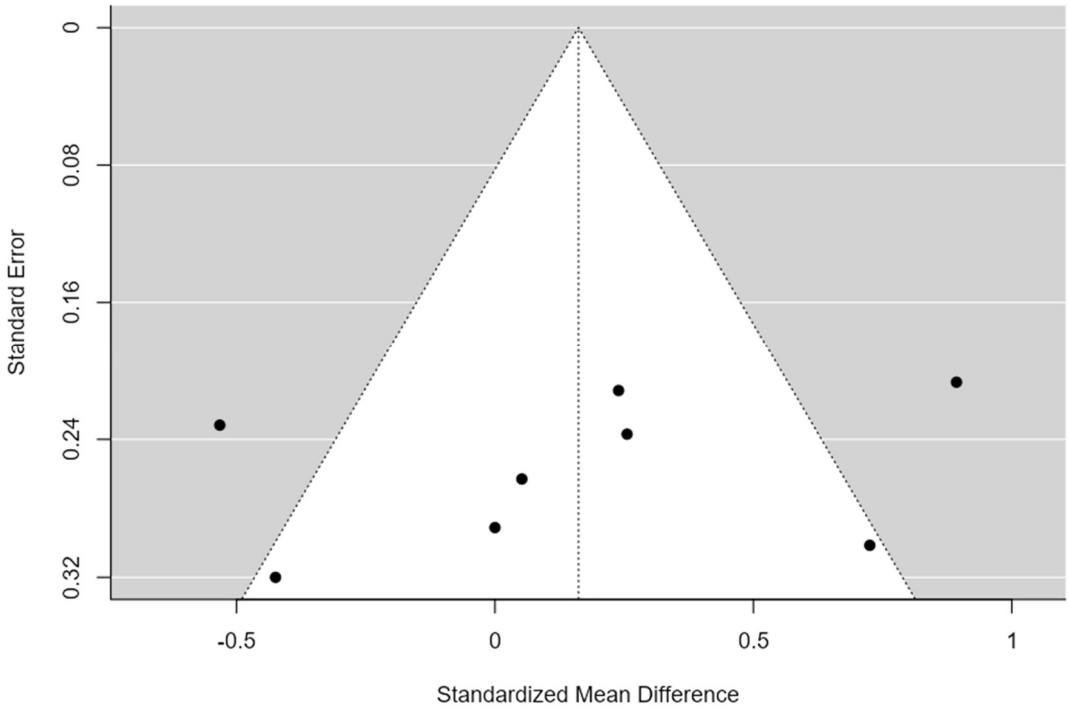


Figure 17

Reversal Learning Funnel Plot



Certainty of Evidence

The certainty of the evidence that OCD affects each associative phenomenon is detailed in **Table 6**.

Table 6

Certainty of Evidence

Associative Phenomenon	**GRADE Rating**	**Explanation**
Associative Learning	Low	• Observational Study • Serious Publication Bias • All Plausible Confounding Would Suggest a Spurious Effect When Results Show No Effect
Avoidance Learning	Very Low	• Observational Study • Serious Inconsistency • Very Serious Imprecision • Serious Publication Bias • All Plausible Confounding Would Suggest a Spurious Effect When Results Show No Effect
Extinction	Low	• Observational Study

Associative Phenomenon	GRADE Rating	Explanation
Generalisation	Low	• Observational Study • Serious Risk of Bias • All Plausible Confounding Would Suggest a Spurious Effect When Results Show No Effect
Latent Inhibition	Low	• Observational Study • Serious Imprecision • All Plausible Confounding Would Suggest a Spurious Effect When Results Show No Effect
Outcome Devaluation	Very Low	• Observational Study • Serious Risk of Bias • Serious Inconsistency • Serious Imprecision • All Plausible Confounding Would Suggest a Spurious Effect When Results Show No Effect
Pavlovian-to-Instrumental Transfer	Low	• Observational Study • Serious Imprecision • All Plausible Confounding Would Suggest a Spurious Effect When Results Show No Effect
Reversal Learning	Moderate	• Observational Study • All Plausible Confounding Would Suggest a Spurious Effect When Results Show No Effect

Discussion

This review suggests people with OCD exhibit attenuated extinction, learning relatively slowly that stimuli no longer predict negatively valanced outcomes. Importantly, there was no evidence that this effect was specific to OCD, relative to other anxiety disorders. Obsessive-compulsive disorder was not reliably associated with differences in associative learning, avoidance learning, blocking, generalisation, LI, mediated associative learning, outcome devaluation, PIT or reversal learning. The quality of evidence was moderate for reversal learning, low for associative learning, extinction, generalisation, LI and PIT, and very low for avoidance learning and outcome devaluation.

These results are consistent with reviews indicating extinction is attenuated in people with OCD (Cooper & Dunsmoor, 2021; Steuber & McGuire, 2022). Also, the demonstration OCD is not associated with differences in associative learning, irrespective of US valence, supports Steuber & McGuire's (2022) conclusion that OCD is not associated with enhanced fear conditioning.

Contemporary theories of OCD derive support from these results. Persistent associations between compulsions and relief from obsessions, despite compulsions failing to terminate obsessions over time, may stem from a failure to learn that an outcome is no longer contingent upon a stimulus (i.e., attenuated extinction). Also, attenuated extinction may explain the retention of strong associations between obsession-related cues and perceived threat. Finally, impaired performance on extinction tasks may stem from attenuated inhibitory learning (Bouton, 1993), consistent with proposals inhibitory learning is impaired in people with OCD (Craske et al., 2014).

However, the studies examining extinction entailed several issues, casting doubt on their interpretation. All but two (Armstrong & Olatunji, 2017; Wang et al., 2024) used OCD-irrelevant stimuli, including lamps, faces and geometric shapes as CSs and electric shocks, screams and fearful faces as USs. Whilst this indicates attenuated extinction extends beyond obsession-specific stimuli, it may also suggest other psychological difficulties underpin this relationship. Some, but not all (Dvir et al., 2019; Wake et al., 2024), meta-analyses suggest anxiety is associated with attenuated extinction (Duits et al., 2015; Lissek et al., 2005). As many participants had comorbid anxiety disorders (see **Appendix 2**), overlapping 'symptoms' between OCD and anxiety may have produced a spurious relationship between OCD and extinction. No study compared extinction in people with OCD and other anxiety disorders, engendering difficulty in determining whether the degree of diminished extinction is specific to OCD. Also, all but two (Armstrong & Olatunji, 2017; Wang et al., 2024) of the studies used SCR as the dependent variable, which has been argued to measure arousal, emotional reactivity and/or attention (Lissek et al., 2005), undermining SCR as a proxy for extinction.

Nevertheless, various alterations to learning mechanisms may underpin the relationship between OCD and attenuated extinction. First, people with OCD may perceive CS-US relationships as more reliable, producing more robust associations (Pearce & Hall, 1980; Yon & Frith, 2021). Second, CS and/or US salience may be lower in people with OCD, diminishing learning during extinction (Mackintosh, 1975). Third, people with OCD may perceive a greater change in environmental (e.g., Diniz et al., 2023; Gimenez et al., 2020), instructional and/or temporal context during extinction, resulting in the context in which associative learning took place acquiring inhibitory properties and the CS-US associative strength being retained. However, these explanations are undermined by the failure of OCD to affect other phenomena using multi-stage designs. Fourth, CS-US associations may transition from goal-directed to habitual associations more rapidly in people with OCD (Gillan & Robbins, 2014), producing

robust associations. Fifth, attenuated 'CS-No US' associations (associations between a CS and the absence of an outcome; Bouton, 1993; Miller & Matzel, 1988), or difficulty forming 'No US' representations may underpin attenuated extinction. Nevertheless, this explanation is challenged by the failure of OCD to affect other phenomena ostensibly depending on CS-No US associations (e.g., LI and reversal learning). Sixth, as all extinction studies used continuous reinforcement procedures, people with OCD may learn less from continuous reinforcement. However, performance in several other paradigms using continuous reinforcement was unaffected by OCD. Finally, people with OCD may form weaker associations during learning, leading to slower decrements in associative strength during extinction, or stronger associations during training, necessitating more trials for total extinction (Rescorla & Wagner, 1972; Wagner, 1981). However, this is inconsistent with evidence that OCD did not affect associative learning.

The causes of alterations to learning mechanisms are unclear. Various environmental, social and biological factors are associated with attenuated extinction, such as stress (Hartley et al., 2014; Merz et al., 2014; Raio et al., 2014; Raio & Phelps, 2015), sociocultural group membership (Navarrete et al., 2009), and alterations in amygdala (Duvarci & Pare, 2014), hippocampus (Maren et al., 2013) and medial prefrontal cortex (Rozeske et al., 2015) functioning. It is unclear which/what combination, if any, of these factors diminishes extinction. Moreover, the direction of causality between OCD and altered extinction is unclear and requires further experimental study, as attenuated extinction may increase vulnerability to OCD.

Several findings are inconsistent with associative theories of OCD. First, although Rachman's (1971) theory focused on negative instrumental reinforcement, all studies of extinction used positive Pavlovian reinforcement procedures. Also, despite proposals that compulsions are operantly conditioned to avoid noxious thoughts (Elsner et al., 2022), OCD was not associated

with potentiated associative or avoidance learning. Furthermore, failure to demonstrate OCD affects PIT contradicts the proposition that altered PIT underlies compulsive behaviour (e.g., repeated washing) when presented with stimuli (e.g., a sink) associated with a common outcome to obsessions (e.g., perceived reductions in infection risk; Krypotos & Engelhard, 2020). Finally, outcome devaluation was not affected by OCD, contradicting theories positing a bias towards habitual behaviour at the expense of goal-directed behaviour (Gillan & Robbins, 2014; Graybiel & Rauch, 2000). However, as the effect of OCD on outcome devaluation became statistically significant after removing one heterogeneous study, further research is necessary to determine whether OCD is associated with attenuated outcome devaluation.

Some findings are inconsistent with competing theories of OCD. Failure to demonstrate OCD affects LI suggests OCD is not associated with heightened attention towards redundant stimuli (Enright & Beech, 1993). Also, failure to demonstrate OCD affects reversal learning indicates people with OCD are not generally cognitively inflexible (Elsner et al., 2022). However, high heterogeneity may suggest these analyses could have been confounded by erroneous synthesis of studies actually examining distinct phenomena. Finally, the absence of an effect of OCD on generalisation contradicts propositions that excessive generalisation underpins pervasive engagement in compulsions across contexts (Lissek et al., 2005).

Limitations

This review entailed some limitations. First, it was not possible to retrieve data for all studies (see **Table 4**). Second, many analyses had low statistical power. Third, whilst some studies reported multiple relevant results, only the primary DV was included in each meta-analysis, potentially omitting relevant information. Relatedly, as none of the studies pre-registered

analyses, variables with 'statistically significant' results may have been reported as 'primary' (Kerr, 1998), inflating false positive rates. Fourth, as many participants took medications (see **Appendix 2**), the effect of OCD on extinction may be confounded by medication use. Fifth, many studies were conducted in western countries, limiting the generalisability of findings. Finally, only studies published in English were included.

Implications

Exposure with response prevention (ERP) aims to extinguish associations between feeling threatened and obsessions (Foa et al., 2012) by supporting clients to expose themselves to obsessions, obsession-relevant stimuli and/or compulsion-relevant stimuli whilst refraining from engaging in compulsions (Hezel & Simpson, 2019). Diminished extinction is associated with lower benefit from ERP in people with OCD (Geller et al., 2019). As attenuated extinction may stem from reduced inhibitory learning, people with OCD may benefit from ERP emphasising inhibitory learning by enhancing expectancy violation, combining extinguished feared CSs during ERP, occasional reinforced extinction, removing safety signals, contingency variability, using retrieval cues, conducting ERP across multiple contexts and rehearsal of CS-No US memories (Craske et al., 2014, 2018).

Future Research

First, research must compare extinction between people with OCD and other anxiety disorders, to determine whether the degree of diminished extinction is specific to OCD. Second, as the

certainty of evidence was generally low, future studies should avoid confounded designs and recruit larger samples. Third, research should elucidate precise alterations to learning mechanisms underpinning attenuated extinction, their causal basis and the direction of causality between OCD and attenuated extinction. Fourth, to examine Rachman's (1971) theory, research should evaluate whether attenuations in extinction extend to negative reinforcement. Fifth, research should replicate extinction effects using OCD-relevant stimuli and a variety of dependent variables, to elucidate the generality of these effects. Sixth, research should examine whether OCD affects intermittent reinforcement, as such procedures parallel real-world learning environments. Finally, research should use multivariate, multilevel and/or robust variance estimation techniques to include multiple results from one study in meta-analyses (Gucciardi et al., 2022).

Conclusion

This review suggests people with OCD exhibit attenuated extinction, potentially suggesting people with OCD would benefit from ERP emphasising inhibitory learning. However, given the numerous limitations, further research is necessary to elucidate the cause of diminished extinction and its specificity to OCD. Also, this review indicates OCD is not reliably associated with differences in associative learning, avoidance learning, blocking, generalisation, LI, mediated associative learning, outcome devaluation, PIT or reversal learning.

References

Abbey, R. D., Clopton, J. R., & Humphreys, J. D. (2007). Obsessive–compulsive disorder and romantic functioning. *Journal of Clinical Psychology*, *63*(12), 1181–1192. https://doi.org/10.1002/jclp.20423

Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological Review*, *89*(4), 369–406. https://doi.org/10.1037/0033-295X.89.4.369

Angelakis, I., & Austin, J. L. (2018). The effects of the non-contingent presentation of safety signals on the elimination of safety behaviors: An experimental comparison between individuals with low and high obsessive-compulsive profiles. *Journal of Behavior Therapy and Experimental Psychiatry*, *59*, 100–106. https://doi.org/10.1016/j.jbtep.2017.12.005

Angst, J., Gamma, A., Endrass, J., Goodwin, R., Ajdacic, V., Eich, D., & Russler, W. (2004). Obsessive-compulsive severity spectrum in the community: Prevalence, comorbidity, and course. *European Archives of Psychiatry and Clinical Neurosciences*, *254*(3), 156–164. https://doi.org/10.1007/s00406-004-0459-4

APA. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. Arlington, Texas: American Psychiatric Pub. https://doi.org/10.1176/appi.books.9780890425596

Apergis-Schoute, A. M., Gillan, C. M., Fineberg, N. A., Fernandez-Egea, E., Sahakian, B. J., & Robbins, T. W. (2017). Neural basis of impaired safety signaling in Obsessive Compulsive Disorder. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(12), 3216–3221. https://doi.org/10.1073/pnas.1609194114

Armstrong, T., & Olatunji, B. (2017). Pavlovian disgust conditioning as a model for contamination-based OCD: Evidence from an analogue study. *BEHAVIOUR RESEARCH AND THERAPY*, *93*, 78–87. https://doi.org/10.1016/j.brat.2017.03.009

Balshem, H., Helfand, M., Schünemann, H. J., Oxman, A. D., Kunz, R., Brozek, J., Vist, G. E., Falck-Ytter, Y., Meerpohl, J., Norris, S., & Guyatt, G. H. (2011). GRADE guidelines: 3. Rating the quality of evidence. *Journal of Clinical Epidemiology*, *64*(4), 401–406. https://doi.org/10.1016/j.jclinepi.2010.07.015

Banca, P., Herrojo Ruiz, M., Gonzalez-Zalba, M. F., Biria, M., Marzuki, A. A., Piercy, T., Sule, A., Fineberg, N. A., & Robbins, T. W. (2024). Action sequence learning, habits, and automaticity in obsessive-compulsive disorder. *eLife*, *12*, RP87346. https://doi.org/10.7554/eLife.87346

Borelli, J., Ruiz, S., Crowley, M., Mayes, L., De los Reyes, A., & Lewin, A. (2015). Children's obsessive compulsive symptoms and fear-potentiated startle responses. *Journal Of Obsessive-Compulsive and Related Disorders*, *6*, 101–107. https://doi.org/10.1016/j.jocrd.2015.06.006

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2021). *Introduction to Meta-Analysis*. John Wiley & Sons.

Bouton, M. E. (1993). Context, time, and memory retrieval in the interference paradigms of Pavlovian learning. *Psychological Bulletin*, *114*(1), 80–99. https://doi.org/10.1037/0033-2909.114.1.80

Bucci, P., Galderisi, S., Catapano, F., Di Benedetto, R., Piegari, G., Mucci, A., & Maj, M. (2007). Neurocognitive indices of executive hypercontrol in obsessive-compulsive disorder. *Acta Psychiatrica Scandinavica*, *115*(5), 380–387. https://doi.org/10.1111/j.1600-0447.2006.00911.x

Cano, M., Martinez-Zalacain, I., Gimenez, M., Torrents-Rodas, D., Real, E., Alonso, P., Segalas, C., Munuera, J., Menchon, J. M., Cardoner, N., Soriano-Mas, C., & Fullana, M. A. (2021). Neural correlates of fear conditioning and fear extinction and its association with cognitive-behavioral therapy outcome in adults with obsessive-

compulsive disorder. *Behaviour Research and Therapy*, *144*, 103927. APA PsycInfo <2021>. https://doi.org/10.1016/j.brat.2021.103927

Cohen, J. (1960). A Coefficient of Agreement for Nominal Scales. *Educational and Psychological Measurement*, *20*(1), 37–46. https://doi.org/10.1177/001316446002000104

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

Cooper, H., Hedges, L. V., & Valentine, J. C. (2019). *The Handbook of Research Synthesis and Meta-Analysis*. Russell Sage Foundation.

Cooper, S. E., & Dunsmoor, J. E. (2021). Fear conditioning and extinction in obsessive-compulsive disorder: A systematic review. *Neuroscience and Biobehavioral Reviews*, *129*, 75–94. https://doi.org/10.1016/j.neubiorev.2021.07.026

Craske, M. G., Hermans, D., & Vervliet, B. (2018). State-of-the-art and future directions for extinction as a translational model for fear and anxiety. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *373*(1742), 20170025. https://doi.org/10.1098/rstb.2017.0025

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach. *Behaviour Research and Therapy*, *58*, 10–23. https://doi.org/10.1016/j.brat.2014.04.006

De Kleine R.A., Hutschemaekers M.H.M., Hendriks G.J., Kampman M., Papalini S., Van Minnen A., & Vervliet B. (2023). Impaired action-safety learning and excessive relief during avoidance in patients with anxiety disorders. *Journal of Anxiety Disorders*, *96*, 102698. https://doi.org/10.1016/j.janxdis.2023.102698

Dickinson, A., & Balleine, B. (1994). Motivational control of goal-directed action. *Animal Learning & Behavior*, *22*(1), 1–18. https://doi.org/10.3758/BF03199951

Dickinson, A., & Weiskrantz, L. (1997). Actions and habits: The development of behavioural autonomy. *Philosophical Transactions of the Royal Society of London. B, Biological Sciences*, *308*(1135), 67–78. https://doi.org/10.1098/rstb.1985.0010

Diniz, J. B., Bazan, P. R., Pereira, C. A. de B., Saraiva, E. F., Ramos, P. R. C., de Oliveira, A. R., Reimer, A. E., Hoexter, M. Q., Miguel, E. C., Shavitt, R. G., & Batistuzzo, M. C. (2023). Brain activation during fear extinction recall in unmedicated patients with obsessive-compulsive disorder. *Psychiatry Research. Neuroimaging*, *336*(101723001), 111733. https://doi.org/10.1016/j.pscychresns.2023.111733

Duits, P., Cath, D. C., Lissek, S., Hox, J. J., Hamm, A. O., Engelhard, I. M., van den Hout, M. A., & Baas, J. M. P. (2015). Updated Meta-Analysis of Classical Fear Conditioning in the Anxiety Disorders. *Depression and Anxiety*, *32*(4), 239–253. https://doi.org/10.1002/da.22353

Duvarci, S., & Pare, D. (2014). Amygdala Microcircuits Controlling Learned Fear. *Neuron*, *82*(5), 966–980. https://doi.org/10.1016/j.neuron.2014.04.042

Dvir, M., Horovitz, O., Aderka, I. M., & Shechner, T. (2019). Fear conditioning and extinction in anxious and non-anxious youth: A meta-analysis. *Behaviour Research and Therapy*, *120*, 103431. https://doi.org/10.1016/j.brat.2019.103431

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, *315*(7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629

Elsner, B., Reuter, B., Said, M., Linnman, C., Kathmann, N., & Beucke, J.-C. (2022). Impaired differential learning of fear versus safety signs in obsessive-compulsive disorder. *Psychophysiology*, *59*(2). https://doi.org/10.1111/psyp.13956

Endrass, T., Kloft, L., Kaufmann, C., & Kathmann, N. (2011). Approach and avoidance learning in obsessive-compulsive disorder. *Depression and Anxiety*, *28*(2), 166–172. https://doi.org/10.1002/da.20772

Enright, S. J., & Beech, A. R. (1993). Reduced cognitive inhibition in obsessive—Compulsive disorder. *British Journal of Clinical Psychology*, *32*(1), 67–74. https://doi.org/10.1111/j.2044-8260.1993.tb01028.x

Epskamp, S., & Nuijten, M. B. (2016). *Statcheck: Extract statistics from articles and recompute p values*.

Ersche, K., Roiser, J., Abbott, S., Craig, K., Müller, U., Suckling, J., Ooi, C., Shabbir, S., Clark, L., Sahakian, B., Fineberg, N., Merlo-Pich, E., Robbins, T., & Bullmore, E. (2011). Response Perseveration in Stimulant Dependence Is Associated with Striatal Dysfunction and Can Be Ameliorated by a D2/3 Receptor Agonist. *Biological Psychiatry*, *70*(8), 754–762. https://doi.org/10.1016/j.biopsych.2011.06.033

Exner, C., Zetsche, U., Lincoln, T. M., & Rief, W. (2014). Imminent danger? Probabilistic classification learning of threat-related information in obsessive-compulsive disorder. *Behavior Therapy*, *45*(2), 157–167. https://doi.org/10.1016/j.beth.2013.09.006

Fawcett, E. J., Power, H., & Fawcett, J. M. (2020). Women Are at Greater Risk of OCD Than Men: A Meta-Analytic Review of OCD Prevalence Worldwide. *The Journal of Clinical Psychiatry*, *81*(4), 13075. https://doi.org/10.4088/JCP.19r13085

Festinger, L. (1962). Cognitive Dissonance. *Scientific American*, *207*(4), 93–106.

Fletcher, P. C., & Frith, C. D. (2009). Perceiving is believing: A Bayesian approach to explaining the positive symptoms of schizophrenia. *Nature Reviews Neuroscience*, *10*(1), 48–58. https://doi.org/10.1038/nrn2536

Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., & Salkovskis, P. M. (2002). The Obsessive-Compulsive Inventory: Development and validation of a

short version. *Psychological Assessment*, *14*(4), 485–496. https://doi.org/10.1037/1040-3590.14.4.485

Foa, E. B., McNally, R. J., Steketee, G. S., & McCarthy, P. R. (1991). A test of preparedness theory in anxiety-disordered patients using an avoidance paradigm. *Journal of Psychophysiology*, *5*(2), 159–163.

Foa, E. B., Yadin, E., & Lichner, T. K. (2012). *Exposure and Response (Ritual) Prevention for Obsessive-Compulsive Disorder: Therapist Guide*. Oxford University Press.

Fontenelle, L. F., Mendlowicz, M. V., & Versiani, M. (2006). The descriptive epidemiology of obsessive–compulsive disorder. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *30*(3), 327–337. https://doi.org/10.1016/j.pnpbp.2005.11.001

Friston, K. (2012). The history of the future of the Bayesian brain. *NeuroImage*, *62*(2), 1230–1233. https://doi.org/10.1016/j.neuroimage.2011.10.004

Fyer, A. J., Schneier, F. R., Simpson, H. B., Choo, T. H., Tacopina, S., Kimeldorf, M. B., Steinglass, J. E., Wall, M., & Walsh, B. T. (2020). Heterogeneity in fear processing across and within anxiety, eating, and compulsive disorders. *Journal of Affective Disorders*, *275*, 329–338. https://doi.org/10.1016/j.jad.2020.03.091

Geller, D. A., McGuire, J. F., Orr, S. P., Pine, D. S., Britton, J. C., Small, B. J., Murphy, T. K., Wilhelm, S., & Storch, E. A. (2017). Fear conditioning and extinction in pediatric obsessive-compulsive disorder. *Annals of Clinical Psychiatry*, *29*(1), 17–26.

Geller, D. A., McGuire, J. F., Orr, S. P., Small, B. J., Murphy, T. K., Trainor, K., Porth, R., Wilhelm, S., & Storch, E. A. (2019). Fear extinction learning as a predictor of response to cognitive behavioral therapy for pediatric obsessive compulsive disorder. *Journal of Anxiety Disorders*, *64*, 1–8. https://doi.org/10.1016/j.janxdis.2019.02.005

Gillan, C. M., Apergis-Schoute, A. M., Morein-Zamir, S., Urcelay, G. P., Sule, A., Fineberg, N. A., Sahakian, B. J., & Robbins, T. W. (2015). Functional neuroimaging of avoidance

habits in obsessive-compulsive disorder. *The American Journal of Psychiatry*, *172*(3), 284–293. https://doi.org/10.1176/appi.ajp.2014.14040525

Gillan, C. M., Papmeyer, M., Morein-Zamir, S., Sahakian, B. J., Fineberg, N. A., Robbins, T. W., & de Wit, S. (2011). Disruption in the Balance Between Goal-Directed Behavior and Habit Learning in Obsessive-Compulsive Disorder. *American Journal of Psychiatry*, *168*(7), 718–726. https://doi.org/10.1176/appi.ajp.2011.10071062

Gillan, C. M., & Robbins, T. W. (2014). Goal-directed learning and obsessive–compulsive disorder. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *369*(1655), 20130475. https://doi.org/10.1098/rstb.2013.0475

Gillan C.M., Apergis-Schoute A.M., Morein-Zamir S., Urcelay G.P., Sule A., Fineberg N.A., Sahakian B.J., & Robbins T.W. (2014). The neural basis of excessive avoidance habits in obsessive-compulsive disorder. *Biological Psychiatry*, *75*(9), 151S. https://doi.org/10.1016/j.biopsych.2014.03.015

Gimenez, M., Cano, M., Martinez-Zalacain, I., Real, E., Alonso, P., Segalas, C., Munuera, J., Kegeles, L. S., Weinstein, J. J., Xu, X., Menchon, J. M., Cardoner, N., Soriano-Mas, C., & Fullana, M. A. (2020). Is glutamate associated with fear extinction and cognitive behavior therapy outcome in OCD? A pilot study. *European Archives of Psychiatry and Clinical Neuroscience*, *270*(8), 1003–1014. https://doi.org/10.1007/s00406-019-01056-3

Gottwald, J., de Wit, S., Apergis-Schoute, A. M., Morein-Zamir, S., Kaser, M., Cormack, F., Sule, A., Limmer, W., Morris, A. C., Robbins, T. W., & Sahakian, B. J. (2018). Impaired cognitive plasticity and goal-directed control in adolescent obsessive-compulsive disorder. *Psychological Medicine*, *48*(11), 1900–1908. https://doi.org/10.1017/S0033291717003464

Graybiel, A. M., & Rauch, S. L. (2000). Toward a Neurobiology of Obsessive-Compulsive Disorder. *Neuron*, *28*(2), 343–347. https://doi.org/10.1016/S0896-6273(00)00113-6

Groves, P. M., & Thompson, R. F. (1970). Habituation: A dual-process theory. *Psychological Review*, *77*(5), 419–450. https://doi.org/10.1037/h0029810

Grudniewicz, A., Moher, D., Cobey, K. D., Bryson, G. L., Cukier, S., Allen, K., Ardern, C., Balcom, L., Barros, T., Berger, M., Ciro, J. B., Cugusi, L., Donaldson, M. R., Egger, M., Graham, I. D., Hodgkinson, M., Khan, K. M., Mabizela, M., Manca, A., … Lalu, M. M. (2019). Predatory journals: No definition, no defence. *Nature*, *576*(7786), 210–212. https://doi.org/10.1038/d41586-019-03759-y

Gucciardi, D. F., Lines, R. L. J., & Ntoumanis, N. (2022). Handling effect size dependency in meta-analysis. *International Review of Sport and Exercise Psychology*, *15*(1), 152–178. https://doi.org/10.1080/1750984X.2021.1946835

Guyatt, G., Oxman, A. D., Akl, E. A., Kunz, R., Vist, G., Brozek, J., Norris, S., Falck-Ytter, Y., Glasziou, P., deBeer, H., Jaeschke, R., Rind, D., Meerpohl, J., Dahm, P., & Schünemann, H. J. (2011). GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables. *Journal of Clinical Epidemiology*, *64*(4), 383–394. https://doi.org/10.1016/j.jclinepi.2010.04.026

Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Systematic Reviews*, *18*(2), e1230. https://doi.org/10.1002/cl2.1230

Hankins, W. G., Garcia, J., & Rusiniak, K. W. (1974). Cortical lesions: Flavor illness and noise-shock conditioning. *Behavioral Biology*, *10*(2), 173–181. https://doi.org/10.1016/S0091-6773(74)91767-2

Hansmeier, J., Exner, C., Zetsche, U., & Jansen, A. (2018). The Neural Correlates of Probabilistic Classification Learning in Obsessive-Compulsive Disorder: A Pilot Study. *Frontiers in Psychiatry*, *9*, 58. https://doi.org/10.3389/fpsyt.2018.00058

Hartley, C. A., Gorun, A., Reddan, M. C., Ramirez, F., & Phelps, E. A. (2014). Stressor controllability modulates fear extinction in humans. *Neurobiology of Learning and Memory*, *113*, 149–156. https://doi.org/10.1016/j.nlm.2013.12.003

Haselgrove, M., & Hogarth, L. (2013). *Clinical Applications of Learning Theory*. Psychology Press.

Hassoulas, A., McHugh, L., & Reed, P. (2014). Avoidance and behavioural flexibility in obsessive compulsive disorder. *Journal of Anxiety Disorders*, *28*(2), 148–153. https://doi.org/10.1016/j.janxdis.2013.05.002

Hearne, L. J., Breakspear, M., Harrison, B. J., Hall, C. V., Savage, H. S., Robinson, C., Sonkusare, S., Savage, E., Nott, Z., Marcus, L., Naze, S., Burgher, B., Zalesky, A., & Cocchi, L. (2023). Revisiting deficits in threat and safety appraisal in obsessive-compulsive disorder. *Human Brain Mapping*, *44*(18), 6418–6428. https://doi.org/10.1002/hbm.26518

Hedges, L. V. (1981). Distribution Theory for Glass's Estimator of Effect size and Related Estimators. *Journal of Educational Statistics*, *6*(2), 107–128. https://doi.org/10.3102/10769986006002107

Hedges, L. V., & Pigott, T. D. (2001). The power of statistical tests in meta-analysis. *Psychological Methods*, *6*(3), 203–217. https://doi.org/10.1037/1082-989X.6.3.203

Hezel, D. M., & Simpson, H. B. (2019). Exposure and response prevention for obsessive-compulsive disorder: A review and new directions. *Indian Journal of Psychiatry*, *61*(1), 85. https://doi.org/10.4103/psychiatry.IndianJPsychiatry_516_18

Hiebert, N. M., Lawrence, M. R., Ganjavi, H., Watling, M., Owen, A. M., Seergobin, K. N., & MacDonald, P. A. (2020). Striatum-Mediated Deficits in Stimulus-Response Learning and Decision-Making in OCD. *Frontiers in Psychiatry*, *11*, 13. https://doi.org/10.3389/fpsyt.2020.00013

Higgins, J. P. T., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine*, *21*(11), 1539–1558. https://doi.org/10.1002/sim.1186

Horwath, E., & Weissman, M. M. (2000). The Epidemiology and Cross-National Presentation of Obsessive-Compulsive Disorder. *Psychiatric Clinics of North America*, *23*(3), 493–507. https://doi.org/10.1016/S0193-953X(05)70176-3

Hunt, C., Degeneffe, N., Bixby, J., & Lissek, S. (2022). Obsessive Compulsive Symptoms Are Associated with Heightened Avoidance of Low-Probability, High-Aversion Threats: A Preliminary Test of the Improbable-Catastrophe Hypothesis. *Clinical Psychological Science*, *10*(3), 514–533. https://doi.org/10.1177/21677026211034861

Jamovi. (2022). *The jamovi project.* (Version 2.3) [Computer software]. https://www.jamovi.org

Joel, D., Zohar, O., Afek, M., Hermesh, H., Lerner, L., Kuperman, R., Gross-Isseroff, R., Weizman, A., & Inzelberg, R. (2005). Impaired procedural learning in obsessive-compulsive disorder and Parkinson's disease, but not in major depressive disorder. *Behavioural Brain Research*, *157*(2), 253–263. https://doi.org/10.1016/j.bbr.2004.07.006

Kaczkurkin, A. N., & Lissek, S. (2013). Generalization of Conditioned Fear and Obsessive-Compulsive Traits. *Journal of Psychology & Psychotherapy*, *7*, 3.

Kaplan, O., Dar, R., Rosenthal, L., Hermesh, H., Fux, M., & Lubow, R. E. (2006). Obsessive–compulsive disorder patients display enhanced latent inhibition on a visual search task.

Behaviour Research and Therapy, *44*(8), 1137–1145. https://doi.org/10.1016/j.brat.2005.09.005

Kaufmann, C., Beucke, J. C., Preuße, F., Endrass, T., Schlagenhauf, F., Heinz, A., Juckel, G., & Kathmann, N. (2013). Medial prefrontal brain activation to anticipated reward and loss in obsessive–compulsive disorder. *NeuroImage: Clinical*, *2*, 212–220. https://doi.org/10.1016/j.nicl.2013.01.005

Kelmendi, B., Adams, T., Jakubovski, E., Hawkins, K. A., Coric, V., & Pittenger, C. (2016). Probing implicit learning in obsessive-compulsive disorder: Moderating role of medication on the weather prediction task. *Journal of Obsessive-Compulsive and Related Disorders*, *9*, 90–95. https://doi.org/10.1016/j.jocrd.2016.03.003

Kerr, N. L. (1998). HARKing: Hypothesizing After the Results are Known. *Personality and Social Psychology Review*, *2*(3), 196–217. https://doi.org/10.1207/s15327957pspr0203_4

Kmet, L., Lee, R., & Cook, L. (2004). *Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields*. Albert Heritage Foundation for Medical Research.

Kochar, N., Ip, S., Vardanega, V., Sireau, N. T., & Fineberg, N. A. (2023). A cost-of-illness analysis of the economic burden of obsessive-compulsive disorder in the United Kingdom. *Comprehensive Psychiatry*, *127*, 152422. https://doi.org/10.1016/j.comppsych.2023.152422

Krypotos, A.-M., & Engelhard, I. M. (2020). Pavlovian-to-instrumental transfer in subclinical obsessive-compulsive disorder. *Journal of Experimental Psychopathology*, *11*(3). https://doi.org/10.1177/2043808720925244

Le Pelley, M. E., Mitchell, C. J., Beesley, T., George, D. N., & Wills, A. J. (2016). Attention and associative learning in humans: An integrative review. *Psychological Bulletin*, *142*, 1111–1140. https://doi.org/10.1037/bul0000064

Lefebvre, C., Glanville, J., Briscoe, S., Littlewood, A., Marshall, C., Metzendorf, M.-I., Noel-Storr, A., Rader, T., Shokraneh, F., Thomas, J., Wieland, L. S., & Group, on behalf of the C. I. R. M. (2019). Searching for and selecting studies. In *Cochrane Handbook for Systematic Reviews of Interventions* (pp. 67–107). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781119536604.ch4

Leplow, B., Murphy, R., & Nutzinger, D. O. (2002). Specificity of conditional associative-learning deficits in obsessive-compulsive disorder (OCD) and non-OCD anxiety disorders. *Journal of Clinical and Experimental Neuropsychology*, *24*(6), 792–805. https://doi.org/10.1076/jcen.24.6.792.8403

Lissek, S., Powers, A. S., McClure, E. B., Phelps, E. A., Woldehawariat, G., Grillon, C., & Pine, D. S. (2005). Classical fear conditioning in the anxiety disorders: A meta-analysis. *Behaviour Research and Therapy*, *43*(11), 1391–1424. https://doi.org/10.1016/j.brat.2004.10.007

Mackintosh, N. J. (1975). A theory of attention: Variations in the associability of stimuli with reinforcement. *Psychological Review*, *82*, 276–298. https://doi.org/10.1037/h0076778

Macy, A., Theo, J., Kaufmann, S., Ghazzaoui, R., Pawlowski, P., Fakhry, H., Cassmassi, B., & IsHak, W. (2013). Quality of life in obsessive compulsive disorder. *CNS Spectrums*, *18*(1), 21–33. https://doi.org/10.1017/S1092852912000697

Mandali, A., Weidacker, K., Kim, S., & Voon, V. (2019). The ease and sureness of a decision: Evidence accumulation of conflict and uncertainty. *Brain*, *142*, 1471–1482. https://doi.org/10.1093/brain/awz013

Maren, S., Phan, K. L., & Liberzon, I. (2013). The contextual brain: Implications for fear conditioning, extinction and psychopathology. *Nature Reviews Neuroscience*, *14*(6), 417–428. https://doi.org/10.1038/nrn3492

Marzuki, A. A., Tomić, I., Ip, S. H. Y., Gottwald, J., Kanen, J. W., Kaser, M., Sule, A., Conway-Morris, A., Sahakian, B. J., & Robbins, T. W. (2021). Association of Environmental Uncertainty With Altered Decision-making and Learning Mechanisms in Youths With Obsessive-Compulsive Disorder. *JAMA Network Open*, *4*(11), e2136195. https://doi.org/10.1001/jamanetworkopen.2021.36195

Marzuki, A. A., Vaghi, M. M., Conway-Morris, A., Kaser, M., Sule, A., Apergis-Schoute, A., Sahakian, B. J., & Robbins, T. W. (2022). Atypical action updating in a dynamic environment associated with adolescent obsessive–compulsive disorder. *Journal of Child Psychology and Psychiatry*, *63*(12), 1591–1601. https://doi.org/10.1111/jcpp.13628

McGowan, J., Sampson, M., Salzwedel, D. M., Cogo, E., Foerster, V., & Lefebvre, C. (2016). PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *Journal of Clinical Epidemiology*, *75*, 40–46. https://doi.org/10.1016/j.jclinepi.2016.01.021

McGuire, J. F. (2016). Fear conditioning and extinction in childhood Obsessive-Compulsive Disorder. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, *76*(12).

McGuire, J. F., Orr, S. P., Wu, M. S., Lewin, A. B., Small, B. J., Phares, V., Murphy, T. K., Wilhelm, S., Pine, D. S., Geller, D., & Storch, E. A. (2016). Fear conditioning and extinction in youth with obsessive-compulsive disorder. *Depression and Anxiety*, *33*(3), 229–237. https://doi.org/10.1002/da.22468

McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica*, *22*(3), 276–282.

McLaughlin, N. C. R., Strong, D., Abrantes, A., Garnaat, S., Cerny, A., O'Connell, C., Fadok, R., Spofford, C., Rasmussen, S. A., Milad, M. R., & Greenberg, B. D. (2015). Extinction retention and fear renewal in a lifetime obsessive-compulsive disorder sample. *Behavioural Brain Research*, *280*, 72–77. Scopus. https://doi.org/10.1016/j.bbr.2014.11.011

Merz, C. J., Hamacher-Dang, T. C., & Wolf, O. T. (2014). Exposure to stress attenuates fear retrieval in healthy men. *Psychoneuroendocrinology*, *41*, 89–96. https://doi.org/10.1016/j.psyneuen.2013.12.009

Milad, M. R., Furtak, S. C., Greenberg, J. L., Keshaviah, A., Im, J. J., Falkenstein, M. J., Jenike, M., Rauch, S. L., & Wilhelm, S. (2013). Deficits in conditioned fear extinction in obsessive-compulsive disorder and neurobiological changes in the fear circuit. *JAMA Psychiatry*, *70*(6), 608–618. https://doi.org/10.1001/jamapsychiatry.2013.914

Miller, R. R., & Matzel, L. D. (1988). The comparator hypothesis: A response rule for the expression of associations. In B. G. (Ed.), *Psychology of learning and motivation* (Vol. 22, pp. 51–92). Academic Press. https://doi.org/10.1016/s0079-7421(08)60038-9

Morein-Zamir, S., Craig, K. J., Ersche, K. D., Abbott, S., Muller, U., Fineberg, N. A., Bullmore, E. T., Sahakian, B. J., & Robbins, T. W. (2010). Impaired visuospatial associative memory and attention in obsessive compulsive disorder but no evidence for differential dopaminergic modulation. *Psychopharmacologia*, *212*(3), 357–367. https://doi.org/10.1007/s00213-010-1963-z

Mowrer, O. H. (1939). A stimulus-response analysis of anxiety and its role as a reinforcing agent. *Psychological Review*, *46*(6), 553–565. https://doi.org/10.1037/h0054288

Murphy, R., Nutzinger, D. O., Paul, T., & Leplow, B. (2004). Conditional-Associative Learning in Eating Disorders: A Comparison With OCD. *Journal of Clinical and Experimental Neuropsychology*, *26*(2), 190–199. https://doi.org/10.1076/jcen.26.2.190.28091

Myles, L. A. M., Garrison, J., & Cheke, L. (2023). Latent Inhibition in Schizophrenia and Schizotypy. *Schizophrenia Bulletin Open*, *4*(1), sgad026.

Nanbu, M., Kurayama, T., Nakazawa, K., Matsuzawa, D., Komiya, Z., Haraguchi, T., Ogura, H., Hashimoto, T., Yoshida, S., Iyo, M., & Shimizu, E. (2010). Impaired P50 suppression in fear extinction in obsessive-compulsive disorder. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *34*(2), 317–322. https://doi.org/10.1016/j.pnpbp.2009.12.005

Navarrete, C. D., Olsson, A., Ho, A. K., Mendes, W. B., Thomsen, L., & Sidanius, J. (2009). Fear Extinction to an Out-Group Face: The Role of Target Gender. *Psychological Science*, *20*(2), 155–158. https://doi.org/10.1111/j.1467-9280.2009.02273.x

Nielen, M. M., den Boer, J. A., & Smid, H. G. O. M. (2009). Patients with obsessive-compulsive disorder are impaired in associative learning based on external feedback. *Psychological Medicine*, *39*(9), 1519–1526. https://doi.org/10.1017/S0033291709005297

Novara, C., Lebrun, C., Macgregor, A., Vivet, B., Therouanne, P., Capdevielle, D., & Raffard, S. (2021). Acquisition and maintenance of disgust reactions in an OCD analogue sample: Efficiency of extinction strategies through a counter-conditioning procedure. *PLoS ONE*, *16*(7). https://doi.org/10.1371/journal.pone.0254592

Oades, R. D., Zimmermann, B., & Eggers, C. (1996). Conditioned blocking in patients with paranoid, non-paranoid psychosis or obsessive compulsive disorder: Associations with symptoms, personality and monoamine metabolism. *Journal of Psychiatric Research*, *30*(5), 369–390. https://doi.org/10.1016/0022-3956%2896%2900006-4

O'Brien, J. L., Jacob, M. L., & King, M. (2019). Preliminary evidence of biased attentional mechanisms and reward processing in adults with obsessive-compulsive disorder. *Bulletin of the Menninger Clinic*, *83*(2), 128–151. https://doi.org/10.1521/bumc.2019.83.2.128

Page, M. J., Higgins, J. P., & Sterne, J. A. (2019). Assessing risk of bias due to missing results in a synthesis. In *Cochrane Handbook for Systematic Reviews of Interventions* (pp. 349–374). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781119536604.ch13

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, *88*, 105906. https://doi.org/10.1016/j.ijsu.2021.105906

Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ*, *372*, n160. https://doi.org/10.1136/bmj.n160

Pearce, J. M., & Hall, G. (1980). A model for Pavlovian learning: Variations in the effectiveness of conditioned but not of unconditioned stimuli. *Psychological Review*, *87*, 532–552. https://doi.org/10.1037/0033-295X.87.6.532

Peng, Z., He, L., Wen, R., Verguts, T., Seger, C. A., & Chen, Q. (2022). Obsessive-compulsive disorder is characterized by decreased Pavlovian influence on instrumental behavior.

PLoS Computational Biology, *18*(10), e1009945. https://doi.org/10.1371/journal.pcbi.1009945

Pertich, A., Eordegh, G., Nemeth, L., Hegedus, O., Ori, D., Puszta, A., Nagy, P., Keri, S., & Nagy, A. (2020). Maintained visual-, auditory-, and multisensory-guided associative learning functions in children with obsessive-compulsive disorder. *Frontiers in Psychiatry*, *11*, 571053. https://doi.org/10.3389/fpsyt.2020.571053

Pohlchen, D., Priouret, M., Kraft, M. S., Binder, F. P., Gursel, D. A., Berberich, G., Koch, K., & Spoormaker, V. I. (2021). Examining differences in fear learning in patients with obsessive-compulsive disorder with pupillometry, startle electromyography and skin conductance responses. *Frontiers in Psychiatry*, *12*, 730742. https://doi.org/10.3389/fpsyt.2021.730742

Poldrack, R. A., Baker, C. I., Durnez, J., Gorgolewski, K. J., Matthews, P. M., Munafò, M. R., Nichols, T. E., Poline, J.-B., Vul, E., & Yarkoni, T. (2017). Scanning the horizon: Towards transparent and reproducible neuroimaging research. *Nature Reviews Neuroscience*, *18*(2), 115–126. https://doi.org/10.1038/nrn.2016.167

Rachman, S. (1971). Obsessional ruminations. *Behaviour Research and Therapy*, *9*(3), 229–235. https://doi.org/10.1016/0005-7967(71)90008-8

Raio, C. M., Brignoni-Perez, E., Goldman, R., & Phelps, E. A. (2014). Acute stress impairs the retrieval of extinction memory in humans. *Neurobiology of Learning and Memory*, *112*, 212–221. https://doi.org/10.1016/j.nlm.2014.01.015

Raio, C. M., & Phelps, E. A. (2015). The influence of acute stress on the regulation of conditioned fear. *Neurobiology of Stress*, *1*, 134–146. https://doi.org/10.1016/j.ynstr.2014.11.004

Remijnse, P. L., Nielen, M. M. A., Balkom, A. J. L. M. van, Hendriks, G.-J., Hoogendijk, W. J., Uylings, H. B. M., & Veltman, D. J. (2009). Differential frontal–striatal and

paralimbic activity during reversal learning in major depressive disorder and obsessive–compulsive disorder. *Psychological Medicine*, *39*(9), 1503–1518. https://doi.org/10.1017/S0033291708005072

Rescorla, R. A., & Wagner, A. R. (1972). A theory of Pavlovian conditioning: Variations in the effectiveness of reinforcement and nonreinforcement. *Current Research and Theory*, 64–99.

Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin*, *86*(3), 638–641. https://doi.org/10.1037/0033-2909.86.3.638

Rouhani, N., Wimmer, G., Schneier, F., Fyer, A., Shohamy, D., & Simpson, H. (2019). Impaired generalization of reward but not loss in obsessive-compulsive disorder. *Depression and Anxiety*, *36*(2), 121–129. https://doi.org/10.1002/da.22857

Rozeske, R. R., Valerio, S., Chaudun, F., & Herry, C. (2015). Prefrontal neuronal circuits of contextual fear conditioning. *Genes, Brain and Behavior*, *14*(1), 22–36. https://doi.org/10.1111/gbb.12181

Salkovskis, P. M. (1985). Obsessional-compulsive problems: A cognitive-behavioural analysis. *Behaviour Research and Therapy*, *23*(5), 571–583. https://doi.org/10.1016/0005-7967(85)90105-6

Sasson, Y., Lustig, M., Zohar, J., Chopra, M., Iancu, M., & Hendler, T. (1997). Epidemiology of Obsessive-Compulsive Disorder: A World View. *Journal of Clinical Psychiatry*, *58*(12), 7–10.

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359–1366. https://doi.org/10.1177/0956797611417632

Snorrason, I., Lee, H. J., de Wit, S., & Woods, D. W. (2016). Are nonclinical obsessive-compulsive symptoms associated with bias toward habits? *Psychiatry Research*, *241*, 221–223. https://doi.org/10.1016/j.psychres.2016.04.067

Sterne, J. A. C., Sutton, A. J., Ioannidis, J. P. A., Terrin, N., Jones, D. R., Lau, J., Carpenter, J., Rücker, G., Harbord, R. M., Schmid, C. H., Tetzlaff, J., Deeks, J. J., Peters, J., Macaskill, P., Schwarzer, G., Duval, S., Altman, D. G., Moher, D., & Higgins, J. P. T. (2011). Recommendations for examining and interpreting funnel plot asymmetry in meta-analyses of randomised controlled trials. *BMJ*, *343*, d4002. https://doi.org/10.1136/bmj.d4002

Steuber, E. R., & McGuire, J. F. (2022). A Systematic Review of Fear Learning, Extinction Learning, and Reversal Learning in Obsessive-Compulsive Disorder: Implications for Treatment. *The Journal of Clinical Psychiatry*, *83*(6). https://doi.org/10.4088/JCP.21r14432

Swerdlow, N. R., Braff, D. L., Hartston, H., Perry, W., & Geyer, M. A. (1996). Latent inhibition in schizophrenia. *Schizophrenia Research*, *20*(1–2), 91–103. https://doi.org/10.1016/0920-9964(95)00097-6

Swerdlow, N. R., Hartston, H. J., & Hartman, P. L. (1999). Enhanced visual latent inhibition in obsessive-compulsive disorder. *Biological Psychiatry*, *45*(4), 482–488. APA PsycInfo <1987 to 2001>. https://doi.org/10.1016/S0006-3223%2898%2900050-X

Szabó, C., Németh, A., & Kéri, S. (2013). Ethical sensitivity in obsessive-compulsive disorder and generalized anxiety disorder: The role of reversal learning. *Journal of Behavior Therapy and Experimental Psychiatry*, *44*(4), 404–410. https://doi.org/10.1016/j.jbtep.2013.04.001

Tracy, J. A., Ghose, S. S., Stecher, T., McFall, R. M., & Steinmetz, J. E. (1999). Classical conditioning in a nonclinical obsessive-compulsive population. *Psychological Science*, *10*(1), 9–13. https://doi.org/10.1111/1467-9280.00098

Vaghi, M. M., Cardinal, R. N., Apergis-Schoute, A. M., Fineberg, N. A., Sule, A., & Robbins, T. W. (2019). Action-Outcome Knowledge Dissociates From Behavior in Obsessive-Compulsive Disorder Following Contingency Degradation. *Biological Psychiatry. Cognitive Neuroscience and Neuroimaging*, *4*(2), 200–209. https://doi.org/10.1016/j.bpsc.2018.09.014

Valentine, J. C., Pigott, T. D., & Rothstein, H. R. (2010). How Many Studies Do You Need?: A Primer on Statistical Power for Meta-Analysis. *Journal of Educational and Behavioral Statistics*, *35*(2), 215–247. https://doi.org/10.3102/1076998609346961

Valerius, G., Lumpp, A., Kuelz, A.-K., Freyer, T., & Voderholzer, U. (2008). Reversal Learning as a Neuropsychological Indicator for the Neuropathology of Obsessive Compulsive Disorder? A Behavioral Study. *The Journal of Neuropsychiatry and Clinical Neurosciences*, *20*(2), 210–218. https://doi.org/10.1176/jnp.2008.20.2.210

Verfaillie, S. C. J., de Wit, S. J., Vriend, C., Remijnse, P. L., Veltman, D. J., & van den Heuvel, O. A. (2016). The course of the neural correlates of reversal learning in obsessive–compulsive disorder and major depression: A naturalistic follow-up fMRI study. *Journal of Obsessive-Compulsive and Related Disorders*, *9*, 51–58. https://doi.org/10.1016/j.jocrd.2016.02.004

Viechtbauer, W. (2005). *Bias and Efficiency of Meta-Analytic Variance Estimators in the Random-Effects Model*. https://journals.sagepub.com/doi/abs/10.3102/10769986030003261

Voon, V., Baek, K., Enander, J., Worbe, Y., Morris, L., Harrison, N., Robbins, T., Rück, C., & Daw, N. (2015). Motivation and value influences in the relative balance of goal-directed

and habitual behaviours in obsessive-compulsive disorder. *Translational Psychiatry*, *5*. https://doi.org/10.1038/tp.2015.165

Voon, V., Derbyshire, K., Rück, C., Irvine, M. A., Worbe, Y., Enander, J., Schreiber, L. R. N., Gillan, C., Fineberg, N. A., Sahakian, B. J., Robbins, T. W., Harrison, N. A., Wood, J., Daw, N. D., Dayan, P., Grant, J. E., & Bullmore, E. T. (2015). Disorders of compulsivity: A common bias towards learning habits. *Molecular Psychiatry*, *20*(3), 345–352. https://doi.org/10.1038/mp.2014.44

Waffenschmidt, S., Knelangen, M., Sieben, W., Bühn, S., & Pieper, D. (2019). Single screening versus conventional double screening for study selection in systematic reviews: A methodological systematic review. *BMC Medical Research Methodology*, *19*(1), 132. https://doi.org/10.1186/s12874-019-0782-0

Wagner, A. R. (1981). SOP: A model of automatic memory processing in animal behavior. In N. E. Spear & R. R. Miller (Eds.), *Information processing in animals* (pp. 15–58). Psychology Press. https://doi.org/10.4324/9781315798820

Wake, S., Hedger, N., Reekum, C. M. van, & Dodd, H. (2024). The effect of social anxiety on threat acquisition and extinction: A systematic review and meta-analysis. *PeerJ*, *12*, e17262. https://doi.org/10.7717/peerj.17262

Wang, J., Becker, B., Wang, Y., Ming, X., Lei, Y., & Wikgren, J. (2024). Conceptual-level disgust conditioning in contamination-based obsessive-compulsive disorder. *Psychophysiology*, *61*(10), e14637. https://doi.org/10.1111/psyp.14637

Wang, Z., Nayfeh, T., Tetzlaff, J., O'Blenis, P., & Murad, M. H. (2020). Error rates of human reviewers during abstract screening in systematic reviews. *PLOS ONE*, *15*(1), e0227742. https://doi.org/10.1371/journal.pone.0227742

Yap, K., Mogan, C., Moriarty, A., Dowling, N., Blair-West, S., Gelgec, C., & Moulding, R. (2018). Emotion regulation difficulties in obsessive-compulsive disorder. *Journal of Clinical Psychology*, *74*(4), 695–709. https://doi.org/10.1002/jclp.22553

Yon, D., & Frith, C. D. (2021). Precision and the Bayesian brain. *Current Biology*, *31*(17), 1026–1032. https://doi.org/10.1016/j.cub.2021.07.044

Yu, Q., Gao, F., Li, C., Xia, J., Cao, Y., Wang, X., Xiao, C., Lu, J., Liu, Q., Fan, J., & Zhu, X. (2024). Compulsion is associated with impaired goal-directed and habitual learning and responding in obsessive-compulsive disorder. *International Journal of Clinical and Health Psychology*, *24*(4), 100531. https://doi.org/10.1016/j.ijchp.2024.100531

Zetsche, U., Rief, W., & Exner, C. (2015). Individuals with OCD lack unrealistic optimism bias in threat estimation. *Behavior Therapy*, *46*(4), 510–520. https://doi.org/10.1016/j.beth.2015.04.002

Zetsche, U., Rief, W., Westermann, S., & Exner, C. (2015). Cognitive deficits are a matter of emotional context: Inflexible strategy use mediates context-specific learning impairments in OCD. *Cognition and Emotion*, *29*(2), 360–371. https://doi.org/10.1080/02699931.2014.911144

Optimising Psychological Therapy Waitlists: Evaluating and Updating DIALOG+

Liam Alexander MacKenzie Myles

St Cross College, University of Oxford

Email address: liam.a.myles@psy.ox.ac.uk

Contact Number: 07530 659 997

Date of Submission: 02/05/2025

Supervisors: Dr Myra Cooper and Dr Georgina Geddes

Word Count: 4998

Student Number: 1455838

Journal: The British Journal of Psychiatry

Abstract

Background

Milton Keynes Community Mental Health Team uses DIALOG+ to support individuals on therapy waitlists. This study aimed to evaluate clients' and clinicians' experiences of DIALOG+-informed check-in calls and improve clients' competence and confidence using coping skills, clients' empowerment to achieve goals and the helpfulness of DIALOG+.

Method

Forty-one clients rated their memory of and confidence using coping skills, their empowerment to achieve goals whilst on therapy waitlists and the helpfulness of DIALOG+; clinicians also rated the helpfulness of DIALOG+. Clients and clinicians were asked for suggestions to improve each dimension. After implementing a service improvement initiative based on these suggestions, 34 clients completed the same measures.

Qualitative Results

Clients wanted to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists.

Service Improvement Initiative

Clients were invited to revise coping skills during check-in calls, sent monthly emails outlining coping skills, offered copies of psychoeducation materials, sent emails regarding the referral processes for services where they could seek extra support, encouraged to seek support from friends and/or family, offered face-to-face check-in appointments, invited to collaboratively set agendas for check-in calls and offered the opportunity to opt-out of check-in calls. Clinicians

arranged check-in calls two weeks in advance and reframed the ‘waitlist’ as the ‘pre-therapy list.’

Quantitative Results

Following the service improvement initiative, there were no differences in clients’ memory of and confidence using coping skills, clients’ perceived ability to progress towards goals or the perceived helpfulness of check-in calls by both clients and staff.

Discussion

Whilst clients wanted to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists, the service improvement initiative failed to produce measurable changes in clients’ memory of and confidence using coping skills, clients’ perceived ability to progress towards goals or the helpfulness of check-in calls. Explanations for these findings, study limitations and clinical and research implications are discussed.

Keywords: DIALOG+, Community Mental Health Team, Therapy Waitlists, Check-In Calls, Coping Skills

Introduction

Up to 50% of people experience mental health problems (Nochaiwong et al., 2021; Wu et al., 2021). In Britain, many seek psychological therapy via community mental health teams (CMHTs), which typically have extensive therapy waitlists. Those on waitlists report disappointment with and uncertainty over their care, lack of communication from and support by clinicians and delays in mental health, occupational and social support (Bhatla et al., 2023; Brown et al., 2002; Crouch et al., 2019; Kristjanson et al., 2022). Clinicians report administrative challenges and moral discomfort with placing clients on waitlists (Brown et al., 2002; McDonnell et al., 2022). These findings underscore the necessity to improve waitlist experiences.

Milton Keynes (MK) CMHT consists of art therapists, assistant psychologists, clinical psychologists, counselling psychologists and psychological wellbeing practitioners and offers both psychoeducation groups and one-to-one therapy to adults. As therapy waitlists span 64 weeks, clinicians conduct 'check-in' telephone calls with waiting clients every 90 days.

Consistent with NHS policy, MK CMHT uses DIALOG+ (Priebe et al., 2007) to support individuals on therapy waitlists (CNWL, 2018, 2022; Department of Health & Social Care, 2021; NHS England, 2022). DIALOG+ is a person-centred, empowering, flexible and responsive approach based on solution-focused therapy (de Shazer, 1985). Solution-focused therapy posits that context-dependent behaviours perpetuate mental health difficulties and advocates solving problems by using pre-existing and newly learned coping strategies (Berg, 2021). DIALOG+ entails seeking clients' satisfaction ratings across eight life domains and three aspects of treatment, collaboratively determining what additional support could improve

satisfaction and devising corresponding action plans for clients, their clinicians and their support networks (Priebe et al., 2012; see **Appendix 11**).

Contemporary literature tentatively suggests DIALOG+ improves empowerment, motivation, organisational skills, quality of life, self-reflection, therapeutic relationships and self-expression, and reduces both mental health difficulties and unmet needs in both adults (Birabwa-Oketcho et al., 2023; Bird et al., 2023; Hunter et al., 2021; Jovanović et al., 2022; Matanov et al., 2021; Omer et al., 2016; Pemovska et al., 2021; Priebe et al., 2015, 2017; van Loggerenberg et al., 2023) and children (Gómez-Restrepo et al., 2022, 2023), often with small-medium effect sizes. Moreover, research indicates DIALOG+ reduces service costs, compared to treatment as usual (Feng et al., 2022; Priebe et al., 2015, 2017). These findings span various psychiatric diagnoses, including anxiety, depression, long-term physical health problems and psychosis, and countries, including Bosnia, Britain, Colombia, Kosovo, Montenegro, North Macedonia, Serbia and Uganda.

However, some clients find DIALOG+ repetitive (Omer et al., 2016) and feel it does not improve social functioning (Birabwa-Oketcho et al., 2023) or empowerment to achieve goals (Matanov et al., 2021). Also, research suggests some clinicians find DIALOG+ protocols challenging to adhere to (Gómez-Restrepo et al., 2022; Omer et al., 2016; Ribic et al., 2022). These issues highlight the necessity to improve DIALOG+ for both clients and staff.

When consulting MK CMHT in March 2023, anecdotal reports from clients indicated they found DIALOG+ “meaningless and impersonal.” Several voiced “struggling to remember and lacking confidence using coping skills learnt in psychoeducation groups.” Also, some felt “unable to achieve goals and cultivate change whilst on waitlists” and were “unmotivated to use coping strategies.” Local clinicians wanted to “improve waitlist experiences,” but were “unsure how to do so.” Poor waitlist experiences can have deleterious effects on clients’ mental

health (Steinert et al., 2017), which may culminate in protracted therapy, poorer recovery, greater pressure on services and thus greater NHS costs (Beck et al., 2015; van Dijk et al., 2023), and clinicians' morale, increasing the risk of burnout (Kälvemark et al., 2004).

The COM-B model suggests the successful implementation of behavioural interventions, such as DIALOG+, depends on clients possessing the capability, opportunity and motivation to change (Michie et al., 2011). Feedback that DIALOG+ is "meaningless and impersonal" and that clients were "unmotivated to use coping strategies" may suggest clients lacked motivation to cultivate behavioural change. Furthermore, feedback that clients "struggled to remember and lacked confidence using coping skills" and felt "unable to achieve goals and cultivate change" may indicate clients were uncapable of behavioural change. Accordingly, DIALOG+ may benefit from initiatives that bolster clients' capability and motivation to change.

Despite these issues, research is yet to examine how DIALOG+ can be adapted to improve clients' and clinicians' experiences. Developed in collaboration with MK CMHT's manager and clinical psychologist, this study aimed to evaluate clients' and clinicians' experiences of DIALOG+-informed check-in calls and improve clients' memory of and confidence using coping skills, clients' perceived ability to progress towards goals and the helpfulness of check-in calls.

Method

This study was pre-registered (see https://osf.io/pn4h6).

Participants

All participants were recruited from MK CMHT between July 2023 and March 2025 and were awaiting psychological therapy following completing a psychoeducation group. Seventy five participants were recruited, with 41 in phase A and 34 in phase B, affording 80% power to detect medium-large effect sizes (d = .66; Cohen, 1988). Limited staff availability to conduct check-in calls prevented recruitment of 128 participants, as planned in the pre-registration. There were no exclusion criteria.

Materials

Relevant constructs were identified through anecdotal reports that MK CMHT clients struggled to remember and lacked confidence using coping skills, felt unable to cultivate change whilst on waitlists and found DIALOG+ unhelpful. As no standardised measures were available, a questionnaire examining these constructs was devised, informed by Flake and Fried's (2020) guidelines. Likert scales ranging from zero to 10 were used to facilitate sufficient variance for measures to be sensitive to changes. Scales were unidimensional to aid measurement validity. For example, clients rated their memory of coping skills on a scale ranging from ‘remembering nothing’ to ‘remembering everything,’ rather than ‘forgetting everything’ to ‘remembering

everything,' as the latter erroneously assumes forgetting dimensionally opposes remembering. Likert scales entailed midpoints to capture neutrality and reduce measurement error, by preventing random selection of points either side of the midpoint.

In both phases, clinicians documented the length of time since the client completed psychoeducation groups and the client's presenting problem. Demographic information was obtained, including their accommodation status, age, employment status, ethnicity and gender. Clients verbally responded to the questionnaire examining their memory of and confidence using skills learnt in psychoeducation groups, their perceived ability to progress towards goals whilst on waitlists and how helpful they found the check-in call. Also, clinicians documented how helpful they thought the check-in call was for the client.

To garner participants' perspectives on how DIALOG+ could be improved, clients in phase A were asked for suggestions on how to improve their memory of and confidence using skills learnt in psychoeducation groups, their perceived ability to progress towards goals whilst on waitlists and the helpfulness of check-in calls. Clinicians were also asked for suggestions on how to improve the helpfulness of check-in calls. In phase B, clinicians documented whether clients chose to rehearse coping skills. Questionnaires for both phases are displayed in **Appendices 12** and **13**. Prior to recruitment, MK CMHT clinicians reviewed the questionnaire and confirmed items assessed constructs relevant to issues with DIALOG+-informed check-in calls, substantiating its construct and content validity.

Design

Mixed methodology was employed. Clients, but not clinicians, were blind to the study phase. Quantitative metrics evaluated clients' memory of and confidence using skills learnt in

psychoeducation groups, clients' perceived ability to progress towards goals whilst on waitlists and clients' and clinicians' perception of the helpfulness of check-in calls; these dimensions constituted dependent variables. Qualitative questions sought suggestions on how to improve each dimension. The independent variable was the study phase, corresponding to whether participants had received the service improvement initiative.

Patient and Public Involvement

The GRIPP2 checklist (Staniszewska et al., 2017) informed the reporting of patient and public involvement (PPI). The concerns of key stakeholders, including MK CMHT's manager, clinical psychologist and administrative lead, were integral to this project's development. After developing the questionnaire, four people with mental health difficulties supported by CMHTs were consulted on its clarity and their willingness to respond honestly; the questionnaire was updated accordingly (see **Appendix 14**). The service improvement initiative was co-developed with MK CMHT's manager, clinical psychologist and administrative lead.

Procedure

Approval to conduct this study was provided by a panel of researchers at the University of Oxford and the MK CMHT team manager. The project was conducted in accordance with the principles of the Declaration of Helsinki and the Good Clinical Practice Guidelines. All staff conducting check-in calls were trained to administer the protocol (see **Appendix 15**). Consistent with local policy, clinicians conducted DIALOG+-informed check-in telephone

calls, lasting approximately 30 minutes. Following this, clinicians outlined the study and, where clients provided informed verbal consent, clinicians verbally administered the questionnaire appropriate for the study phase and transcribed clients' responses. Demographic information was retrieved from clinical notes. In phase B, participants also received the updated check-in call protocol, which is detailed under 'Service Improvement Initiative.'

Epistemology

A critical-realist epistemology was adopted (Braun & Clarke, 2006). It was assumed that clients had insight into their waitlist experiences and could communicate both their waitlist experiences and improvement suggestions, whilst acknowledging the influence of sociocultural discourses, language and power dynamics on the client's communication and clinician's interpretation of clients' responses (Foucault, 2008). This epistemology was adopted because this study aimed to elucidate issues with and improve check-in calls, rather than elucidating the socially constructed discourses influencing experiences (Braun & Clarke, 2021). It is, however, acknowledged that the author's background, which is one of training in scientific methodology situated within a positivist epistemology, likely influenced this study's epistemological underpinnings.

Qualitative Analysis

Thematic analysis was conducted using Braun and Clarke's (2006, 2021) guidelines, whereby an inductive approach identified themes and deductive methods determined which themes were

relevant to the study aims. First, the author familiarised themselves with the data through transcription and repeatedly reading the data, before generating codes that included as much of the data as possible. Codes were predominantly semantic rather than latent, capturing the content rather than socially constructed meaning of data, as the purpose of the analysis was to elicit check-in call improvement suggestions. Following this, the author searched for themes, including all relevant codes in each theme, and subsequently reviewed these themes against their constituent codes. Given that this study aimed to improve check-in calls, theme generation revolved around problems with and improvement suggestions for check-in calls. The authors endeavoured to generate themes that were internally homogenous and distinct from one another (Patton, 1990). Triangulation aided validity, whereby the author consulted their supervisors to determine whether they derived similar themes. The author then defined and named themes, before selecting pertinent data extracts to exemplify themes. Finally, a hierarchy of themes and nested subthemes was derived. These stages were moved between recursively, with codes regularly revised to ensure they fit data well. Supervision was used to reflect on the influence of the author's presuppositions on the thematic analysis, to acknowledge and, where possible, attenuate their influence (see **Appendix 16**).

Quantitative Analysis

Jamovi was used to analyse quantitative data. Chi-squared and Mann-Whitney (1947) tests were used to determine whether categorical and continuous demographics varied between phases, respectively. Shapiro-Wilk (1965) and Levene's tests were used to examine normality and homogeneity of variances, respectively. As none of the data conformed to parametric assumptions (see **Appendix 23**), frequentist and Bayesian Mann-Whitney tests, the latter using

1000 samples, determined whether questionnaire scores differed between phases. Bayesian tests used the Cauchy prior, with a mean of zero and a scale of .707, as this represents an appropriately conservative a priori assumption when nullity is assumed (Ly et al., 2016; Rouder et al., 2009; Schmalz et al., 2023). Where demographics varied between phases, ANCOVAs examined the effect of study phase on questionnaire scores, whilst controlling for the respective demographics. For frequentist tests, rank biserial correlation coefficients were used to interpret effect sizes, with values of .1 – .3, .3 – .5 and .5 – 1 interpreted as small, medium and large, respectively (Glass, 1966). For Bayesian tests, Bayes factors (BFs) of 1, 1-3, 3-10, 10-30, 30-100 and greater than 100 were interpreted as no, anecdotal, moderate, strong, very strong and extreme evidence, respectively (Jeffreys, 1961). The false positive rate was set at a = .05, with 95% credible intervals reported for Bayesian tests, and no correction was applied for multiple comparisons, as each test examined different empirical questions.

Thematic Analysis

Thematic analysis generated four themes and nine subthemes, which are detailed in **Table 1** with exemplifying quotes. Whilst an additional theme of 'Feedback for the Team' was generated, with subthemes of 'The Team and Psychoeducation Groups are Helpful,' 'Improving Psychoeducation Groups' and 'Coping Skills do not Help,' it is detailed in **Appendix 17** as it extends beyond the scope of this study.

Table 1

Themes and Subthemes

Theme	Subtheme	Exemplifying Quotes
Improving Memory and Practice of Coping Skills	Revising Coping Skills	It would be good to have a reminder of the coping skills (learnt in psychoeducation groups) because it is very hard to remember on your own and it has been quite a long time since the group (P49). It would be helpful to have time to run through and review some specific skills (C11).
	Practising Coping Skills	We should get patients to do things a bit more (e.g., homework). If there was more structure, such that there was a space to talk about homework and more emphasis to do it, this would help people remember more (P20). I learn better with practice and by doing things. Advise me when to use which skill (e.g., breathing techniques) and which ones to use first (P30). We should encourage patients to use coping skills learnt (in psychoeducation groups) (C30).
	Support from Family and Friends to Implement Coping Skills	Someone in the family (could) support clients to remember the coping skills (learnt in psychoeducation groups) (P32). Allow partners to attend (check-in calls) to help understand (coping) skills (P37).

Theme	Subtheme	Exemplifying Quotes
Connecting with Understanding Others	Normalising Struggles Through Connecting with People with Mental Health Difficulties	(I am) still in touch with people from the (psychoeducation) group and find that this … has been helpful. It was nice to understand that mental health is everywhere (P7). Incorporating lived experience more and self-disclosure to build a strong connection (would be helpful) (P8). The (psychoeducation) group was very non-judgmental, open and understanding, and they brought my defences down. I thought the group was very helpful (P19).
	Feeling Valued and Understood by Professionals	(It was) nice to hear from you and nice to be able to give opinions on things. I appreciate that you are calling people (P6). (It) has been nice talking today, nice to get more information and (nice) to feel understood (P13). It's the feeling of being held and remembered that resonates more (C20). It helped to feel held in mind (C34).

Theme	Subtheme	Exemplifying Quotes
Cultivating Flexible and Predictable Check in Calls	Conducting Predictable Check in Calls	(It would be good to) have the same clinician where possible to do the calls each time for stability and certainty (C13). It sounds like clinician's follow different formats for asking the questions. It could be helpful if we followed a similar format/structure so that patients know what to expect with the calls, rather than them being different each time (C14). Face-to-face appointments (are better) sometimes, telephone calls (are better) sometimes, depending on mood (P27).
	Conducting Flexible Check in Calls	Give suggestions to clients and ask for their feedback to get more insight into what would be helpful (C9). I would suggest having these wellbeing calls as optional, so people can opt-in to them. I think some people can find them quite helpful, but others may feel like a tick box which can be frustrating while waiting for therapy (C40).
Empowerment to Cultivate Progress	Powerlessness to Change without Therapy	Once we had finished the course (psychoeducation group), … I was told I was fine. I didn't feel fine, I felt rushed off. Having to wait long periods of times between group and therapy is not helpful (P8). It is helpful to have the check-in calls, but it can only be so helpful, as it is not therapy (P23). Not receiving the one-to-one support is what stops (me) from moving towards goals (P25).
	Responsibility for Progress	I use all the skills, and they really help. I want to be able to keep getting better. You can't force people to try them (coping skills). You can take a horse to water, (but you cannot make it drink). I think that some people just aren't ready to try things and really work to get well. So, you can only do what you can do for people (P3). I need to go back and have a look at the handouts (P17).

Note. ‘P’ and ‘C’ refer to the participant number and participant with which the clinician was conducting the call, respectively. For example, if the same clinician conducted check-in calls for the first two participants, ‘P1’ and ‘P2,’ they would be assigned the code ‘C1’ and ‘C2,’ respectively.

Improving Memory and Practice of Coping Skills

'Improving memory and practice of coping skills' is defined as encouragement to revise and practice using coping skills with clinicians, family and/or friends. Participants reported struggling to remember and implement coping skills learnt in psychoeducation groups. Both participants and clinicians voiced wanting to improve clients' coping skills to aid progress towards their goals and prepare them for therapy, as therapy often makes use of coping skills. Distinction was made between learning coping skills and implementing strategies in daily life, with some noting psychoeducation groups helped them with the former but not the latter. To enhance clients' memory and implementation of coping skills, participants suggested revising and practising coping skills learnt in psychoeducation groups with clinicians during check-in calls. Also, some suggested gaining support from family and/or friends to help clients understand, revise, remember to use and use coping skills.

Connecting with Understanding Others

'Connecting with understanding others' is defined as supporting clients to feel valued and understood by others through normalising mental health difficulties. Participants described wanting to connect with others who would understand their mental health difficulties. Many indicated connecting with clinicians and fellow service-users prompted reflection on the normality of struggling with mental health difficulties, attenuating feelings of shame, isolation and judgement. Some suggested that incorporating people with lived-experience into clinical care would aid the sense of communality shared by service-users through normalising difficulties. Clients also mentioned that connecting with clinicians via check-in calls helped

them feel understood and valued. This appeared to be important to clients, perhaps because this engendered trust that they would receive the support they desired (e.g., therapy), helped clients to better understand their difficulties, reduced expectations that clinicians held stigmatising preconceptions and/or cultivated a sense of self-worth, as the latter is, at least partially, socially determined (Fennell, 2016).

Cultivating Flexible and Predictable Check in Calls

'Cultivating flexible and predictable check-in calls' is defined as increasing control over and the consistency of check-in call protocols. As participants did not necessarily complete each check-in call with the same clinician, some voiced dissatisfaction with the variation in check-in call content between clinicians. Also, clients said some clinicians did not arrange appointments in advance, meaning the timings of calls were unpredictable and sometimes inconvenient. These issues indicated a general desire for predictable, standardised check-in calls. Moreover, clients described a lack of flexibility in check-in calls. For example, some discussed being told they could not have face-to-face appointments, instead of telephone calls. Also, participants suggested making check-in calls optional, as some clients found them unhelpful and disruptive. These responses suggested clients believed they would benefit from greater control over whether they have check-in calls and whether appointments are held via telephone or face-to-face.

Empowerment to Cultivate Progress

‘Empowerment to cultivate progress’ is defined as clients' perception of their ability to achieve goals whilst on waitlists. Clients described feeling powerless to cultivate change and unable to achieve goals whilst on waitlists. Many discussed a sense of stagnation in improvements in their mental health after psychoeducation groups ceased and implied that one-to-one therapy was necessary to progress towards goals. These reflections indicated clients felt dependent on services to improve their mental health and may suggest clients expected therapy to solve challenges and/or abolish distressing emotions. In contrast, some voiced a sense of responsibility for making progress whilst on waitlists. Indeed, they described using coping skills to continue to improve their mental health and progress towards goals. These clients appeared more determined to cultivate progress whilst waiting for therapy, whereas those who felt powerless to change appeared to feel dependent on future services for achieving mental health-related goals.

Service Improvement Initiative

Participants made several improvement suggestions related to each theme, each of which are detailed in **Table 2**; unfortunately, it was not possible to implement all suggestions. Based on the thematic analysis, feasibility of improvement suggestions and prior research, a service improvement initiative was devised in collaboration with MK CMHT's manager and clinical psychologist (see **Appendix 18**), which is detailed below.

To improve clients' memory and practice of coping skills, clinicians offered to revise coping skills during check-in calls (Esmaeilimotlagh et al., 2018; Kennerley et al., 2016; Schleider et al., 2021; Sung et al., 2023; Taylor & Stanton, 2007). Clients were also sent a monthly 'Skill of the Month' email, outlining a coping skill and the contexts where it may be helpful (Esmaeilimotlagh et al., 2018; Kennerley et al., 2016; Schleider et al., 2021; Sung et al., 2023; Taylor & Stanton, 2007; see **Appendix 19**). Clients were encouraged to seek support from family and/or friends to use and remember to use these skills (Bjørlykhaug et al., 2022). The coping skill changed each month (see **Appendix 20**), to develop clients' repertoire of coping strategies. Clients were encouraged to contact MK CMHT for support to understand, remember to use and use coping skills. Finally, during check-in calls, clinicians offered to post and/or email materials from previously attended psychoeducation groups.

To improve clients' connection with understanding others, clients were sent an 'Accessing Extra Support' email every three months (Cheng et al., 2015; Thomas et al., 2016; see **Appendix 21**). In addition to encouraging clients to seek support from family and/or friends, this email outlined referral processes for services offering additional support and the opportunity to meet others with mental health difficulties (see **Appendix 22**). Also, clients with

additional needs (e.g., deafness) could choose between face-to-face and telephone appointments (Oliver et al., 2024).

To cultivate flexible and predictable check-in calls, clinicians were trained to deliver standardised DIALOG+-informed check-in calls (Priebe et al., 2012; see **Appendix 15**). This consisted of a single training session in which clinicians were reminded of DIALOG+ and informed of the aforementioned changes to the protocol by the team's clinical psychologist. Clinicians also collaboratively set check-in call agendas, adding topics important to the client (Kennerley et al., 2016). Furthermore, check-in calls were arranged at least two weeks in advance and, should clients be unable to attend, check-in calls were rescheduled. Finally, clients were offered the ability to 'opt out' of check-in calls (Tran, 2024).

To empower clients to cultivate progress, the Skill of the Month and Accessing Extra Support emails aimed to highlight that progress towards goals was possible on waitlists. Additionally, the term 'waitlist' was updated to 'pre-therapy list' and the time between psychoeducation groups and one-to-one therapy was referred to as the 'skill consolidation period,' as these terms did not suggest that clients cannot progress towards goals without therapy (Foucault, 2008).

Table 2

Improvement Suggestions

Theme	Subtheme	Improvement Suggestion
Improving Memory and Practice of Coping Skills	Revising Coping Skills	Make psychoeducation groups longer to consolidate skills learnt.
		Ensure clients have paperwork from psychoeducation groups.
		Offer to send out paperwork from psychoeducation groups physically and electronically.
		Prompt clients to review paperwork from psychoeducation groups.
		Remind clients of coping skills learnt in psychoeducation groups.
		Provide additional psychoeducation literature.
	Practising Coping Skills	Make waitlists for one-to-one therapy shorter.
		Offer one-to-one practice implementing coping skills with clients.
		Trouble-shoot problems with implementing skills.
		Discuss examples of appropriate scenarios for using coping skills.
		Help clients to devise methods to remember to use coping skills.
		Set homework to use coping skills.

Theme	Subtheme	Improvement Suggestion
Improving Memory and Practice of Coping Skills	Support from Family and Friends to Implement Coping Skills	Enquire whether family members can support clients to remember and use coping skills learnt in psychoeducation groups.
Connecting with Understanding Others	Normalising Struggles Through Connecting with People with Mental Health Difficulties	Encourage meeting others with mental health difficulties. Include people with lived experience of mental health difficulties in facilitating psychoeducation groups and mental health care.
	Feeling Valued and Understood by Professionals	Offer face-to-face check-ins. Conduct regular check-in calls (e.g., every three months). Make referrals to other services where clients can speak about difficulties (e.g., Recovery College). Offer keyworkers.

Theme	Subtheme	Improvement Suggestion
Cultivating Flexible and Predictable Check in Calls	Conducting Predictable Check in Calls	Plan check-in appointments at least two weeks in advance.
		Where possible, have the same clinician conducting check-in calls with clients.
		Standardise the delivery of check-in calls across staff.
		Make check-in calls optional, rather than mandatory.
	Conducting Flexible Check in Calls	Offer to reschedule check-in calls if clients feel unable to engage.
		Offer face-to-face and telephone check-in appointments.
		Encourage clients, as well as clinicians, to set agendas for check-in calls.
		Offer clients support to access other services (e.g., helplines).
Empowerment to Cultivate Progress	Powerlessness to Change without Therapy	Increase contact with the team following the cessation of the psychoeducation groups.
		Reduce waitlist durations for one-to-one therapy.
	Responsibility for Progress	

Results

Participant demographic information is shown **Table 3**, with statistical tests elucidating whether there were differences between phases. Demographics did not vary between phases, except for the time since participants had completed the psychoeducation groups, which was longer in phase B.

Table 3

Demographic Information

Demographic	Phase A	Phase B	Statistical Test
Accommodation Status			
Homeowner	9.8% (4)	8.8% (3)	
Mainstream Housing	48.8% (20)	50% (17)	
Temporary Housing	2.4% (1)		
Tenant	24.4% (10)	35.3% (12)	
Staying with Friends/Family	4.9% (2)	2.9% (1)	
Missing Data	9.8% (4)	2.9% (1)	
Age (Years)	38.2 (13.4)	40.1 (12.3)	U = 615, p = .503
Missing Data		2.9% (1)	
Employment Status			
Employed	14.6% (6)	11.8% (4)	
Student	4.9% (2)		
Unemployed	65.9% (27)	85.3% (29)	
Missing Data	14.6% (6)	2.9% (1)	

Ethnicity			
African	2.4% (1)	2.9% (1)	
Any Other White Background	2.4% (1)		
Arabic	4.9% (2)		
Asian	2.4% (1)	2.9% (1)	
Black African	2.4% (1)		
Black British	2.4% (1)		
British	17.1% (7)	79.4% (27)	
Pakistani	2.4% (1)		
White British	58.5% (24)	11.8% (4)	
Missing Data	4.9% (2)	2.9% (1)	
Gender			χ^2 (2) = 1.39, p = .498
Female	68.3% (28)	70.6% (24)	
Male	31.7% (13)	26.5% (9)	
Missing Data		2.9% (1)	
Presenting Problem			
Agoraphobia	2.4% (1)		
Anger	2.4% (1)	2.9% (1)	
Anxiety	22% (9)	17.6% (6)	
Bipolar Disorder	2.4% (1)		
Delusions	7.3% (3)		
Dissociation	2.4% (1)		
Dissociative Identity Disorder		2.9% (1)	
Domestic Violence	2.4% (1)		
Eating Difficulties	2.4% (1)		

Emotional Intensity	14.6% (6)	2.9% (1)	
Flashbacks	29.3% (12)	23.5% (8)	
Hallucinations	14.6% (6)	2.9% (1)	
Loneliness	4.9% (2)		
Low Mood	12.2% (5)	14.7% (5)	
Low Self-Esteem	12.2% (5)		
Nightmares	31.7% (13)	17.6% (6)	
Post-Traumatic Stress Disorder	12.2% (5)	38.2% (13)	
Panic Attacks	2.4% (1)	5.9% (2)	
Paranoia	7.3% (3)	2.9% (1)	
Poor Sleep	2.4% (1)		
Psychosis		5.9% (2)	
Relationship Difficulties	7.3% (3)	8.8% (3)	
Shame	2.4% (1)		
Sleep Difficulties	2.4% (1)	2.9% (1)	
Suicidal Ideation	7.3% (3)	2.9% (1)	
Trauma	24.4% (10)	26.5% (9)	
Time Since Completed Psychoeducation Groups (Months)	8.33 (3.61)	13 (5.18)	U = 52.5, p = .039

Note. For age and the time since completing the psychoeducation groups, the mean is reported with the standard deviation (SD) in parentheses. For accommodation status, employment status, ethnicity, gender and the presenting problem, the proportion of participants in each category is reported, with the absolute number of participants shown in parentheses. Chi-squared tests were deemed inappropriate for accommodation status, employment status,

ethnicity and the presenting problem as at least one of the categories had expected frequencies of less than five (Haberman, 1988).

The means and SDs of the questionnaire scores for each phase are shown in **Table 4**. Across phases, there were no differences in clients' memory of coping skills, U = 664, p = .896, r_{rb} = .018, BF = .244, [-.496, .391], clients' confidence using coping skills, U = 539, p = .237, r_{rb} = .162, BF = .396, [-.692, .17], clients' perceived ability to progress towards goals, U = 519, p = .156, r_{rb} = .194, BF = .833, [-.079, .803], clients' perception of the helpfulness of the calls, U = 642, p = .818, r_{rb} = .032, BF = .238, [-.419, .419], and clinicians' perception of the helpfulness of the calls, U = 628, p = .991, r_{rb} = .002, BF = .271, [-.386, .487]. Controlling for the length of time since clients completed psychoeducation groups did not impact the effect of phase on questionnaire scores, except for clients' perception of their ability to progress towards goals, which was lower in phase B than phase A (see **Appendix 23, Supplementary Analysis 3**). Finally, eight participants chose to rehearse coping skills during check-in calls in phase B.

Table 4

Means and Standard Deviations of Questionnaire Scores

Construct	Phase A	Phase B
Clients' Memory of Coping Skills	5.16 (2.52)	5.21 (3.04)
Clients' Confidence Using Coping Skills	4.72 (2.8)	5.44 (3.39)
Clients' Perceived Ability to Progress Towards Goals	4.06 (2.59)	3.18 (2.36)
Clients' Perception of the Helpfulness of the Call	7.06 (2.98)	7.12 (3.17)
Clinicians' Perception of the Helpfulness of the Call	5.7 (2.3)	5.44 (2.85)

Note. Standard deviations are reported in brackets.

Discussion

This study evaluated clients' and clinicians' experiences of DIALOG+-informed check-in calls. Clients wanted to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists. A service improvement initiative was devised, in which clients were invited to revise coping skills during check-in calls, sent monthly emails outlining coping skills, offered copies of psychoeducation materials, sent emails regarding the referral processes for services where they could seek extra support, encouraged to seek support from friends and/or family, offered face-to-face check-in appointments if appropriate, invited to collaboratively set agendas for check-in calls and offered the opportunity to opt-out of check-in calls. Clinicians arranged check-in calls two weeks in advance and reframed the 'waitlist' as the 'pre-therapy list,' in which skill consolidation was encouraged. However, this initiative did not culminate in improvements in clients' memory of and confidence using coping skills, clients' perceived ability to progress towards goals or the perceived helpfulness of check-in calls by both clients and staff.

Qualitative results align with several prior findings, including more critical appraisals of DIALOG+. Consistent with requests for more flexible and predictable calls, earlier studies highlighted that DIALOG+ protocols are often perceived as long and inflexible (Gómez-Restrepo et al., 2022; Omer et al., 2016; Ribic et al., 2022). Similarly, reports of clients feeling disempowered to cultivate progress mirrors previous research suggesting DIALOG+ does not support goal achievement (Matanov et al., 2021). Nevertheless, participants made suggestions that research suggests would enhance psychological wellbeing. For instance, in line with requests to practice coping skills, research indicates revising coping strategies aids skill retention (Jónsson & Hougaard, 2009; Kennerley et al., 2016; Whitfield, 2010). Furthermore, studies suggest validation and empathy improves psychological wellbeing by helping

individuals feel valued (Gilbert, 2014; Hayes, 2019; Kennerley et al., 2016; Payne, 2006), consistent with requests to connect with understanding others.

The service improvement initiative failed to produce improvements in clients' memory of and confidence using coping skills, clients' perceived ability to progress towards goals or the perceived helpfulness of check-in calls. Across both phases, clients' ratings of their memory of and confidence using coping skills and their empowerment to achieve goals was relatively low. Whilst their ratings of the helpfulness of check-in calls was higher, desire to avoid offending clinicians may have inflated scores. One possible explanation for the initiative's failure is that it may not have increased clients' motivation and perceived capability to remember and use coping skills and achieve goals (Michie et al., 2011). This may suggest the researchers' interpretation of the thematic analysis failed to effectively operationalise suggested improvements or that these improvements were delivered with inadequate fidelity.

Several other factors may account for the absence of an effect of the service improvement initiative. First, this study may have failed to measure dimensions relevant to clients' experiences of DIALOG+, such as their connection with understanding others and/or the flexibility and predictability of check-in calls. Second, measures may have lacked sensitivity to changes in scores. Relatedly, measures were not standardised, perhaps culminating in differences in the way participants responded to measures between phases. Third, as clients could opt out of check-in calls in phase B, those benefiting from aspects of the service improvement initiative (e.g., emails) may have not felt they needed check-in calls, deflating scores in phase B. Fourth, as it had been longer since clients in phase B completed a psychoeducation group, the initiative may have attenuated deteriorations in scores that would have otherwise occurred; however, this is unlikely as controlling for the time since they completed the psychoeducation groups did not affect the results (see **Appendix 23, Supplementary Analysis 3**). Fifth, as few clients elected to practice coping skills during

check-in calls in phase B, they may not have reaped the rewards of the initiative (see **Appendix 23, Supplementary Analysis 4**). Finally, as the fidelity with which clinicians delivered the DIALOG+ protocol was not examined, low adherence to protocol revisions may underpin these results.

Limitations

This study entailed various limitations. First, the relatively low recruitment rate indicates high attrition, suggesting results may not be generalisable to all MK CMHT clients. Also, attrition rates were not measured and may have varied between phases, confounding analyses. Second, this study was only powered to detect medium-large effect sizes, inflating the risk of false negatives and false positives (Simmons et al., 2011). Relatedly, as check-in calls were conducted every 90 days, some participants may have participated in both phases, unbeknownst to the researcher. Using between subjects' tests may have inflated between phase variance estimations and reduced statistical power. Third, when collecting and transcribing verbal data, clinicians may have distilled clients' responses into perceived 'points.' Their perception of 'important information' may have been influenced by their own check-in call experiences and/or knowledge of this research project. Finally, the author's experiences of check-in calls, service-related issues and/or epistemological biases may also have influenced the themes generated. Multiple layers of abstraction may have occluded the intended meanings of clients' responses.

Implications

Milton Keynes CMHT should improve clients' opportunities to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists. As no measurable improvements were observed following the service improvement initiative, MK CMHT may wish to undertake alternative initiatives. For example, to improve clients' knowledge of and confidence using coping skills, MK CMHT may wish to offer 'top-up' psychoeducation sessions. To support clients to feel valued and understood by others, clinicians could help clients to refer themselves to and attend relevant organisations. Clients' desire to achieve goals whilst on waitlists suggests waitlists should be reimagined as opportunities for therapeutic progress rather than unproductive periods of passive waiting. For instance, clients could be referred to relevant services, offered bibliotherapy and directed to online therapeutic resources at minimal costs. However, quantitative research is necessary to determine whether these suggestions would improve DIALOG+.

Future Research

There are several areas for future research. First, research should investigate whether the service improvement initiative improved clients' connection with understanding others and/or the flexibility and predictability of check-in calls. More generally, qualitative research should examine which aspects of the service improvement initiative were helpful, if any. Second, replications may wish to use standardised measures to circumvent issues with measurement insensitivity, validity and reliability. Third, future studies would benefit from consulting MK

CMHT clients on the development of service improvement initiatives, as this may enhance the helpfulness, relevance and feasibility of initiatives. Fourth, replications should ensure clients in phase B receive all aspects of the service improvement initiative (e.g., emails). Fifth, replications should evaluate the influence of attrition. Finally, replications should endeavour for higher statistical power.

Conclusions

This study suggests MK CMHT clients want greater opportunities to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists. However, a service improvement initiative, in which clients could revise coping skills, were sent emails outlining coping skills, were offered copies of psychoeducation materials, were sent emails regarding the referral process for services in which they could seek extra support, were encouraged to seek support from friends and/or family, were offered face-to-face check-in appointments, were given the opportunity to collaboratively set check-in call agendas and were offered the opportunity to opt-out of check-in calls, did not improve clients' memory of and confidence using coping skills, clients' perceived ability to progress towards goals or the helpfulness of check-in calls.

References

Beck, A., Burdett, M., & Lewis, H. (2015). The association between waiting for psychological therapy and therapy outcomes as measured by the CORE-OM. *British Journal of Clinical Psychology*, *54*(2), 233–248. https://doi.org/10.1111/bjc.12072

Berg, S. de S., Yvonne Dolan, Harry Korman, Terry Trepper, Eric McCollum, Insoo Kim. (2021). *More Than Miracles: The State of the Art of Solution-Focused Brief Therapy* (2nd ed.). Routledge. https://doi.org/10.4324/9781003125600

Bhatla, J. L., James, K., Lamb, K., Neault-Lount, C., Protudjer, J. L. P., Reitmeier, S. D., Cooney, M., & Wicklow, B. (2023). The experience of youth on the waitlist for gender-affirming care in Manitoba. *Paediatrics & Child Health*, pxad087. https://doi.org/10.1093/pch/pxad087

Birabwa-Oketcho, H., Nakasujja, N., Alinaitwe, R., Bird, V., Priebe, S., & Sewankambo, N. (2023). The effectiveness of a solution-focused approach (DIALOG+) for patients with severe mental illness and epilepsy in Uganda: A randomised controlled trial. *Psychiatry Research Communications*, *3*(1), 100097. https://doi.org/10.1016/j.psycom.2022.100097

Bird, V. J., Sajun, S. Z., Peppl, R., Evans-Lacko, S., Priebe, S., Singh, S., Venkatraman, L., Ramachandran, P., Pasha, A., Malik, A., & Qureshi, O. (2023). Assessing the effectiveness and cost-effectiveness of a solution-focused resource-orientated approach (DIALOG+) to improving the quality of life for people with psychosis in India and Pakistan—A cluster RCT. *Trials*, *24*(1), 59. https://doi.org/10.1186/s13063-022-07032-y

Bjørlykhaug, K. I., Karlsson, B., Hesook, S. K., & Kleppe, L. C. (2022). Social support and recovery from mental health problems: A scoping review. *Nordic Social Work Research*, *12*(5), 666–697. https://doi.org/10.1080/2156857X.2020.1868553

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, *18*(3), 328–352. https://doi.org/10.1080/14780887.2020.1769238

Brown, S. A., Parker, J. D., & Godding, P. R. (2002). Administrative, clinical, and ethical issues surrounding the use of waiting lists in the delivery of mental health services. *The Journal of Behavioral Health Services & Research*, *29*(2), 217–228. https://doi.org/10.1007/BF02287708

Cheng, S. Y., Bamford, D., Papalexi, M., & Dehe, B. (2015). Improving access to health services – challenges in Lean application. *International Journal of Public Sector Management*, *28*(2), 121–135. https://doi.org/10.1108/IJPSM-05-2014-0066

CNWL. (2018). *DIALOG+ & Care Planning Policy*. https://www.cnwl.nhs.uk/application/files/3016/8621/5273/DIALOG__and_Care_Planning_Policy_2022-2025b.pdf

CNWL. (2022). *Dialog+ launches across adult community mental health services*. https://www.cnwl.nhs.uk/news/dialog-launches-across-adult-community-mental-health-services

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

Crouch, L., Reardon, T., Farrington, A., Glover, F., & Creswell, C. (2019). "Just keep pushing": Parents' experiences of accessing child and adolescent mental health services for child

anxiety problems. *Child: Care, Health and Development*, *45*(4), 491–499. https://doi.org/10.1111/cch.12672

de Shazer, S. (1985). *Keys to Solution in Brief Therapy*. Norton.

Department of Health & Social Care. (2021). *Reforming the Mental Health Act*. https://www.gov.uk/government/consultations/reforming-the-mental-health-act/reforming-the-mental-health-act

Esmaeilimotlagh, M., Oveisi, K., Alizadeh, F., Kheirabadi, M., & Jamalpour, H. (2018). An Investigation on Coping Skills Training Effects on Mental Health Status of University Students. *Journal of Humanities Insights*, *2*, 37–42. https://doi.org/10.22034/jhi.2018.61430

Feng, Z., Deng, X., Zhao, N., Jin, J., Yue, J., Hu, Y., Jing, Y., Wang, H., Knösche, T., Zang, Y., & Wang, J. (2022). Resting-State fMRI Functional Connectivity Strength Predicts Local Activity Change in the Dorsal Cingulate Cortex: A Multi-Target Focused rTMS Study. *Cerebral Cortex*, *32*(13), 2773–2784. https://doi.org/10.1093/cercor/bhab380

Fennell, M. (2016). *Overcoming Low Self-Esteem, 2nd Edition: A self-help guide using cognitive behavioural techniques*. Hachette UK.

Flake, J. K., & Fried, E. I. (2020). Measurement Schmeasurement: Questionable Measurement Practices and How to Avoid Them. *Advances in Methods and Practices in Psychological Science*, *3*(4), 456–465. https://doi.org/10.1177/2515245920952393

Foucault, M. (2008). Power/Knowledge. In *The New Social Theory Reader* (2nd ed.). Routledge.

Gilbert, P. (2014). The origins and nature of compassion focused therapy. *British Journal of Clinical Psychology*, *53*(1), 6–41. https://doi.org/10.1111/bjc.12043

Glass, G. V. (1966). Note on Rank Biserial Correlation. *Educational and Psychological Measurement*, *26*(3), 623–631. https://doi.org/10.1177/001316446602600307

Gómez-Restrepo, C., Marroquín-Rivera, A., Calvo-Valderrama, M. G., Ospina-Pinillos, L., Sureshkumar, D. S., & Bird, V. J. (2022). Stakeholder perspectives on a patient-centred intervention (DIALOG+) for adolescents with common mental disorders in Colombia: A qualitative study. *PLOS One*, *17*(8), e0272066. https://doi.org/10.1371/journal.pone.0272066

Gómez-Restrepo, C., Sarmiento-Suárez, M. J., Alba-Saavedra, M., Calvo-Valderrama, M. G., Rincón-Rodríguez, C. J., Bird, V. J., Priebe, S., & Loggerenberg, F. van. (2023). Development and Implementation of DIALOG+S in the School Setting as a Tool for Promoting Adolescent Mental Well-Being and Resilience in a Post–Armed Conflict Area in Colombia: Exploratory Cluster Randomized Controlled Trial. *JMIR Formative Research*, *7*(1), e46757. https://doi.org/10.2196/46757

Haberman, S. J. (1988). A Warning on the Use of Chi-Squared Statistics with Frequency Tables with Small Expected Cell Counts. *Journal of the American Statistical Association*, *83*(402), 555–560. https://doi.org/10.1080/01621459.1988.10478632

Hayes, S. (2019). *A Liberated Mind: The essential guide to ACT*. Random House.

Hunter, J., McCabe, R., Francis, J. J., Pemovska, T., Ribić, E., Me&amp, S., scaron, Ević, E., Konjufca, J., Markovska Simoska, S., Blazevska Stoilkovska, B., Radojičić, T., Repi&amp, scaron, Ti, S., Jerotić, S., Ristić, I., Zebić, M., Injac-Stevović, L., … Jovanović, N. (2021). Implementing a mental health intervention in low-and-middle-income countries in Europe: Is it all about resources? *Global Psychiatry Archives*, *4*(1), 31–54. https://doi.org/10.52095/gp.2020.1409

Jeffreys, H. (1961). *Theory of probability* (3rd ed.). Oxford University Press.

Jónsson, H., & Hougaard, E. (2009). Group cognitive behavioural therapy for obsessive-compulsive disorder: A systematic review and meta-analysis. *Acta Psychiatrica Scandinavica*, *119*(2), 98–106. https://doi.org/10.1111/j.1600-0447.2008.01270.x

Jovanović, N., Russo, M., Pemovska, T., Francis, J. J., Arenliu, A., Bajraktarov, S., Kulenović, A. D., Stević, L. I., Novotni, A., Petrović, S. A., Radojičić, T., Ribić, E., Konjufca, J., & Marić, N. P. (2022). Improving treatment of patients with psychosis in low-and-middle-income countries in Southeast Europe: Results from a hybrid effectiveness-implementation, pragmatic, cluster-randomized clinical trial (IMPULSE). *European Psychiatry*, *65*(1), e50. https://doi.org/10.1192/j.eurpsy.2022.2302

Kälvemark, S., Höglund, A. T., Hansson, M. G., Westerholm, P., & Arnetz, B. (2004). Living with conflicts-ethical dilemmas and moral distress in the health care system. *Social Science & Medicine*, *58*(6), 1075–1084. https://doi.org/10.1016/S0277-9536(03)00279-X

Kennerley, H., Westbrook, D., & Kirk, J. (2016). *An Introduction to Cognitive Behaviour Therapy: Skills and Applications*. 1–512.

Kristjanson, A. J., Hardman, M. P., Penner, K. E., Gornik, M. E., Pryor, T. A. M., Petty, S. K., Alcolado, G. M., Furer, P., & Reynolds, K. A. (2022). "There is always a waitlist": The experiences of perinatal women randomized to a waitlist condition in a trial evaluating a novel online self-directed intervention for perinatal anxiety. *Frontiers in Health Services*, *2*. https://doi.org/10.3389/frhs.2022.957368

Ly, A., Verhagen, J., & Wagenmakers, E.-J. (2016). Harold Jeffreys's default Bayes factor hypothesis tests: Explanation, extension, and application in psychology. *Journal of Mathematical Psychology*, *72*, 19–32. https://doi.org/10.1016/j.jmp.2015.06.004

Mann, H. B., & Whitney, D. R. (1947). On a Test of Whether one of Two Random Variables is Stochastically Larger than the Other. *The Annals of Mathematical Statistics*, *18*(1), 50–60.

Matanov, A., McNamee, P., Akther, S., Barber, N., & Bird, V. (2021). Acceptability of a technology-supported and solution-focused intervention (DIALOG+) for chronic

depression: Views of service users and clinicians. *BMC Psychiatry*, *21*(1), 263. https://doi.org/10.1186/s12888-021-03256-5

McDonnell, D., Vasiliou, V. S., Lonergan, E., & Moore, P. (2022). Psychologists' Experiences Who Managed Waitlists in Mental-Health Services During the COVID-19 Lockdown. *European Journal of Psychology Open*, *81*(2), 47–56. https://doi.org/10.1024/2673-8627/a000024

Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1), 42. https://doi.org/10.1186/1748-5908-6-42

Myles, L. A. M., & Johnson, P. G. B. (2023). Parsimony: A Forgotten Principle in Clinical Psychology and Classics. *Mediterranean Journal of Clinical Psychology*, *11*(1).

NHS England. (2022). *Care Programme Approach: NHS England position statement*.

Nochaiwong, S., Ruengorn, C., Thavorn, K., Hutton, B., Awiphan, R., Phosuya, C., Ruanta, Y., Wongpakaran, N., & Wongpakaran, T. (2021). Global prevalence of mental health issues among the general population during the coronavirus disease-2019 pandemic: A systematic review and meta-analysis. *Scientific Reports*, *11*(1), 10173. https://doi.org/10.1038/s41598-021-89700-8

Oliver, A., Chandler, E., & Gillard, J. A. (2024). Impact of Digital Inclusion Initiative to Facilitate Access to Mental Health Services: Service User Interview Study. *JMIR Mental Health*, *11*(1), e51315. https://doi.org/10.2196/51315

Omer, S., Golden, E., & Priebe, S. (2016). Exploring the Mechanisms of a Patient-Centred Assessment with a Solution Focused Approach (DIALOG+) in the Community Treatment of Patients with Psychosis: A Process Evaluation within a Cluster-Randomised Controlled Trial. *PLOS ONE*, *11*(2), e0148415. https://doi.org/10.1371/journal.pone.0148415

Patton, M. (1990). *Qualitative evaluation and research methods* (2nd ed.). Sage.

Payne, M. (2006). *Narrative Therapy*. Sage.

Pemovska, T., Arënliu, A., Konjufca, J., Uka, F., Hunter, J., Bajraktarov, S., Stević, L. I., Jerotić, S., Kulenović, A. D., Novotni, A., Novotni, L., Radojičić, T., Repišti, S., Ribić, E., Ristić, I., Mešević, E. S., Zebić, M., & Jovanović, N. (2021). Implementing a digital mental health intervention for individuals with psychosis—A multi-country qualitative study. *BMC Psychiatry*, *21*(1), 468. https://doi.org/10.1186/s12888-021-03466-x

Priebe, S., Golden, E., Kingdon, D., Omer, S., Walsh, S., Katevas, K., McCrone, P., Eldridge, S., & McCabe, R. (2017). Effective patient–clinician interaction to improve treatment outcomes for patients with psychosis: A mixed-methods design. *Programme Grants for Applied Research*, *5*(6). https://doi.org/10.3310/pgfar05060

Priebe, S., Golden, E., McCabe, R., & Reininghaus, U. (2012). Patient-reported outcome data generated in a clinical intervention in community mental health care—Psychometric properties. *BMC Psychiatry*, *12*(1), 113. https://doi.org/10.1186/1471-244X-12-113

Priebe, S., Kelley, L., Omer, S., Golden, E., Walsh, S., Khanom, H., Kingdon, D., Rutterford, C., McCrone, P., & McCabe, R. (2015). The Effectiveness of a Patient-Centred Assessment with a Solution-Focused Approach (DIALOG+) for Patients with Psychosis: A Pragmatic Cluster-Randomised Controlled Trial in Community Care. *Psychotherapy and Psychosomatics*, *84*(5), 304–313. https://doi.org/10.1159/000430991

Priebe, S., McCabe, R., Bullenkamp, J., Hansson, L., Lauber, C., Martinez-Leal, R., Rössler, W., Salize, H., Svensson, B., Torres-Gonzales, F., Brink, R. V. D., Wiersma, D., & Wright, D. J. (2007). Structured patient–clinician communication and 1-year outcome in community mental healthcare: Cluster randomised controlled trial. *The British Journal of Psychiatry*, *191*(5), 420–426. https://doi.org/10.1192/bjp.bp.107.036939

Ribic, E., Sikira, H., Kulenovic, A. D., Pemovska, T., Russo, M., Jovanovic, N., Radojicic, T., Repisti, S., Milutinović, M., Blazevska, B., Konjufca, J., Ramadani, F., Jerotic, S., & Savic, B. (2022). Perceived sustainability of psychosocial treatment in low- and middle-income countries in South-Eastern Europe. *BJPsych Open*, *8*(5), e156. https://doi.org/10.1192/bjo.2022.539

Rouder, J. N., Speckman, P. L., Sun, D., Morey, R. D., & Iverson, G. (2009). Bayesian t tests for accepting and rejecting the null hypothesis. *Psychonomic Bulletin & Review*, *16*(2), 225–237. https://doi.org/10.3758/PBR.16.2.225

Schleider, J., Sung, J., Bianco, A., Gonzalez, A., Vivian, D., & Mullarkey, M. (2021). Open pilot trial of a single-session consultation service for clients on psychotherapy wait-lists. *The Behavior Therapist*, *44*(1), 8–15.

Schmalz, X., Biurrun Manresa, J., & Zhang, L. (2023). What is a Bayes factor? *Psychological Methods*, *28*(3), 705–718. https://doi.org/10.1037/met0000421

Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, *52*(3–4), 591–611. https://doi.org/10.1093/biomet/52.3-4.591

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359–1366. https://doi.org/10.1177/0956797611417632

Staniszewska, S., Brett, J., Simera, I., Seers, K., Mockford, C., Goodlad, S., Altman, D. G., Moher, D., Barber, R., Denegri, S., Entwistle, A., Littlejohns, P., Morris, C., Suleman, R., Thomas, V., & Tysall, C. (2017). GRIPP2 reporting checklists: Tools to improve reporting of patient and public involvement in research. *BMJ*, *358*, j3453. https://doi.org/10.1136/bmj.j3453

Steinert, C., Stadter, K., Stark, R., & Leichsenring, F. (2017). The Effects of Waiting for Treatment: A Meta-Analysis of Waitlist Control Groups in Randomized Controlled Trials for Social Anxiety Disorder. *Clinical Psychology & Psychotherapy*, *24*(3), 649–660. https://doi.org/10.1002/cpp.2032

Sung, J. Y., Bugatti, M., Vivian, D., & Schleider, J. L. (2023). Evaluating a telehealth single-session consultation service for clients on psychotherapy wait-lists. *Practice Innovations*, *8*(2), 141–161. https://doi.org/10.1037/pri0000207

Taylor, S. E., & Stanton, A. L. (2007). Coping Resources, Coping Processes, and Mental Health. *Annual Review of Clinical Psychology*, *3*, 377–401. https://doi.org/10.1146/annurev.clinpsy.3.022806.091520

Thomas, S., Jenkins, R., Burch, T., Calamos Nasir, L., Fisher, B., Giotaki, G., Gnani, S., Hertel, L., Marks, M., Mathers, N., Millington-Sanders, C., Morris, D., Ruprah-Shah, B., Stange, K., Thomas, P., White, R., & Wright, F. (2016). Promoting Mental Health and Preventing Mental Illness in General Practice. *London Journal of Primary Care*, *8*(1), 3–9. https://doi.org/10.1080/17571472.2015.1135659

Tran, Q. D. (2024). Going Beyond Waitlists in Mental Healthcare. *Community Mental Health Journal*, *60*(4), 629–634. https://doi.org/10.1007/s10597-024-01233-2

van Dijk, D. A., Meijer, R. M., van den Boogaard, Th. M., Spijker, J., Ruhé, H. G., & Peeters, F. P. M. L. (2023). Worse off by waiting for treatment? The impact of waiting time on clinical course and treatment outcome for depression in routine care. *Journal of Affective Disorders*, *322*, 205–211. https://doi.org/10.1016/j.jad.2022.11.011

van Loggerenberg, F., Akena, D., Alinaitwe, R., Birabwa-Oketcho, H., Méndez, C. A. C., Gómez-Restrepo, C., Kulenović, A. D., Selak, N., Kiseljaković, M., Musisi, S., Nakasujja, N., Sewankambo, N. K., & Priebe, S. (2023). Feasibility and outcomes of using DIALOG+ in primary care to improve quality of life and mental distress of

patients with long-term physical conditions: An exploratory non-controlled study in Bosnia and Herzegovina, Colombia and Uganda. *BMC Primary Care*, *24*(1), 241. https://doi.org/10.1186/s12875-023-02197-0

Whitfield, G. (2010). Group cognitive–behavioural therapy for anxiety and depression. *Advances in Psychiatric Treatment*, *16*(3), 219–227. https://doi.org/10.1192/apt.bp.108.005744

Wu, T., Jia, X., Shi, H., Niu, J., Yin, X., Xie, J., & Wang, X. (2021). Prevalence of mental health problems during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Affective Disorders*, *281*, 91–98. https://doi.org/10.1016/j.jad.2020.11.117



UNIVERSITY OF
OXFORD

The Role of Aberrant Salience of Internal Representations in Hallucinations

Liam Alexander MacKenzie Myles

St Cross College, University of Oxford

Email address: liam.myles@psy.ox.ac.uk

Contact Number: 07530 659 997

Date of Submission: 01/05/2025

Supervisors: Dr Louise Johns, Dr Emmeline Goodby, Dr Shama El-Salahi and Dr Mark Haselgrove

Word Count: 4999

Student Number: 1455838

Journal: Schizophrenia Bulletin

Abstract

Background and Hypotheses

The salience hypothesis posits that aberrant salience of stimuli contributes to unusual beliefs in people with psychosis. Specifically, this theory argues that people with psychosis afford an exaggerated prominence to redundant, unimportant objects. The salience hypothesis also suggests that hallucinations in people with psychosis stem from aberrant salience of 'internal representations' (i.e., thoughts, mental images or memories). The current study investigated whether people with psychosis who hallucinate exhibit aberrant salience of internal representations and whether people with psychosis, irrespective of whether they hallucinate, show aberrant salience of external stimuli.

Study Design

One hundred and eleven adults were recruited, with equal numbers of participants without psychosis ('controls'), with psychosis who hallucinate ('hallucinators') and with psychosis who do not hallucinate ('non-hallucinators'). To assess symptoms of psychosis, participants completed the Specific Psychotic Experiences Questionnaire, which measures paranoia, hallucinatory experiences, cognitive disorganisation, grandiosity and anhedonia. Participants also completed paradigms examining latent inhibition, to examine whether people with psychosis show aberrant salience of external stimuli, and 'mediated latent inhibition,' to determine whether hallucinators exhibit aberrant salience of internal representations.

Results

Participants in all groups exhibited both latent inhibition and mediated latent inhibition, but no differences were observed between controls, hallucinators and non-hallucinators.

Conclusions

Contrary to the predictions of the salience hypothesis, these findings suggest that people with psychosis who currently hallucinate do not exhibit aberrant salience of internal representations and that people with psychosis, irrespective of whether they hallucinate, do not demonstrate aberrant salience of external stimuli.

Keywords: Psychosis, Hallucinations, Aberrant Salience, Mediated Latent Inhibition, Latent Inhibition, Associative Learning

Introduction

Psychosis is a severe mental health difficulty affecting 3% of people (Kirkbride et al., 2012; Moreno-Küstner et al., 2018; Morgan et al., 2014; Perälä et al., 2007). It is characterised by 'positive,' 'negative' and 'disorganised' symptoms: positive symptoms refer to hallucinations, unusual beliefs and disorganised thoughts; negative symptoms include social withdrawal and reduced motivation, emotional affect, pleasure and speech; disorganised symptoms pertain to problems with attention, decision making, memory and planning (APA, 2013). Psychosis costs the UK over £12.5 billion each year (Fineberg et al., 2013) and is associated with poorer quality of life (Watson et al., 2018), physical health (Moreno et al., 2013; Sleurs et al., 2023) and relationships (Stain et al., 2012).

The salience hypothesis is an influential theory of psychosis (Howes & Kapur, 2009; Kapur, 2003; Kapur et al., 2005). It suggests people with psychosis experience context-independent aberrant salience of environmental stimuli. Specifically, redundant, unimportant objects maintain an exaggerated prominence and acquire greater attention. Unusual beliefs, it is argued, stem from rationalisations of this heightened salience. For example, if an individual repeatedly notices a car parked outside their home, they may conclude they are being monitored. The salience hypothesis also posits that hallucinations stem from aberrant salience of 'internal representations' (i.e., thoughts, mental images or memories). For example, a highly salient memory of a parent's critical comments may be perceived as an external voice. However, this theory struggles to elucidate why heightened salience culminates in external attributions of internal representations.

Researchers have subjected the salience hypothesis to empirical scrutiny. Anecdotal evidence comes from reports that sensations feel 'heightened' and redundant stimuli can seem important

for people with psychosis (Anonymous, 1955; Arner, 2023; Bowers, 1968; Bowers & Freedman, 1966; Chadwick, 2007; MacDonald, 1960; McGhie & Chapman, 1961; Murawiec, 2008; Sack et al., 2005). Empirical evidence comes from studies of latent inhibition (LI), the phenomenon that pre-exposure to a conditioned stimulus (CS) hinders subsequent learning about the relationship between the CS and an unconditioned stimulus (US; Ginton et al., 1975). Research suggests LI is caused by reductions in the salience of the CS during pre-exposure (Le Pelley et al., 2016; Mackintosh, 1975; Pearce & Hall, 1980; Pearce & Mackintosh, 2010; Wagner, 1981). As stimuli of lower salience are learnt about more slowly, this reduction in salience diminishes subsequent learning about the CS-US relationship. Consistent with the salience hypothesis' proposition that stimuli retain relatively higher salience in people with psychosis, Baruch et al. (1988) reported seminal evidence that LI is attenuated in people with schizophrenia. However, a recent review found conflicting evidence that LI is attenuated in people with psychosis (Myles et al., 2023), and thus only tentative support for the proposition that external stimuli are aberrantly salient.

Correlational research offers tentative evidence that hallucinations are associated with aberrantly salient internal representations. People experiencing auditory hallucinations often report hallucinations of remembered voices (Beyer, 2022; Jepson, 2021; Tian, 2022) and experiences (McCarthy-Jones, Trauer, et al., 2014), consistent with proposals that hallucinations stem from thoughts/memories (Beck & Rector, 2003). Also, scores on questionnaires examining aberrant salience and hallucinatory experiences are correlated (De Fazio et al., 2020; Pugliese et al., 2022), with day-to-day fluctuations in salience associated with unusual sensory experiences (Chun et al., 2020). Whilst it is unclear whether these results stemmed from aberrant internal or external salience, Morrison & Haddock (1997) reported that hallucinating, compared to non-hallucinating, people with schizophrenia exhibited elevated 'self-focused attention,' perhaps indicating internal representations acquire greater attention.

Relatedly, some, though not all (Wagner & Monzel, 2023), studies reported higher mental imagery vividness (MIV) in people with psychosis (Sack et al., 2005), which may be a consequence of aberrant internal salience. However, studies of MIV examine volitional mental images/sounds, which may be underpinned by distinct cognitive mechanisms to those governing involuntary hallucinations. Notably, MIV is not associated with hallucinatory experiences (Aleman et al., 2001, 2003; Slade, 1976), contrasting proposals that aberrantly salient internal representations produce both greater MIV and hallucinations.

Experimental research has also indirectly examined claims that aberrant salience of internal representations causes hallucinations. For example, after associating a visual CS (VCS) with an auditory CS (ACS), people with psychosis who hallucinate, people at high risk of psychosis and people who hallucinate were subsequently more likely to report hearing the ACS when presented with the VCS in isolation than people with psychosis who do not hallucinate, people at low risk of psychosis and people who do not hallucinate, respectively (Fry et al., 2022; Kafadar et al., 2020; Kot & Serper, 2002; Powers et al., 2017). However, whilst this suggests associatively activated internal representations (i.e., the memory of the ACS) are more likely to be externally attributed, it is unclear whether this is underpinned by aberrant salience. These studies provide only limited evidence for the salience hypothesis, but no other studies have directly examined the claim that aberrant salience of internal representations causes hallucinations.

Hallucinations can be distressing and are experienced by up to 80% of people with psychosis (McCarthy-Jones et al., 2017), but exhibit only modest reductions following therapy (van der Gaag et al., 2014). Whilst accurate theoretical conceptualisations of psychosis are imperative for developing effective interventions, direct evidence for the proposition that hallucinations result from aberrant salience of internal representations is absent. Therefore, this study investigated whether people with psychosis who hallucinate exhibit aberrant salience of

internal representations. Also, given the mixed evidence, this study examined whether people with psychosis exhibit attenuated LI. Consistent with the salience hypothesis, it was hypothesised that people with psychosis who hallucinate would exhibit aberrant salience of internal representations and people with psychosis, irrespective of whether they hallucinate, would show aberrant salience of external stimuli.

Methods

This study was pre-registered (see https://osf.io/bc25v/).

Participants

This study included adults without a diagnosis/history of mental health difficulties ('controls'), with psychosis and ongoing hallucinations ('hallucinators') and with psychosis who do not hallucinate ('non-hallucinators'). As hallucinations are common in psychosis (Allen et al., 2023; Lim et al., 2016), hallucinators were defined as people who self-identified as having ongoing hallucinations, with at least one hallucination in the preceding two weeks, and non-hallucinators were defined as those who self-identified as not having hallucinated in the preceding three months. One hundred and eleven participants were recruited from NHS Trusts, charitable organisations and social media (see **Appendix 27**) between 20/05/2024 and 04/02/2025, with 37 in each group, affording 90% power to detect small effect sizes (f = .13). Individuals were ineligible to participate if they had a self-reported learning disability, dementia and/or severe drug and/or alcohol difficulty, due to potential confounding effects on learning.

Design

A cross-sectional, quasi-experimental design was used. The independent variables were the groups (i.e., controls, hallucinators and non-hallucinators) and stimuli (i.e., A, B, X, Y and Z; see *Materials*). The dependent variable was reaction time (RT).

Measures and Materials

Participants provided demographic information, including their age, gender, ethnicity, psychiatric diagnoses, medications (type and dose), average alcohol consumption per week, average cigarette use per day, vape use, illicit substance use and physical health conditions; these variables were measured because they may affect LI (Evans et al., 2007; Leumann et al., 2002; Weiner & Arad, 2009). Also, participants reported the frequency with which they hallucinate on a seven-point Likert scale of 'every few minutes,' 'hourly,' 'daily,' 'weekly,' 'monthly,' 'yearly' and 'never.' During piloting, people with psychosis were consulted on the clarity of all written information.

The Specific Psychotic Experiences Questionnaire (SPEQ; Ronald et al., 2014), administered via Qualtrics, measured psychosis symptoms over the preceding month (see **Appendix 28**). The 15-item paranoia and nine-item hallucination subscales assessed the frequency of suspicious, mistrustful thoughts and erroneous perceptions, respectively, on six-point Likert scales. The 11-item cognitive disorganisation subscale examined problems with attention, concentration and decision making using a dichotomous scale. The eight-item grandiosity subscale measured inflated perceptions of self-importance, competence and abilities on a four-

point Likert scale. Finally, the 10-item anhedonia subscale evaluated loss of pleasure and excitement on a six-point Likert scale.

Evidence for the validity of the SPEQ comes from reports that scores correlate with measures of relevant phenomena, including psychosis, depression and anxiety questionnaires (Ronald et al., 2014). Evidence for its reliability comes from reports of high internal (a = .77 – .93) and test-retest (r = .65 – .74) reliability over nine months (Ronald et al., 2014).

Adapted from Granger et al. (2016), a 'mediated LI' paradigm was developed to examine the salience of internal representations and external stimuli (see https://run.pavlovia.org/LiamMyles/mediated_li_v2); this was delivered via PsychoPy. The term 'mediated LI' was coined to describe efforts to observe LI of mental representations. The design and example stimuli are displayed in **Figures 1** and **2**, respectively. Pronounceable 'pseudowords' with at least one vowel, including 'lonc,' 'kuep,' 'cazs,' 'sone,' 'rini,' 'koes,' 'sern,' 'tono' and 'zyne,' were used as stimuli. During piloting, people with psychosis were consulted to ensure these pseudowords did not have any personal connotations, to minimise systematic differences in stimulus salience/associability. Pseudowords were randomised for each participant; letters (e.g., 'A') are used to represent pseudowords. Within each phase, the order of stimulus presentation was randomised.

In the associative learning phase, participants were instructed, "pseudowords are 'made up' words, such as 'yacz.' Watch the sequence of pseudowords appearing on the screen and state each pseudoword out loud." Two sets of stimuli were associated together through 30 concurrent presentations each (i.e., 'A – X' and 'B – Y'); stimulus pairs (e.g., 'A – X') were presented for two seconds each, followed by a 200ms interval. As people associate concurrently presented stimuli, presentation of one stimulus (e.g., 'A') should evoke an internal representation of the other (e.g., 'X;' Castro & Matute, 2010; Holland, 1990; Stout & Miller, 2007). Piloting

suggested 30 presentations of each stimulus pair was sufficient for associations to form. To ensure the task was sufficiently challenging, four distractor stimuli (i.e., 'D1,' 'D2,' 'D3' and 'D4') were presented in compounds (e.g., 'D1 – D2'), with every possible stimulus compound (e.g., 'D1 – D3,' 'D1 – D4,' etc.) presented twice.

In the pre-exposure phase, which immediately followed the associative learning phase, participants received 20 presentations of 'A.' Repeated exposure to 'A' should attenuate its salience and repeatedly evoke internal representations of 'X.' Theory suggests this 'mediated pre-exposure' to 'X' will diminish the salience of the internal representation of 'X' (Mackintosh, 1975; Pearce & Hall, 1980; Pearce & Mackintosh, 2010). Four distractor stimuli were individually presented ten times each (e.g., 'D1,' 'D2,' etc.) and every possible compound of distractor stimuli was presented twice. Compound distractor stimuli were used to minimise perceived changes in the 'context' between the associative learning and pre-exposure phases, as context changes can diminish the expression of prior associative learning (De Houwer, 2014; Hamid et al., 2010; Urcelay & Miller, 2014). Individual stimuli and stimulus compounds were presented for one second and two seconds, respectively, followed by a 200ms interval.

In the test phase, participants were instructed, "watch the sequence of pseudowords appearing on the screen. Your task is to try to predict when the pseudoword 'dax' is going to appear. If you think you know when dax will appear, press the space bar (i.e., before dax appears). Alternatively, if you do not know when dax will appear, please press the spacebar as quickly as possible when you see dax. There may be more than one rule that predicts dax." Stimuli 'A,' 'B,' 'X,' 'Y' and 'Z,' the latter a novel stimulus, were presented 20 times each for one second and were always followed by a 200ms interval and a one second presentation of 'dax.' Reaction times were calculated as the latency with which participants pressed the space bar following the onset of predictor stimuli ('A,' 'B,' 'X,' 'Y' and 'Z'); they were limited to a maximum of 2200ms, following the termination of 'dax.' If participants hit the space bar multiple times, the

first RT was recorded. As more salient stimuli form associations more readily (Mackintosh, 1975; Pearce & Hall, 1980; Pearce & Mackintosh, 2010), faster RTs were indicative of higher stimulus salience. Four distractor stimuli were individually presented 64 times each.

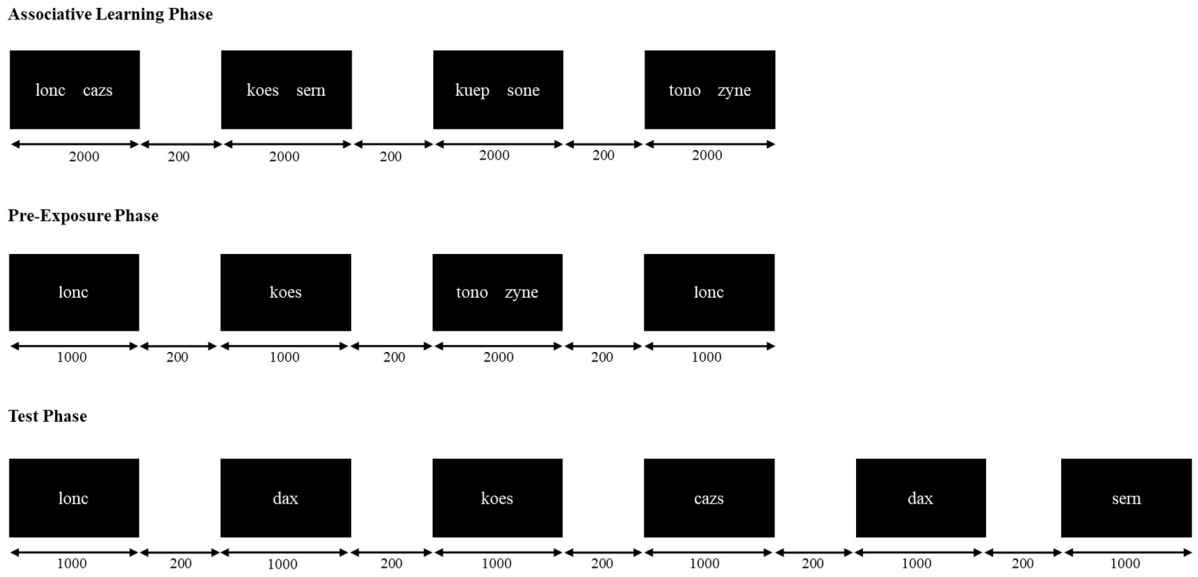
Figure 1

Mediated Latent Inhibition Paradigm Design

Associative Learning Phase	**Pre-Exposure Phase**	**Test Phase**
A – X	A	A → 'dax'
B – Y	Distractor Stimuli	B → 'dax'
Compound Distractor Stimuli	Compound Distractor Stimuli	X → 'dax'
		Y → 'dax'
		Z → 'dax'
		Distractor Stimuli

Figure 2

Mediated Latent Inhibition Paradigm Stimuli



Note. A, B, X, Y, Z, D1, D2, D3 and D4 are represented by 'lonc,' 'kuep,' 'cazs,' 'sone,' 'rini,' 'koes,' 'sern,' 'tono' and 'zyne,' respectively. In the associative learning phase, A – X (e.g., lonc cazs), D1 – D2 (e.g., koes sern), B – Y (e.g., kuep sone) and D3 – D4 (e.g., tono zyne) are presented. In the pre-exposure phase, A (e.g., lonc), D1 (e.g., koes), D3 – D4 (e.g., tono zyne) and A (e.g., lonc) are presented. In the test phase, A (e.g., lonc) → 'dax,' D1 (e.g., koes), X (e.g., cazs) → 'dax' and D2 (e.g., sern) are presented.

Procedure

Ethical and HRA approval for this study was provided by NHS Lothian Research Ethics Committee. This study was conducted over videocall to ensure participants were completing the study appropriately. After providing informed consent (see **Appendices 29** and **30**), participants provided demographic information, before independently completing the SPEQ

and mediated LI task. The researcher ensured participants vocalised pseudowords during the associative learning and pre-exposure phases, to minimise the confounding effects of learned irrelevance (Myles et al., 2023). Participants were then debriefed (see **Appendix 32**).

Statistical Analysis

Jamovi version 2.3.28 was used to analyse data. Between-subjects ANOVAs and chi-squared tests assessed whether continuous and nominal demographic and clinical information varied between groups, respectively. A mixed ANOVA examined the effect of group (controls, hallucinators and non-hallucinators) and stimuli (A, B, X, Y and Z) on RTs. For ANOVAs, Levene's (1960) test was used to examine variance homogeneity. Welch's (1947) correction was applied where heterogeneity was indicated. In mixed ANOVAs, Mauchly's (1940) test examined sphericity. The Greenhouse-Geisser (1959) correction was applied where sphericity assumptions were violated. Shapiro-Wilk (1965) tests and histograms were used to examine normality. Where the dependent variable was not normally distributed, Kruskal-Wallis (1952) non-parametric ANOVAs were used. Non-parametric Dwass-Steel-Critchlow-Fligner pairwise comparisons followed up statistically significant effects. For mixed ANOVAs, quantile-quantile plots of the standardised residuals against theoretical quantiles were used to ascertain whether residuals were normally distributed. Where demographics differed between groups, ANCOVAs examined the effect of the group and stimuli on RTs, controlling for relevant demographics. For ANOVAs and ANCOVAs, partial eta-squared effect sizes of .01, .06 and .14 were interpreted as small, medium and large, respectively (Richardson, 2011). T-tests followed up statistically significant effects. For t-tests, effect sizes of .2, .5 and .8 were interpreted as small, medium and large, respectively (Cohen, 1988). The significance threshold was $\alpha = .05$

and no correction for multiple comparisons was applied, as each test evaluated different questions.

Results

Demographic and Clinical Information

Demographic and clinical information for each group is shown in **Table 1**, alongside statistical tests reporting whether there were differences between groups. Tests of the assumptions of these statistical tests are detailed in **Appendix 33, Supplementary Analysis (SA) 1**. Whilst anhedonia was normally distributed, age, alcohol consumption, number of cigarettes smoked per day, paranoia, hallucinations, cognitive disorganisation and grandiosity were not. All non-normally distributed variables were positively skewed, except for cognitive disorganisation which exhibited a platykurtic distribution.

Regarding demographics, controls smoked less than hallucinators, $W = -4.034$, $p = .012$, and non-hallucinators, $W = -3.323$, $p = .049$, but drank more alcohol than hallucinators, $W = 4.11$, $p = .01$. Regarding symptomology, hallucinators exhibited higher paranoia than controls, $W = -5.83$, $p < .001$. As well as reporting more hallucinatory experiences than controls, $W = -8.95$, $p < .001$, and non-hallucinators, $W = -8.2$, $p < .001$, hallucinators disclosed higher grandiosity than controls, $W = -3.625$, $p = .028$, and non-hallucinators, $W = -3.96$, $p = .014$. Finally, controls displayed less cognitive disorganisation than hallucinators, $W = -5.21$, $p < .001$, and non-hallucinators, $W = -3.52$, $p = .034$, and lower anhedonia than hallucinators, $p = .021$, $d = .71$, and non-hallucinators, $p = .009$, $d = .79$.

Table 1

Demographic and Clinical Information

Demographic/ Symptom	Controls	Hallucinators	Non-Hallucinators	Statistics
Age	31.12 (10.07)	35.54 (14.3)	36.05 (13.78)	$\chi^2(2) = 1.75$, $p = .42$
Gender	Female: 51.35% Male: 48.65%	Female: 51.35% Male: 35.14% Non-Binary: 10.81% Transgender: 2.7%	Female: 51.35% Male: 43.24% Non-Binary: 5.41%	$\chi^2(6) = 6.81$, $p = .34$
Ethnicity	Asian or Asian British: 2.7% Asian or Asian British (Any Other Asian Background): 2.7% Asian or Asian British (Chinese): 2.7%	Asian or Asian British: 10.81% Black, Black British, Caribbean or African: 2.7% Mixed or Multiple Ethnic Groups: 5.41%	Asian or Asian British (Chinese): 2.7% Asian or Asian British (Indian): 2.7%	$\chi^2(30) = 35.8$, $p = .21$

	Asian or Asian British (Indian): 5.41% Asian or Asian British (Pakistani): 2.7% Mixed or Multiple Ethnic Groups (Any Other Mixed or Multiple Ethnic Background): 5.41% Mixed or Multiple Ethnic Groups (White and Asian): 2.7% Other Ethnic Group (Arab): 2.7% White: 16.22% White (Any Other White Background): 8.11% White (British): 43.24% White (Irish): 5.41%	Mixed or Multiple Ethnic Groups (White and Asian): 5.41% White: 24.32% White (Any Other White Background): 8.11% White British: 40.54% White (Irish): 2.7%	Mixed or Multiple Ethnic Groups: 8.11% White: 5.41% Mixed or Multiple Ethnic Groups (White and Black African): 2.7% White (Any Other White Background): 8.11% White (British): 70.27%
Psychiatric Diagnoses	Anxiety: 13.51% Depression: 2.7% Obsessive-Compulsive Disorder: 2.7%	Anxiety: 16.22% Attention Deficit Hyperactivity Disorder: 5.41% Autism: 10.81%	Anxiety: 21.62% Attention Deficit Hyperactivity Disorder: 10.81%

	Panic Disorder: 2.7% Post-Traumatic Stress Disorder: 2.7%	Depression: 18.92% Personality Disorder: 16.22% Post-Traumatic Stress Disorder: 13.51% Psychosis: 100% Substance Use: 2.7%	Autism: 5.41% Depression: 29.73% Obsessive-Compulsive Disorder: 5.41% Personality Disorder: 2.7% Psychosis: 100%
Medications	Escitalopram: 5.41% Nortriptyline: 2.7% Sertraline: 2.7%	Amisulpride: 2.7% Amitriptyline: 2.7% Aripiprazole: 27.03% Clozapine: 2.7% Diazepam: 8.11% Duloxetine: 2.7% Escitalopram: 2.7% Espinol: 2.7% Fluoxetine: 2.7% Haloperidol: 2.7%	Amisulpride: 2.7% Aripiprazole: 40.54% Clozapine: 2.7% Dexamphetamine: 2.7% Diazepam: 2.7% Escitalopram: 2.7% Fluoxetine: 2.7% Lamotrigine: 8.11% Lithium: 2.7% Mirtazapine: 2.7%

		Mirtazapine: 8.11% Olanzapine: 18.92% Pregabalin: 5.41% Procyclidine: 2.7% Propranolol: 5.41% Quetiapine: 2.7% Risperidone: 10.81% Sertraline: 18.92% Trazadone: 2.7% Venlafaxine: 8.11% Zolpidem: 2.7% Zopiclone: 2.7%	Olanzapine: 8.11% Pregabalin: 2.7% Promethazine: 5.41% Quetiapine: 13.51% Risperidone: 13.51% Sertraline: 13.51% Venlafaxine: 18.92% Zopiclone: 2.7% Zuclopenthixol: 2.7%	
Alcohol	5.14 (5.88)	3.36 (8.1)	3.64 (4.86)	$\chi^2(2) = 8.11$, $p = .017$
Smoking	.19 (.81)	3.24 (7.21)	2.81 (6.49)	$\chi^2(2) = 8.05$, $p = .018$

Vape Use	Vaper: 13.51%	Vaper: 21.62%	Vaper: 27.03%	$\chi^2(2) = 2.08$,
	Non-Vaper: 86.49%	Non-Vaper: 78.38%	Non-Vaper: 72.97%	$p = .35$
Substance Use	Cannabis: 10.81%	Benzodiazepines: 2.7%	Cannabis: 16.22%	
	Cocaine: 2.7%	Cannabis: 13.51%	Cocaine: 2.7%	
	LSD: 2.7%	Cocaine: 5.41%	Ketamine: 2.7%	
	MDMA: 5.41%	Heroin: 2.7%	Magic Mushrooms: 2.7%	
	Psilocybin: 2.7%	Magic Mushrooms: 2.7%	MDMA: 2.7%	
		MDMA: 5.41%		
		Pregabalin: 2.7%		
Health	Asthma: 2.7%	Asthma: 8.11%	Arthritis: 2.7%	
Conditions	Chronic Pain: 2.7%	Bulging Disc: 2.7%	Bulging Disc: 2.7%	
	Eczema: 5.41%	Chronic Pain: 2.7%	Chronic Fatigue Syndrome:	
	Gilbert's Syndrome: 2.7%	Cornelia de Lange Syndrome: 2.7%	5.41%	
	Migraines: 5.41%	Fibroid: 2.7%	Clubfoot: 2.7%	
	Sinusitis: 2.7%	Fibromyalgia: 5.41%	Diabetes: 2.7%	
	Tension Headaches: 2.7%	Gastroesophageal Reflux Disease: 2.7%	Dyspraxia: 2.7%	

		Graves' Disease: 2.7% Hypertension: 2.7% Keratoconus: 2.7% Migraines: 5.41% Osteoarthritis: 5.41% Osteoporosis: 5.41% Seizures: 2.7% Sinus Tachycardia: 2.7% Spondylitis: 2.7%	Epilepsy: 2.7% Fatigue: 2.7% Herniated Disc: 2.7% Hypothyroidism: 5.41% Obesity: 5.41% Osteoarthritis: 5.41% Parkinsons: 2.7% Primary Addison's Disease: 2.7% Psoriasis: 2.7% Sickle Cell Anaemia: 2.7% Visual Snow Syndrome: 2.7%	
Recruitment	Online: 100%	NHS: 54.1% Online: 45.9%	NHS: 86.5% Online: 13.5%	$\chi^2(2) = 56.7$, $p < .001$
Paranoia	22.97 (8.32)	45.16 (23.96)	33.38 (19.29)	$\chi^2(2) = 17.21$, $p < .001$

Hallucinations	11.81 (4.88)	27.95 (11.53)	13.22 (6.53)	$\chi^2(2) = 50.98$, $p < .001$
Cognitive Disorganisation	14.89 (2.93)	17.95 (3.37)	17.16 (3.93)	$\chi^2(2) = 13.54$, $p = .001$
Grandiosity	11.73 (4.07)	15.62 (6.84)	11.7 (4.69)	$\chi^2(2) = 9.87$, $p = .007$
Anhedonia	37.46 (6.31)	32.11 (9.96)	31.46 (10.04)	$F(2, 68.2) = 6.6$, $p = .002$

Note. Means and standard deviations (SDs) are displayed for all continuous variables. For each nominal variable, the proportion of members for each group is shown. The UK Government ethnicity categories were used to categorise participants into ethnic groups (see https://www.ethnicity-facts-figures.service.gov.uk/style-guide/ethnic-groups/). Statistical tests were not reported for psychiatric diagnoses, medications and illicit substance use because there were too many variables within each group for tests to be sufficiently powered.

Correlations Between SPEQ Subdimensions and Stimuli

As some variables were not normally distributed, Spearman (1961) correlations between SPEQ subdimensions and stimuli are shown in **Table 2**. Higher paranoia was associated with longer RTs to B and X. Also, greater cognitive disorganisation was associated with prolonged RTs to Z.

Table 2

Correlations Between SPEQ Subdimensions and Stimuli

	P		H		CD		G	IA	A	B	X	Y	Z
P	—												
H	**.566**	***	—										
CD	**.658**	***	**.561**	***	—								
G	**.356**	***	**.357**	***	**.239**	*	—						

	P	H	CD	G	IA	A	B	X	Y	Z
IA	**-.200 ***	-.091	-.181	.078	—					
A	.124	.032	.128	.148	.037	—				
B	**.199 ***	.034	.163	.095	.057	**.840 *****	—			
X	**.236 ***	.076	.173	.157	.044	**.810 *****	**.878 *****	—		
Y	.114	.031	.144	.112	.057	**.797 *****	**.902 *****	**.812 *****	—	
Z	.180	.078	**.219 ***	.117	-.018	**.758 *****	**.819 *****	**.806 *****	**.788 *****	—

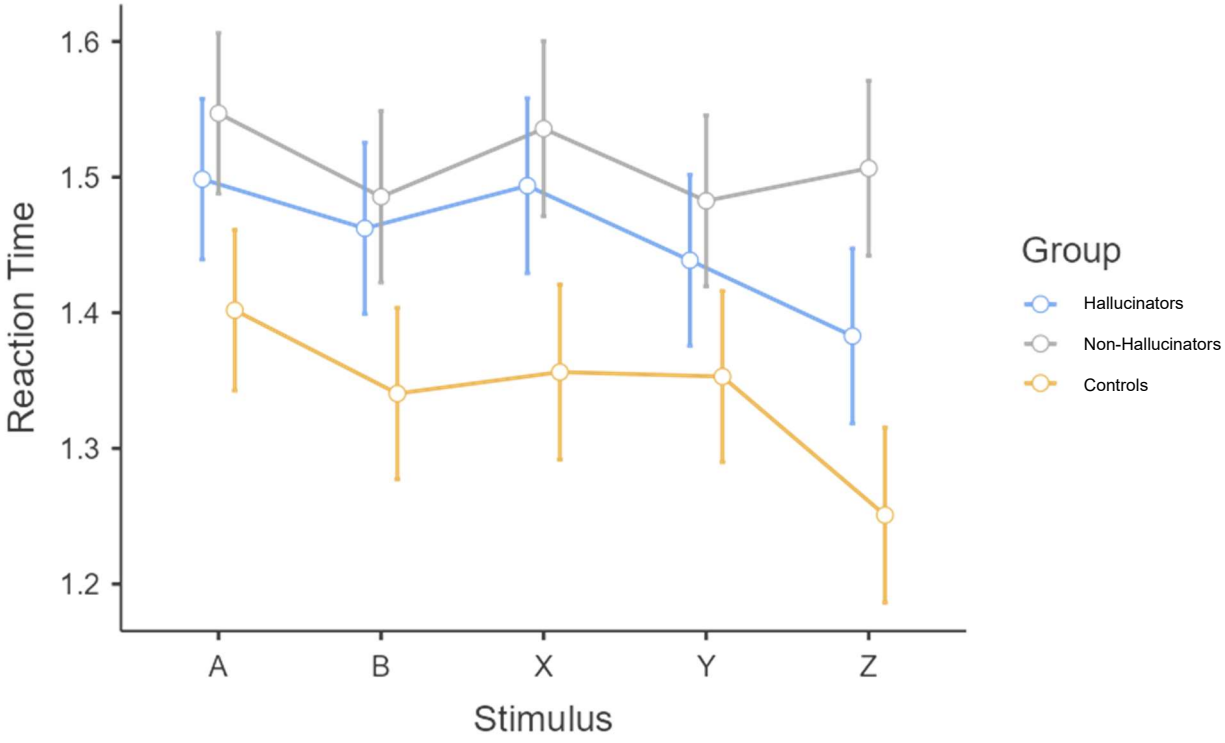
Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Significant correlations are highlighted in bold. Paranoia, hallucinations, cognitive disorganisation, grandiosity and anhedonia are represented by ‘P,’ ‘H,’ ‘CD,’ ‘G’ and ‘IA,’ respectively.

The Effect of Group and Stimuli on Reaction Times

The means and standard errors of each group's RTs for each stimulus are shown in **Figure 3**. As Mauchly's test indicated the assumption of sphericity was violated, $W = .797$, $p = .004$, the Greenhouse-Geisser correction was applied, $\varepsilon = .914$. Inspection of the quantile-quantile plot suggested residuals approximated a normal distribution (see **Appendix 33, SA 2**). The stimulus had a medium effect on RTs, $F(3.66, 394.98) = 6.96$, $p < .001$, $\eta^2_p = .061$. However, RTs were not significantly affected by the group, $F(2, 108) = 2.21$, $p = .11$, $\eta^2_p = .039$, or the interaction between the stimulus and group, $F(7.31, 394.98) = 1.16$, $p = .32$, $\eta^2_p = .021$. Similar results were ascertained when controlling for smoking and alcohol consumption (see **Appendix 33, SA 3**).

Figure 3

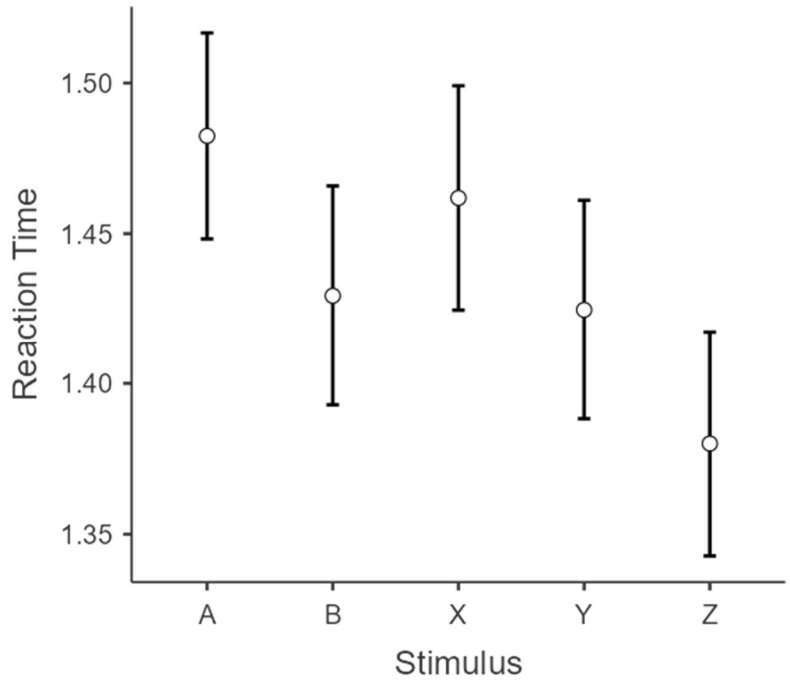
Means and Standard Errors of Each Group's Reaction Times for Each Stimulus



The means and standard errors of RTs to each stimulus are shown in **Figure 4**. Pairwise comparisons (see **Appendix 33, SA 4**) indicated RTs to A were higher than B, $p = .009$, $d = .51$, Y, $p = .007$, $d = .53$, and Z, $p < .001$, $d = .88$, but not X, $p = .358$, $d = .18$. Also, RTs to X were marginally greater than B, $p = .078$, $d = .34$ and Y, $p = .078$, $d = .34$, and significantly higher than Z, $p < .001$, $d = .67$. Furthermore, RTs to B were higher than Z, $p = .027$, $d = .43$, but no different to Y, $p = .77$, $d = .06$. Finally, RTs for Y were marginally greater than Z, $p = .05$, $d = .38$. Corrected pairwise comparisons are shown in **Appendix 33, SA 5**.

Figure 4

Means and Standard Errors of Reaction Times to Each Stimulus



Discussion

This study investigated whether people with psychosis who hallucinate exhibit aberrant salience of internal representations and whether people with psychosis, irrespective of whether they hallucinate, exhibit aberrant salience of external stimuli. All participants exhibited both mediated LI and LI, with no group differences. This suggests people with psychosis who hallucinate do not exhibit aberrant salience of internal representations and people with psychosis, irrespective of whether they hallucinate, do not exhibit aberrant salience of external stimuli.

Latent Inhibition and Mediated Latent Inhibition

Across groups, participants exhibited LI, as indicated by longer RTs to stimuli with which they received prior exposure (A, B, X and Y) than to novel stimuli (Z). These findings are consistent with previous research demonstrating LI in humans (Ginton et al., 1975; Granger et al., 2016; Gray et al., 2003; Lubow & Gewirtz, 1995; Lubow & Weiner, 2010). Also, across groups, participants appeared to exhibit mediated LI, as indicated by a trend towards longer RTs to stimuli that received mediated pre-exposure (X) compared with stimuli that received identical physical, but not mediated, pre-exposure (B and Y). Differences between stimuli pre-exposed in a mediated (X) and non-mediated (B and Y) manner were only significant at trend level, perhaps suggesting A was too weakly associated with X to evoke its representation. Nevertheless, participants exhibited longer RTs to stimuli that were pre-exposed 50 (A), as compared to 30 (B and Y), times, only when the latter did not receive mediated pre-exposure

(X), corroborating the proposal that mediated pre-exposure attenuated stimulus salience. Thus, the results generally suggest that participants exhibited LI and mediated LI.

Hallucinations and Aberrant Salience of Internal Representations

There were no differences in mediated LI between controls, hallucinators and non-hallucinators and RTs to stimuli that received mediated pre-exposure (X) were not correlated with measures of hallucinations, suggesting people with psychosis who hallucinate do not exhibit aberrant salience of internal representations. These results are unlikely to be attributable to insufficient variation in hallucinations between groups, as hallucinators disclosed significantly more hallucinatory experiences than controls and non-hallucinators. Nevertheless, these results do not negate the possibility that other aberrations in internal representations and/or conditioning processes underlie hallucinations (Suzuki & Kosaki, 2024).

As previous research directly examining the assertion that hallucinations stem from aberrantly salient internal representations is absent, these findings do not directly contradict prior literature. One explanation for these results is that hallucinations in psychosis may reflect stable trait characteristics rather than transient state phenomena (Kühn & Gallinat, 2012). This would suggest there were insufficient differences in trait hallucinations between 'hallucinators' and 'non-hallucinators,' as many non-hallucinators experience hallucinations at some point in their lives (McCarthy-Jones et al., 2017). However, there were also no differences between hallucinators, non-hallucinators and control groups, despite the latter ostensibly being lower in trait hallucinations. Another explanation is that the salience hypothesis may be imprecise in its predictions concerning the causes of hallucinations. Hallucinations typically consist of emotionally distressing material (Tsang et al., 2021) and it has been argued that the prominence

of only some types of internal representations (McCarthy-Jones, Thomas, et al., 2014), namely dialogical inner speech (McCarthy-Jones & Fernyhough, 2011), underlies hallucinations. Accordingly, people with psychosis who hallucinate may only exhibit aberrant salience of emotionally distressing and/or dialogical internal representations. Unfortunately, this study may have overlooked the role of emotionally distressing and/or dialogical internal representations by using only neutral pseudowords.

Paranoia was associated with greater mediated LI, as indicated by longer RTs to X. Consistent with the salience hypothesis, these results may stem from paranoid individuals directing greater attention towards external stimuli at the expense of internal representations. However, the absence of an attenuating effect of paranoia on LI (i.e., RTs to A) undermines this explanation. More generally, paranoia maintained weak, often non-significant, correlations with RTs to other stimuli. Paranoia may have a small association with slower RTs, and B and X may have crossed the threshold of 'statistical significance' by chance (Abelson, 2012). Unfortunately, limitations in statistical power prevent confirmation of this hypothesis.

Psychosis and Aberrant Salience

Hallucinators and non-hallucinators did not exhibit attenuated LI, and RTs to stimuli that received (non-mediated) pre-exposure (A, B and Y) were not correlated with psychosis symptoms, apart from the correlation between paranoia and RTs to B. These results suggest that people with psychosis do not assign aberrant salience to external stimuli. These findings add to the highly inconsistent and contradictory research literature, consisting of several studies claiming psychosis is (Baruch et al., 1988; Cohen et al., 2004; Gal et al., 2009; Guterman et al., 1996; Rascle et al., 2001; Serra et al., 2001; Vaitl et al., 2002; Williams et al., 1998; Yogev

et al., 2004) and is not (Gray et al., 1995; Kathmann et al., 2000; Lubow et al., 1987; Swerdlow et al., 1996, 2005) associated with attenuated LI. The validity of many previous studies is compromised by the confounding effects of learned irrelevance, conditioned inhibition, negative priming effects, the absence of an empirical basis to segment participant groups by symptoms or psychosis longevity and low statistical power (Myles et al., 2023). The current study does not suffer from these confounds, strengthening the validity of the conclusion that psychosis is not associated with attenuated LI. However, the current results may be attributable to insufficient variation in psychosis symptoms between groups. Specifically, whilst non-hallucinators reported greater cognitive disorganisation and anhedonia than controls, they did not significantly differ in paranoia, hallucinatory experiences or grandiosity. Insufficient variation in symptoms may have obfuscated any effects of psychosis on LI. Nevertheless, hallucinators exhibited more paranoia, hallucinatory experiences, grandiosity, cognitive disorganisation and anhedonia than controls and did not demonstrate attenuated LI, indicating external stimuli are not aberrantly salient in people with psychosis.

Higher paranoia was associated with longer RTs to B, suggesting LI was potentiated for those high in paranoia after 30, but not 50 (A), pre-exposures. Whilst this contradicts almost all studies investigating the relationship between psychosis symptoms and LI (Myles et al., 2023), Granger et al. (2016), who used a similar paradigm to that used in this study, reported that unusual beliefs were associated with potentiated LI. Whilst not identical, unusual beliefs and paranoia are conceptually related, as the former can culminate in the latter (Freeman et al., 2002; Morrison, 2001). However, similar results were not ascertained for Y, which received identical pre-exposure to B. Moreover, it is unclear why LI would be enhanced after 30, but not 50, pre-exposure trials. Inconsistencies in results between B and Y may suggest these results are more readily attributable to chance, as previously discussed.

Psychosis and Associative Learning

Overall RTs did not vary between groups, suggesting that psychosis, irrespective of hallucinatory experiences, did not affect associative learning. However, consistent with some previous research (Gray et al., 2002), cognitive disorganisation was associated with slower learning that a novel stimulus (Z) predicted an outcome. This suggests that difficulties with attention, concentration and decision-making hinder learning associations between novel stimuli. The basis for this relationship is unclear and warrants further research. Again, cognitive disorganisation maintained weak, non-significant correlations with RTs to other stimuli, perhaps suggesting its association with RTs to novel stimuli crossed the threshold of 'statistical significance' by chance.

Limitations

First, rapid learning of associations between novel stimuli (Z) may be due to novel popout effects, the phenomenon that novel stimuli are learnt about more rapidly when placed amongst familiar distractors (Johnston et al., 1993; Johnston & Hawley, 1994). This could enhance RT differences between novel and pre-exposed stimuli, producing 'LI-like' effects. Accordingly, the effects of cognitive disorganisation on learning associations between novel stimuli (Z) may be attributable to the impact of cognitive disorganisation on novel pop out effects. Second, presentation of X during the test phase may have associatively activated participants' representation of A, which may have disrupted processing of X and increased RTs. This explanation does not necessitate alterations to X's salience during pre-exposure, casting doubt on the validity of RTs to X as a metric for the salience of internal representations. Third, as the

expression of associative learning is moderated by context (Rosas et al., 2013; Urcelay & Miller, 2014), participants may have perceived a context change between phases, perhaps consequential to presentation of single, rather than compound, stimuli following the associative learning phase and new instructions prior to the test phase. Perceived context changes may have abolished differences in the salience of stimuli between groups. Fourth, this study was only powered to detect medium sized effects of the group on RTs (see **Appendix 33, SA 7**); lack of power may have obfuscated group differences. Fifth, hallucinators and non-hallucinators reported greater medication use, illicit substance use, psychiatric difficulties and physical health problems. As medication and illicit substance use impact LI (Leumann et al., 2002; McCartan et al., 2001; Soar et al., 2015; Vaitl et al., 2002; Weiner & Arad, 2009; Williams et al., 1996, 1997), this may have occluded differences between groups. Furthermore, individuals with psychosis typically exhibit general cognitive impairments (Morgan et al., 2014). This may account for correlations between slower RTs to some stimuli and higher scores on measures of paranoia and cognitive disorganisation. Nevertheless, the absence of overall differences in RTs between groups suggests general cognitive impairments may not have had a significant impact on the results. Sixth, as it was not possible to verify the diagnoses of those recruited online, some may have inaccurately claimed to have psychosis. However, given that participants did not receive financial reimbursement, it is unclear why they would be untruthful. Seventh, as hallucinators self-identified as hallucinating, those without insight into hallucinations may have been erroneously included in the non-hallucinating group, diminishing differences between hallucinators and non-hallucinators. Finally, this study had limited ethnic diversity, perhaps limiting the generalisability of these findings to other cultures.

Future Research

It is too early to derive clinical implications, as further research is required to interrogate the salience hypothesis. To determine whether hallucinations stem from aberrantly salient emotionally distressing or dialogical internal representations, researchers could examine whether hallucinators exhibit attenuated mediated LI of emotionally distressing and dialogical stimuli. Also, researchers could investigate the impact of the congruence between the sensory modality of hallucinations and experimental stimuli on mediated LI, to determine whether individuals only exhibit aberrant salience of internal representations in the same sensory modality as their hallucinations. Future research should also adapt this paradigm to circumvent confounds of novel popout effects and perceived context changes, perhaps by using perceptual learning paradigms. Also, research should aim to mitigate the confounding effects of medications and illicit substance use, perhaps by recruiting control groups with similar levels of use. Furthermore, research could replicate this study using a larger sample, to address issues concerning statistical power and enhance ethnic diversity. Finally, future research could investigate this study's more tentative findings, such as how cognitive disorganisation affects associative learning.

Conclusion

Whilst participants exhibited both mediated LI and LI, these effects did not vary between controls, hallucinators and non-hallucinators. This suggests that people with psychosis who currently hallucinate do not exhibit aberrant salience of internal representations and people

with psychosis, irrespective of whether they hallucinate, do not exhibit aberrant salience of external stimuli.

References

Abelson, R. P. (2012). *Statistics As Principled Argument*. Psychology Press. https://doi.org/10.4324/9781410601155

Aleman, A., Böcker, K. B. E., & De Haan, E. H. F. (2001). Hallucinatory Predisposition and Vividness of Auditory Imagery: Self-Report and Behavioral Indices. *Perceptual and Motor Skills*, *93*(1), 268–274. https://doi.org/10.2466/pms.2001.93.1.268

Aleman, A., Böcker, K. B. E., Hijman, R., de Haan, E. H. F., & Kahn, R. S. (2003). Cognitive basis of hallucinations in schizophrenia: Role of top-down information processing. *Schizophrenia Research*, *64*(2), 175–185. https://doi.org/10.1016/S0920-9964(03)00060-4

Allen, S., Goodall, T., Jones, C., James, R., & Surtees, A. (2023). What Is the Prevalence of Visual Hallucinations in a First-Episode Psychosis Population? A Systematic Review and Meta-analysis of the Literature. *Schizophrenia Bulletin Open*, *4*(1), sgad002. https://doi.org/10.1093/schizbullopen/sgad002

Anonymous. (1955). An autobiography of a schizophrenic experience. *The Journal of Abnormal and Social Psychology*, *51*(3), 677–689. https://doi.org/10.1037/h0043431

APA. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. Arlington, Texas: American Psychiatric Pub. https://doi.org/10.1176/appi.books.9780890425596

Arner, M. (2023). A Psychotic Experience. *Schizophrenia Bulletin*, *49*(1), 9–10. https://doi.org/10.1093/schbul/sbac063

Baruch, I., Hemsley, D. R., & Gray, J. A. (1988). Differential performance of acute and chronic schizophrenics in a latent inhibition task. *Journal of Nervous and Mental Disease*, *176*(10), 598–606. https://doi.org/10.1097/00005053-198810000-00004

Beck, A. T., & Rector, N. A. (2003). A Cognitive Model of Hallucinations. *Cognitive Therapy and Research*, *27*(1), 19–52. https://doi.org/10.1023/A:1022534613005

Beyer, A. C. (2022). On How to Create Nice Voices and How to Overcome Stigma. *Schizophrenia Bulletin*, *48*(2), 292–293. https://doi.org/10.1093/schbul/sbab077

Bowers, M. B. (1968). Pathogenesis of Acute Schizophrenic Psychosis: An Experiential Approach. *Archives of General Psychiatry*, *19*(3), 348–355. https://doi.org/10.1001/archpsyc.1968.01740090092009

Bowers, M. B., & Freedman, D. X. (1966). Psychedelic experiences in acute psychoses. *Archives of General Psychiatry*, *15*(3), 240–248. https://doi.org/10.1001/archpsyc.1966.01730150016003

Castro, L., & Matute, H. (2010). Positive and Negative Mediation as a Function of Whether the Absent Cue was Previously Associated with the Outcome. *Quarterly Journal of Experimental Psychology*, *63*(12), 2359–2375. https://doi.org/10.1080/17470218.2010.493614

Chadwick, P. K. (2007). Peer-professional first-person account: Schizophrenia from the inside—Phenomenology and the integration of causes and meanings. *Schizophrenia Bulletin*, *33*(1), 166–173. https://doi.org/10.1093/schbul/sbl034

Chun, C., Gross, G., Mielock, A., & Kwapil, T. (2020). Aberrant salience predicts psychotic-like experiences in daily life: An experience sampling study. *Schizophrenia Research*, *220*, 218–224. https://doi.org/10.1016/j.schres.2020.03.016

Cohen, E., Sereni, N., Kaplan, O., Weizman, A., Kikinzon, L., Weiner, I., & Lubow, R. E. (2004). The relation between latent inhibition and symptom-types in young schizophrenics. *Behavioural Brain Research*, *149*(2), 113–122. https://doi.org/10.1016/S0166-4328(03)00221-3

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334. https://doi.org/10.1007/BF02310555

De Fazio, P., Pugliese, V., Cattolico, M., Aloi, M., & Segura-Garcia, C. (2020). The relationship between childhood trauma and aberrant salience: A preliminary study in patients with Schizophrenia. *Journal of Psychopathology*, *26*, 28–35. https://doi.org/10.36148/2284-0249-367

De Houwer, J. (2014). A propositional perspective on context effects in human associative learning. *Behavioural Processes*, *104*, 20–25. https://doi.org/10.1016/j.beproc.2014.02.002

Dolgun, A., & Demirhan, H. (2017). Performance of nonparametric multiple comparison tests under heteroscedasticity, dependency, and skewed error distribution. *Communications in Statistics - Simulation and Computation*, *46*(7), 5166–5183. https://doi.org/10.1080/03610918.2016.1146761

Evans, L. H., Gray, N. S., & Snowden, R. J. (2007). A new continuous within-participants latent inhibition task: Examining associations with schizotypy dimensions, smoking status and gender. *Biological Psychology*, *74*(3), 365–373. https://doi.org/10.1016/j.biopsycho.2006.09.007

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Fineberg, N. A., Haddad, P. M., Carpenter, L., Gannon, B., Sharpe, R., Young, A. H., Joyce, E., Rowe, J., Wellsted, D., Nutt, D. J., & Sahakian, B. J. (2013). The size, burden and cost

of disorders of the brain in the UK. *Journal of Psychopharmacology*, *27*(9), 761–770. https://doi.org/10.1177/0269881113495118

Freeman, D., Garety, P. A., Kuipers, E., Fowler, D., & Bebbington, P. E. (2002). A cognitive model of persecutory delusions. *British Journal of Clinical Psychology*, *41*(4), 331–347. https://doi.org/10.1348/014466502760387461

Fry, B. R., Roberts, D., Thakkar, K. N., & Johnson, A. W. (2022). Variables influencing conditioning-evoked hallucinations: Overview and future applications. *Psychological Medicine*, *52*(14), 2937–2949. https://doi.org/10.1017/S0033291722002100

Gal, G., Barnea, Y., Biran, L., Mendlovic, S., Gedi, T., Halavy, M., Feldon, J., Fennig, S., & Levkovitz, Y. (2009). Enhancement of latent inhibition in patients with chronic schizophrenia. *Behavioural Brain Research*, *197*(1), 1–8. https://doi.org/10.1016/j.bbr.2008.08.023

Ginton, A., Urca, G., & Lubow, R. E. (1975). The effects of preexposure to a nonattended stimulus on subsequent learning: Latent inhibition in adults. *Bulletin of the Psychonomic Society*, *5*(1), 5–8. https://doi.org/10.3758/BF03336682

Granger, K. T., Moran, P. M., Buckley, M. G., & Haselgrove, M. (2016). Enhanced latent inhibition in high schizotypy individuals. *Personality and Individual Differences*, *91*, 31–39. https://doi.org/10.1016/j.paid.2015.11.040

Gray, N. S., Fernandez, M., Williams, J., Ruddle, R. A., & Snowden, R. J. (2002). Which schizotypal dimensions abolish latent inhibition? *British Journal of Clinical Psychology*, *41*(3), 271–284. https://doi.org/10.1348/014466502760379136

Gray, N. S., Pilowsky, L. S., Gray, J. A., & Kerwin, R. W. (1995). Latent inhibition in drug naive schizophrenics: Relationship to duration of illness and dopamine D2 binding using SPET. *Schizophrenia Research*, *17*(1), 95–107. https://doi.org/10.1016/0920-9964(95)00034-J

Gray, N. S., Snowden, R. J., Peoples, M., Hemsley, D. R., & Gray, J. A. (2003). A demonstration of within-subjects latent inhibition in the human: Limitations and advantages. *Behavioural Brain Research*, *138*(1), 1–8. https://doi.org/10.1016/S0166-4328(02)00181-X

Greenhouse, S. W., & Geisser, S. (1959). On methods in the analysis of profile data. *Psychometrika*, *24*(2), 95–112. https://doi.org/10.1007/BF02289823

Guterman, Y., Josiassen, R. C., Bashore, T. E., Johnson, M., & Lubow, R. E. (1996). Latent inhibition effects reflected in event-related brain potentials in healthy controls and schizophrenics. *Schizophrenia Research*, *20*(3), 315–326. https://doi.org/10.1016/0920-9964(95)00086-0

Hamid, O. H., Wendemuth, A., & Braun, J. (2010). Temporal context and conditional associative learning. *BMC Neuroscience*, *11*(1), 45. https://doi.org/10.1186/1471-2202-11-45

Holland, P. C. (1990). Event representation in Pavlovian conditioning: Image and action. *Cognition*, *37*(1), 105–131. https://doi.org/10.1016/0010-0277(90)90020-K

Hotelling, H. (1960). *Contributions to probability and statistics: Essays in honor of Harold Hotelling*. Stanford University Press.

Howes, O. D., & Kapur, S. (2009). The Dopamine Hypothesis of Schizophrenia: Version III—The Final Common Pathway. *Schizophrenia Bulletin*, *35*(3), 549–562. https://doi.org/10.1093/schbul/sbp006

Jepson, J. A. (2021). Coping With My Delusions. *Schizophrenia Bulletin*, *47*(4), 888. https://doi.org/10.1093/schbul/sbaa189

Johnston, W. A., & Hawley, K. J. (1994). Perceptual inhibition of expected inputs: The key that opens closed minds. *Psychonomic Bulletin & Review*, *1*(1), 56–72. https://doi.org/10.3758/BF03200761

Johnston, W. A., Hawley, K. J., & Farnham, J. M. (1993). Novel popout: Empirical boundaries and tentative theory. *Journal of Experimental Psychology: Human Perception and Performance*, *19*(1), 140–153. https://doi.org/10.1037/0096-1523.19.1.140

Kafadar, E., Mittal, V. A., Strauss, G. P., Chapman, H. C., Ellman, L. M., Bansal, S., Gold, J. M., Alderson-Day, B., Evans, S., Moffatt, J., Silverstein, S. M., Walker, E. F., Woods, S. W., Corlett, P. R., & Powers, A. R. (2020). Modeling perception and behavior in individuals at clinical high risk for psychosis: Support for the predictive processing framework. *Schizophrenia Research*, *226*, 167–175. https://doi.org/10.1016/j.schres.2020.04.017

Kapur, S. (2003). *Psychosis as a State of Aberrant Salience: A Framework Linking Biology, Phenomenology, and Pharmacology in Schizophrenia | American Journal of Psychiatry*. https://ajp.psychiatryonline.org/doi/full/10.1176/appi.ajp.160.1.13

Kapur, S., Mizrahi, R., & Li, M. (2005). From dopamine to salience to psychosis—Linking biology, pharmacology and phenomenology of psychosis. *Schizophrenia Research*, *79*(1), 59–68. https://doi.org/10.1016/j.schres.2005.01.003

Kathmann, N., Recum, S., Haag, C., & Engel, R. R. (2000). Electrophysiological evidence for reduced latent inhibition in schizophrenic patients. *Schizophrenia Research*, *45*(1–2), 103–114. https://doi.org/10.1016/S0920-9964(99)00172-3

Kirkbride, J. B., Errazuriz, A., Croudace, T. J., Morgan, C., Jackson, D., Boydell, J., Murray, R. M., & Jones, P. B. (2012). Incidence of Schizophrenia and Other Psychoses in England, 1950–2009: A Systematic Review and Meta-Analyses. *PLOS One*, *7*(3), e31660. https://doi.org/10.1371/journal.pone.0031660

Kot, T., & Serper, M. (2002). Increased Susceptibility to Auditory Conditioning in Hallucinating Schizophrenic Patients: A Preliminary Investigation. *The Journal of Nervous and Mental Disease*, *190*(5), 282.

Kruskal, W. H., & Wallis, W. A. (1952). Use of Ranks in One-Criterion Variance Analysis. *Journal of the American Statistical Association*, *47*(260), 583–621. https://doi.org/10.1080/01621459.1952.10483441

Kühn, S., & Gallinat, J. (2012). Quantitative Meta-Analysis on State and Trait Aspects of Auditory Verbal Hallucinations in Schizophrenia. *Schizophrenia Bulletin*, *38*(4), 779–786. https://doi.org/10.1093/schbul/sbq152

Le Pelley, M. E., Mitchell, C. J., Beesley, T., George, D. N., & Wills, A. J. (2016). Attention and associative learning in humans: An integrative review. *Psychological Bulletin*, *142*, 1111–1140. https://doi.org/10.1037/bul0000064

Leumann, L., Feldon, J., Vollenweider, F. X., & Ludewig, K. (2002). Effects of typical and atypical antipsychotics on prepulse inhibition and latent inhibition in chronic schizophrenia. *Biological Psychiatry*, *52*(7), 729–739. https://doi.org/10.1016/S0006-3223(02)01344-6

Lim, A., Hoek, H. W., Deen, M. L., Blom, J. D., Bruggeman, R., Cahn, W., de Haan, L., Kahn, R. S., Meijer, C. J., Myin-Germeys, I., van Os, J., & Wiersma, D. (2016). Prevalence and classification of hallucinations in multiple sensory modalities in schizophrenia spectrum disorders. *Schizophrenia Research*, *176*(2), 493–499. https://doi.org/10.1016/j.schres.2016.06.010

Lubow, R. E., & Gewirtz, J. C. (1995). Latent inhibition in humans: Data, theory, and implications for schizophrenia. *Psychological Bulletin*, *117*(1), 87–103. https://doi.org/10.1037/0033-2909.117.1.87

Lubow, R. E., & Moore, A. U. (1959). Latent inhibition: The effect of nonreinforced pre-exposure to the conditional stimulus. *Journal of Comparative and Physiological Psychology*, *52*, 415–419. https://doi.org/10.1037/h0046700

Lubow, R. E., Weiner, I., Schlossberg, A., & Baruch, I. (1987). Latent inhibition and schizophrenia. *Bulletin of the Psychonomic Society*, *25*(6), 464–467. https://doi.org/10.3758/BF03334742

Lubow, R., & Weiner, I. (2010). *Latent Inhibition: Cognition, Neuroscience and Applications to Schizophrenia*. Cambridge University Press.

MacDonald, N. (1960). Living with Schizophrenia. *Canadian Medical Association Journal*, *82*(4), 218–221.

Mackintosh, N. J. (1975). A theory of attention: Variations in the associability of stimuli with reinforcement. *Psychological Review*, *82*, 276–298. https://doi.org/10.1037/h0076778

Mauchly, J. W. (1940). Significance test for sphericity of a normal n-variate distribution. *The Annals of Mathematical Statistics*, *11*(2), 204–209. https://doi.org/10.1214/aoms/1177731915

McCartan, D., Bell, R., Green, J. F., Campbell, C., Trimble, K., Pickering, A., & King, D. J. (2001). The differential effects of chlorpromazine and haloperidol on latent inhibition in healthy volunteers. *Journal of Psychopharmacology*, *15*(2), 96–104. https://doi.org/10.1177/026988110101500211

McCarthy-Jones, S., & Fernyhough, C. (2011). The varieties of inner speech: Links between quality of inner speech and psychopathological variables in a sample of young adults. *Consciousness and Cognition*, *20*(4), 1586–1593. https://doi.org/10.1016/j.concog.2011.08.005

McCarthy-Jones, S., Smailes, D., Corvin, A., Gill, M., Morris, D. W., Dinan, T. G., Murphy, K. C., Anthony O′Neill, F., Waddington, J. L., Australian Schizophrenia Research Bank, Donohoe, G., & Dudley, R. (2017). Occurrence and co-occurrence of hallucinations by modality in schizophrenia-spectrum disorders. *Psychiatry Research*, *252*, 154–160. https://doi.org/10.1016/j.psychres.2017.01.102

McCarthy-Jones, S., Thomas, N., Strauss, C., Dodgson, G., Jones, N., Woods, A., Brewin, C. R., Hayward, M., Stephane, M., Barton, J., Kingdon, D., & Sommer, I. E. (2014). Better Than Mermaids and Stray Dogs? Subtyping Auditory Verbal Hallucinations and Its Implications for Research and Practice. *Schizophrenia Bulletin*, *40*(4), S275–S284. https://doi.org/10.1093/schbul/sbu018

McCarthy-Jones, S., Trauer, T., Mackinnon, A., Sims, E., Thomas, N., & Copolov, D. L. (2014). A New Phenomenological Survey of Auditory Hallucinations: Evidence for Subtypes and Implications for Theory and Practice. *Schizophrenia Bulletin*, *40*(1), 231–235. https://doi.org/10.1093/schbul/sbs156

McGhie, A., & Chapman, J. (1961). Disorders of attention and perception in early schizophrenia. *British Journal of Medical Psychology*, *34*(2), 103–116. https://doi.org/10.1111/j.2044-8341.1961.tb00936.x

Moreno, C., Nuevo, R., Chatterji, S., Verdes, E., Arango, C., & Ayuso-Mateos, J. L. (2013). Psychotic symptoms are associated with physical health problems independently of a mental disorder diagnosis: Results from the WHO World Health Survey. *World Psychiatry*, *12*(3), 251–257. https://doi.org/10.1002/wps.20070

Moreno-Küstner, B., Martín, C., & Pastor, L. (2018). Prevalence of psychotic disorders and its association with methodological issues. A systematic review and meta-analyses. *PLOS One*, *13*(4), e0195687. https://doi.org/10.1371/journal.pone.0195687

Morgan, V. A., McGrath, J. J., Jablensky, A., Badcock, J. C., Waterreus, A., Bush, R., Carr, V., Castle, D., Cohen, M., Galletly, C., Harvey, C., Hocking, B., McGorry, P., Neil, A. L., Saw, S., Shah, S., Stain, H. J., & Mackinnon, A. (2014). Psychosis prevalence and physical, metabolic and cognitive co-morbidity: Data from the second Australian national survey of psychosis. *Psychological Medicine*, *44*(10), 2163–2176. https://doi.org/10.1017/S0033291713002973

Morrison, A. P. (2001). The Interpretation of Intrusions in Psychosis: An Integrative Cognitive Approach to Hallucinations and Delusions. *Behavioural and Cognitive Psychotherapy*, *29*(3), 257–276. https://doi.org/10.1017/S1352465801003010

Morrison, A. P., & Haddock, G. (1997). Self-focused attention in schizophrenic patients with and without auditory hallucinations and normal subjects: A comparative study. *Personality and Individual Differences*, *23*(6), 937–941. https://doi.org/10.1016/S0191-8869(97)00130-X

Murawiec, S. (2008). *Psychological phenomena in the first two weeks of pharmacotherapy of schizophrenic patients in the framework of Shitij Kapur's theory of psychosis as a state of aberrant salience–a preliminary report. 1*, 67–77.

Myles, L. A. M., Garrison, J., & Cheke, L. (2023). Latent Inhibition in Schizophrenia and Schizotypy. *Schizophrenia Bulletin Open*, *4*(1), sgad026.

Pearce, J. M., & Hall, G. (1980). A model for Pavlovian learning: Variations in the effectiveness of conditioned but not of unconditioned stimuli. *Psychological Review*, *87*, 532–552. https://doi.org/10.1037/0033-295X.87.6.532

Pearce, J. M., & Mackintosh, N. J. (2010). Two theories of attention: A review and a possible integration. In C. J., Mitchell, & M. E. L. Pelley (Eds.), *Attention and associative learning: From brain to behaviour* (pp. 11–39). Oxford University Press.

Perälä, J., Suvisaari, J., Saarni, S. I., Kuoppasalmi, K., Isometsä, E., Pirkola, S., Partonen, T., Tuulio-Henriksson, A., Hintikka, J., Kieseppä, T., Härkänen, T., Koskinen, S., & Lönnqvist, J. (2007). Lifetime Prevalence of Psychotic and Bipolar I Disorders in a General Population. *Archives of General Psychiatry*, *64*(1), 19–28. https://doi.org/10.1001/archpsyc.64.1.19

Powers, A. R., Mathys, C., & Corlett, P. R. (2017). Pavlovian conditioning–induced hallucinations result from overweighting of perceptual priors. *Science*, *357*(6351), 596–600. https://doi.org/10.1126/science.aan3458

Pugliese, V., de Filippis, R., Aloi, M., Rotella, P., Carbone, E. A., Gaetano, R., & De Fazio, P. (2022). Aberrant salience correlates with psychotic dimensions in outpatients with schizophrenia spectrum disorders. *Annals of General Psychiatry*, *21*(1), 25. https://doi.org/10.1186/s12991-022-00402-5

Rascle, C., Mazas, O., Vaiva, G., Tournant, M., Raybois, O., Goudemand, M., & Thomas, P. (2001). Clinical features of latent inhibition in schizophrenia. *Schizophrenia Research*, *51*(2–3), 149–161. https://doi.org/10.1016/S0920-9964(00)00162-6

Rescorla, R. A., & Wagner, A. R. (1972). A theory of Pavlovian conditioning: Variations in the effectiveness of reinforcement and nonreinforcement. *Current Research and Theory*, 64–99.

Richardson, J. T. E. (2011). Eta squared and partial eta squared as measures of effect size in educational research. *Educational Research Review*, *6*(2), 135–147. https://doi.org/10.1016/j.edurev.2010.12.001

Ronald, A., Sieradzka, D., Cardno, A. G., Haworth, C. M. A., McGuire, P., & Freeman, D. (2014). Characterization of Psychotic Experiences in Adolescence Using the Specific Psychotic Experiences Questionnaire: Findings From a Study of 5000 16-Year-Old Twins. *Schizophrenia Bulletin*, *40*(4), 868–877. https://doi.org/10.1093/schbul/sbt106

Rosas, J. M., Todd, T. P., & Bouton, M. E. (2013). Context change and associative learning. *WIREs Cognitive Science*, *4*(3), 237–244. https://doi.org/10.1002/wcs.1225

Sack, A. T., van de Ven, V. G., Etschenberg, S., Schatz, D., & Linden, D. E. J. (2005). Enhanced vividness of mental imagery as a trait marker of schizophrenia? *Schizophrenia Bulletin*, *31*(1), 97–104. https://doi.org/10.1093/schbul/sbi011

Serra, A. M., Jones, S. H., Toone, B., & Gray, J. A. (2001). Impaired associative learning in chronic schizophrenics and their first-degree relatives: A study of latent inhibition and the Kamin blocking effect. *Schizophrenia Research*, *48*(2–3), 273–289. https://doi.org/10.1016/S0920-9964(00)00141-9

Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, *52*(3–4), 591–611. https://doi.org/10.1093/biomet/52.3-4.591

Slade, P. D. (1976). An investigation of psychological factors involved in the predisposition to auditory hallucinations. *Psychological Medicine*, *6*(1), 123–132. https://doi.org/10.1017/S0033291700007558

Sleurs, D., Dubertret, C., Pignon, B., Tebeka, S., & Le Strat, Y. (2023). Psychotic-like experiences are associated with physical disorders in general population: A cross-sectional study from the NESARC II. *Journal of Psychosomatic Research*, *165*, 111128. https://doi.org/10.1016/j.jpsychores.2022.111128

Soar, K., Dawkins, L., Page, F., & Wooldridge, J. (2015). Recreational cocaine use is associated with attenuated latent inhibition. *Addictive Behaviors*, *50*, 34–39. https://doi.org/10.1016/j.addbeh.2015.06.010

Spearman, C. (1961). *The Proof and Measurement of Association Between Two Things* (p. 58). Appleton-Century-Crofts. https://doi.org/10.1037/11491-005

Stain, H. J., Galletly, C. A., Clark, S., Wilson, J., Killen, E. A., Anthes, L., Campbell, L. E., Hanlon, M.-C., & Harvey, C. (2012). Understanding the social costs of psychosis: The experience of adults affected by psychosis identified within the second Australian national survey of psychosis. *Australian & New Zealand Journal of Psychiatry*, *46*(9), 879–889. https://doi.org/10.1177/0004867412449060

Stout, S. C., & Miller, R. R. (2007). Sometimes-competing retrieval (SOCR): A formalization of the comparator hypothesis. *Psychological Review*, *114*(3), 759–783. https://doi.org/10.1037/0033-295X.114.3.759

Suzuki, R., & Kosaki, Y. (2024). Prediction, perception, and psychosis: Application of associative learning theories to schizophrenia research. *Behavioral Neuroscience*, *138*(3), 195–211. https://doi.org/10.1037/bne0000599

Swerdlow, N. R., Braff, D. L., Hartston, H., Perry, W., & Geyer, M. A. (1996). Latent inhibition in schizophrenia. *Schizophrenia Research*, *20*(1–2), 91–103. https://doi.org/10.1016/0920-9964(95)00097-6

Swerdlow, N. R., Stephany, N., Wasserman, L. C., Talledo, J., Sharp, R., Minassian, A., & Auerbach, P. P. (2005). Intact visual latent inhibition in schizophrenia patients in a within-subject paradigm. *Schizophrenia Research*, *72*(2–3), 169–183. https://doi.org/10.1016/j.schres.2004.03.022

Tian, R. (2022). Three Puzzles Explainable With My Experience. *Schizophrenia Bulletin*, *48*(1), 6–7. https://doi.org/10.1093/schbul/sbab067

Tsang, A., Bucci, S., Branitsky, A., Kaptan, S., Rafiq, S., Wong, S., Berry, K., & Varese, F. (2021). The relationship between appraisals of voices (auditory verbal hallucinations) and distress in voice-hearers with schizophrenia-spectrum diagnoses: A meta-analytic review. *Schizophrenia Research*, *230*, 38–47. https://doi.org/10.1016/j.schres.2021.02.013

Urcelay, G. P., & Miller, R. R. (2014). The functions of contexts in associative learning. *Behavioural Processes*, *104*, 2–12. https://doi.org/10.1016/j.beproc.2014.02.008

Vaitl, D., Lipp, O., Bauer, U., Schüler, G., Stark, R., Zimmermann, M., & Kirsch, P. (2002). Latent inhibition and schizophrenia: Pavlovian conditioning of autonomic responses.

Schizophrenia Research, *55*(1–2), 147–158. https://doi.org/10.1016/S0920-9964(01)00250-X

van der Gaag, M., Valmaggia, L. R., & Smit, F. (2014). The effects of individually tailored formulation-based cognitive behavioural therapy in auditory hallucinations and delusions: A meta-analysis. *Schizophrenia Research*, *156*(1), 30–37. https://doi.org/10.1016/j.schres.2014.03.016

Wagner, A. R. (1981). SOP: A model of automatic memory processing in animal behavior. In N. E. Spear & R. R. Miller (Eds.), *Information processing in animals* (pp. 15–58). Psychology Press. https://doi.org/10.4324/9781315798820

Wagner, S., & Monzel, M. (2023). Measuring imagery strength in schizophrenia: No evidence of enhanced mental imagery priming. *Brain and Behavior*, *13*(9), e3146. https://doi.org/10.1002/brb3.3146

Watson, P., Zhang, J.-P., Rizvi, A., Tamaiev, J., Birnbaum, M. L., & Kane, J. (2018). A meta-analysis of factors associated with quality of life in first episode psychosis. *Schizophrenia Research*, *202*, 26–36. https://doi.org/10.1016/j.schres.2018.07.013

Weiner, I., & Arad, M. (2009). Using the pharmacology of latent inhibition to model domains of pathology in schizophrenia and their treatment. *Behavioural Brain Research*, *204*(2), 369–386. https://doi.org/10.1016/j.bbr.2009.05.004

Welch, B. L. (1947). The Generalization of 'Student's' Problem when Several Different Population Variances are Involved. *Biometrika*, *34*(1–2), 28–35. https://doi.org/10.1093/biomet/34.1-2.28

Williams, J. H., Wellman, N. A., Geaney, D. P., Cowen, P. J., Feldon, J., & Rawlins, J. N. P. (1996). Antipsychotic drug effects in a model of schizophrenic attentional disorder: A randomized controlled trial of the effects of haloperidol on latent inhibition in healthy

people. *Biological Psychiatry*, *40*(11), 1135–1143. https://doi.org/10.1016/S0006-3223(95)00629-X

Williams, J. H., Wellman, N. A., Geaney, D. P., Cowen, P. J., Feldon, J., & Rawlins, J. N. P. (1998). Reduced latent inhibition in people with schizophrenia: An effect of psychosis or of its treatment. *The British Journal of Psychiatry*, *172*(3), 243–249. https://doi.org/10.1192/bjp.172.3.243

Williams, J. H., Wellman, N. A., Geaney, D. P., Feldon, J., Cowen, P. J., & Rawlins, J. N. P. (1997). Haloperidol enhances latent inhibition in visual tasks in healthy people. *Psychopharmacology*, *133*(3), 262–268. https://doi.org/10.1007/s002130050400

Yogev, H., Sirota, P., Gutman, Y., & Hadar, U. (2004). Latent Inhibition and Overswitching in Schizophrenia. *Schizophrenia Bulletin*, *30*(4), 713–726. https://doi.org/10.1093/oxfordjournals.schbul.a007125

Executive Summary

Psychosis is a severe mental health difficulty that affects approximately 3% of people (Kirkbride et al., 2012; Moreno-Küstner et al., 2018; Morgan et al., 2014; Perälä et al., 2007). It involves different types of symptoms, which are grouped into so-called 'positive,' 'negative' and 'disorganised' symptoms (APA, 2013). Positive symptoms refer to hallucinations and unusual beliefs. Negative symptoms include social withdrawal and reduced motivation, emotional affect, pleasure and speech. Disorganised symptoms pertain to problems with attention, decision making, thinking, memory and planning.

The salience hypothesis is an influential theory about the causes of psychosis (Howes & Kapur, 2009; Kapur, 2003; Kapur et al., 2005). This theory suggests that people with psychosis pay higher attention than people without psychosis to stimuli of otherwise low significance. It suggests that unusual beliefs arise because people with psychosis try to make sense of how these salient stimuli grab their attention. For example, if an individual repeatedly notices a car parked outside their home, they may conclude they are being monitored. The salience hypothesis also suggests that people with psychosis hallucinate because they also pay higher attention to their thoughts than people without psychosis. For example, an individual with psychosis may pay so much attention to thoughts about a parent's critical comments that these thoughts may be perceived as an external voice.

However, there is mixed evidence for the salience hypothesis. A recent review found conflicting evidence for the theory that people with psychosis pay relatively high attention to stimuli of otherwise low significance (Myles et al., 2023). Also, there is very limited evidence that people with psychosis hallucinate because they pay relatively high attention to their own thoughts. Therefore, this study investigated two questions:

1) Do people with psychosis who hallucinate pay more attention to their thoughts?
2) Do people with people with psychosis, irrespective of whether they hallucinate, pay more attention to stimuli of otherwise low significance?

To answer these questions, this study recruited 111 adults. These were 37 people without a diagnosis/history of mental health difficulties ('controls'), 37 people with psychosis and ongoing hallucinations ('hallucinators') and 37 people with psychosis without hallucinations ('non-hallucinators').

Participants were asked to provide demographic information and were asked about how frequently they hallucinate. Next, participants completed a questionnaire assessing the extent to which they experience paranoia, hallucinations, cognitive disorganisation, grandiosity and anhedonia. Then, participants completed an experiment which examined how much attention they paid to environmental stimuli and their own thoughts. In this experiment, participants were presented with fictitious words, which we termed 'pseudowords.' They were trained to associated two pseudowords together (e.g., 'lonc' and 'cazs'), such that presentation of one pseudoword (i.e., 'lonc') would make them think of the other (i.e., 'casz'). Participants were then repeatedly presented with one of these pseudowords (i.e., 'lonc'). Repeatedly presenting participants with 'lonc' should reduce their attention to both 'lonc' and the thought of the pseudoword with which it is associated (i.e., 'cazs'). Finally, to evaluate how much attention participants were paying to each of the pseudowords, they were required to learn that presentation of each pseudoword predicted the subsequent presentation of a novel pseudoword (i.e., 'dax'). Participants were expected to learn the relationship between the pseudowords and 'dax' faster if they were paying more attention to the pseudowords.

The results suggested that controls, hallucinators and non-hallucinators did not differ in the extent to which they paid attention to environmental stimuli or their own thoughts. These

findings contradict the salience hypothesis in two ways. First, they suggest that unusual believes are not caused by paying relatively high attention to stimuli of otherwise low significance. Second, they suggest that hallucinations are not caused by paying relatively high attention to one's own thoughts.

However, this study had some limitations. These included methodological issues, which could mean that the experiment did not accurately measure how much attention participants paid to environmental stimuli and/or their thoughts. Also, this study had a relatively small sample, and some participants had unconfirmed psychosis diagnoses. This may limit how well the findings apply to other individuals with psychosis. Furthermore, it is possible that participants' use of medications may have made it harder to determine whether psychosis is linked with differences in the way clients pay attention. Finally, this study had limited ethnic diversity, which may affect how well the findings apply to people from different cultural backgrounds.

It is too early to derive clinical implications, as further research is needed to examine the salience hypothesis. For example, studies should investigate whether hallucinations stem from paying large amounts of attention to particular types of internal experiences, such as emotive thoughts or memories. Also, future research should adapt this experiment to overcome the aforementioned limitations.

In conclusion, these findings contradict the salience hypothesis. Indeed, the results suggest that unusual beliefs are not caused by paying relatively high attention to stimuli of otherwise low significance and that hallucinations are not caused by paying relatively high attention to one's own thoughts.

Connecting Reflective Narrative

During my undergraduate degree, I supported research on the associative basis of spatial navigation. I was introduced to a world of theoretical specificity and empirical elegance, rarely afforded in other areas of psychological research. Continued work with associative theorists over the last eight years has convinced me that a large portion of human learning is associatively based.

In my final year of undergraduate study, I read Haselgrove and Hogarth's '*Clinical Applications of Learning Theory*,' where I first encountered proposals that aberrations in associative mechanisms underlie psychological difficulties. These ideas extended beyond the claim that associative processes play a role in psychological difficulties such as phobias, proposing instead that changes to associative mechanisms themselves underlie psychological issues. Despite its rare articulation, this idea appears to be a silent assumption in several contemporary theories of psychological difficulties. For example, cognitive theories would be incomplete without reference to the effects of experience on beliefs, yet discussion concerning the mechanisms by which experience is translated into beliefs is sparse.

I was always attracted by the parsimonious nature of associative accounts, which often afford a falsifiable precision in their predictions. Whilst alluring, I wonder whether my desire for parsimonious accounts of problems culminates in reductive explanations for psychological difficulties. Indeed, it seems my scientific values of falsifiability and parsimony influence the theoretical positions I adopt, which in turn influences both my clinical and research work. Perhaps there is need for greater interrogation and, if necessary, updating of these values and their influence on my clinical work. Indeed, associative theories are reductive, and it is

challenging to determine whether their reductive nature is a worthy cost for their specificity and falsifiability.

Given this interest, my theory-driven research project (TDRP) and systematic review of the literature (SRL) examined the relationship between psychological difficulties and associative learning. My TDRP was borne out of the unexpected finding from my master's degree that people experiencing hallucinations direct less attention to their external environments. I wondered whether attention towards internal representations was elevated at the expense of external stimuli and designed my TDRP to investigate this question. My SRL, which investigated the effect of OCD on associative learning, was derived from a well-known phenomenon that people with OCD engage in compulsions, despite typically reporting that the probability of the feared intrusion is relatively low. The self-evident nature of the 'irrationality' of compulsions led me to question whether non-declarative, associative mechanisms may more readily account for symptoms.

The challenge of involving experts by experience in my TDRP and SRL was perturbing. I believe in scientific communality, such that research should be done for the people. Therefore, 'the people' should be consulted at every aspect of the research process. That said, associative theories are dense and complex, making avoiding esotericism challenging. The uncomfortable incongruence of my values (i.e., scientific communality) and actions (i.e., involving experts by experience in the design of my research to only a limited extent) served as motivation to conduct a service improvement project (SIP), which placed patient and service goals as the top priority. Indeed, working collaboratively with a clinical team to the very tangible end of service improvement was new to me, as I had previously been involved with predominantly theoretical projects.

Initially, I was somewhat disinterested in the idea of service improvement research. Whilst I saw service improvement as very important, I thought research had to be theoretically complex to be interesting. But experiencing the extensive waitlists in the Milton Keynes Community Mental Health Team during my first placement enlightened me to the timeless, purgatorial limbo clients felt they were in. The knowledge that my project could change clients' experiences of waitlists was a rewarding motivator, engendering determination to ensure the project was of the utmost rigour. Ultimately, this has shaped my current research interests, as it is now very important to me that my future research in associative learning has clinical, as well theoretical, implications.

Relatedly, I have become very interested in exploring the limits of the scientist practitioner model, which I have pursued by learning about and applying single case experimental design methodology to my clinical work. I am also exploring other applications of the scientist practitioner model, which recently culminated in a 'proof of principle' formulation of a client's problems using only mathematical equations; this was not a client-facing exercise, but instead was intended to inspire curiosity about the limits of the scientist practitioner model.

I was disappointed that no measurable change occurred as a consequence of my service improvement initiative. Nevertheless, this highlighted the importance of mixed methodology when implementing service improvement initiatives. Without this quantitative data, the service may have continued to invest time and effort into an initiative that was not helping clients, a luxury that the highly pressured NHS cannot afford. Indeed, I felt a responsibility to refrain from 'putting a positive slant' on these null results, as I did not want to encourage the service to pursue an inefficient approach to managing their problems. Whilst seemingly obvious, such an approach appears rarer than would be expected in academia, perhaps highlighting the conflict between empiricism and politics in research.

My clinical experience has convinced me that any aberrations in associative mechanisms underlying psychological difficulties are, at least in part, the product of environmental experiences. Unfortunately, the slow bureaucratic nature of conducting research in the NHS and the challenging conditions of academic posts serves as a deterrent for conducting research. Nevertheless, I hope to continue researching the influence of experience on associative processes and their consequential effect on psychological wellbeing. As alluded to, it has become increasingly important to me to ensure this work has clinical application, which I hope will arise through improving understanding of the fundamental mechanisms and processes underpinning clients' difficulties. I have kept an active research profile over the course of my training, publishing over 16 papers, but hope to refine the focus of my work to applying associative theory to helping people with psychological problems.

Acknowledgements

This thesis would not have been possible without the support of so many people. First and foremost, I am deeply grateful to my partner for her boundless support, encouragement, intellectual curiosity and patience, the latter of which was no-doubt tested when I regularly secluded myself to work during evenings and weekends. I would also like to thank my mother, father and sister for remaining a stable, supportive base during my studies, and my friends who I can count on to bring a dry, satirical and jovial perspective to any situation. Their support has enabled me to navigate the challenges I have faced over the last three years.

Also, I would like to express my gratitude to all my supervisors, whose guidance and support have been invaluable throughout these projects. I am thankful for their generosity with their time and the wealth of knowledge I have gained from each of them. My supervisors include Professor Paul Salkovskis, Professor Mark Haselgrove, Dr Myra Cooper, Dr Georgina Geddes, Dr Louise Johns, Dr Salma El-Salahi, Dr Matthew Hotton and Dr Emmeline Goodby. A special thank you goes to Professor Paul Salkovskis, whose unwavering support as my course tutor has been a cornerstone of my doctoral training.

Looking further back, I would like to thank Professor Anthony McGregor and Dr Matthew Buckley, whose mentorship ignited my passion for research during my undergraduate studies. Their generosity with their time when sharing the beauty of associative learning theory continues to shape my career, which in turn has continuously enriched my understanding of the depth of meaning in the statement: learning is everything.

Furthermore, I would like to thank NHS England for funding my doctoral training in clinical psychology. The decision to invest in trainee clinical psychologists, in the hope that this support

will be repaid through service within the NHS, is not easy. I am deeply grateful for this funding, which has allowed me to pursue a career in the field I love

Finally, I would like to thank all the clients who participated in my research studies, as well as the charities and NHS clinics that supported my recruitment efforts. Their contributions were truly indispensable and without them, this research simply would not have been possible. For that, I am deeply grateful.

Appendices Contents

Appendix 1 – Database Search Terms

Appendix 2 – Data Extraction Tool

Appendix 3 – Meta-Analysis Data Selection and Extraction Procedures

Appendix 4 – Data Extracted from Articles

Appendix 5 - Kmet et al.'s (2004) Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields

Appendix 6 - Inter-Rater Reliability of the Risk of Bias Assessment

Appendix 7 – Sensitivity Analyses

Appendix 8 - Grading of Recommendations Assessment, Development, and Evaluation (GRADE)

Appendix 9 – Study Summary Statistics for Each Meta-Analysis

Appendix 10 – Clinical Psychology Review Author Guidelines

Appendix 11 – DIALOG+

Appendix 12 – Phase A Questionnaire

Appendix 13 – Phase B Questionnaire

Appendix 14 – Patient and Public Informed Questionnaire Development

Appendix 15 – Telephone Call Protocol

Appendix 16 – Reflections on Thematic Analysis

Appendix 17 – Additional Themes and Subthemes

Appendix 18 – Participant Suggestions and Corresponding Actions

Appendix 19 – Skill of the Month Email Template

Appendix 20 – Skill of the Month Emails

Appendix 21 – Accessing Extra Support Email Template

Appendix 22 – Accessing Extra Support Emails

Appendix 23 – Service Improvement Project Supplementary Analyses

Appendix 24 – Journal Guidelines

Appendix 25 – Lay Summary

Appendix 26 – Milton Keynes Community Mental Health Team Response to the Service Improvement Project

Appendix 27 – Recruitment Locations

Appendix 28 - Specific Psychotic Experiences Questionnaire

Appendix 29 – Participant Information Sheet

Appendix 30 – Participant Consent Form

Appendix 31 – Bot Check

Appendix 32 – Participant Debrief Sheet

Appendix 33 – Theory Driven Research Project Supplementary Analyses

Appendix 34 – Schizophrenia Bulletin Author Guidelines

Appendix 1 – Database Search Terms

CINAHL Search Strategy

AB ("Obsessive Compulsive Disorder" OR "Obsessive-Compulsive Disorder" OR OCD) AND AB ("Associat* Learning" OR Extinction OR Conditioning OR Conditioned OR Classical OR Pavlovian OR Acquisition OR Instrumental OR Operant OR "Pavlovian-to-Instrumental Transfer" OR "Pavlovian to Instrumental Transfer")

Cochrane Library and Cochrane Central Register of Controlled Trials Search Strategy

Table 7

Cochrane Library and Cochrane Central Register of Controlled Trials Search Strategy

Concept Number	Keywords
1	"Obsessive Compulsive Disorder" OR "Obsessive-Compulsive Disorder" OR OCD
2	"Associative Learning"
3	Extinction OR Conditioning OR Conditioned OR Classical OR Pavlovian OR Acquisition OR Instrumental OR Operant OR "Pavlovian-to-Instrumental Transfer" OR "Pavlovian to Instrumental Transfer"
4	Component number 2 OR component number 3
5	Component number 1 AND component number 4

EMBASE, MEDLINE and PsycINFO Search Strategy

Table 8

EMBASE, MEDLINE and PsycINFO Search Strategy

Concept Number	Keywords
1	"Obsessive Compulsive Disorder" OR "Obsessive-Compulsive Disorder" OR OCD
2	"Associat* Learning"
3	Extinction OR Conditioning OR Conditioned OR Classical OR Pavlovian OR Acquisition OR Instrumental OR Operant OR "Pavlovian-to-Instrumental Transfer" OR "Pavlovian to Instrumental Transfer"
4	Concept number 2 OR concept number 3
5	Concept number 1 AND concept number 4

PubMed Search Strategy

("Obsessive Compulsive Disorder" OR "Obsessive-Compulsive Disorder" OR OCD) AND ("Associat* Learning" OR Extinction OR Conditioning OR Conditioned OR Classical OR Pavlovian OR Acquisition OR Instrumental OR Operant OR "Pavlovian-to-Instrumental Transfer" OR "Pavlovian to Instrumental Transfer")

Scopus Search Strategy

"Obsessive Compulsive Disorder" OR "Obsessive-Compulsive Disorder" OR OCD

AND

"Associat* Learning" OR Extinction OR Conditioning OR Conditioned OR Classical OR Pavlovian OR Acquisition OR Instrumental OR Operant OR "Pavlovian-to-Instrumental Transfer" OR "Pavlovian to Instrumental Transfer"

Web of Science Search Strategy

Table 9

Web of Science Search Strategy

Concept Number	Keywords
1	"Obsessive Compulsive Disorder" OR "Obsessive-Compulsive Disorder" OR OCD
2	"Associat* Learning"
3	Extinction OR Conditioning OR Conditioned OR Classical OR Pavlovian OR Acquisition OR Instrumental OR Operant OR "Pavlovian-to-Instrumental Transfer" OR "Pavlovian to Instrumental Transfer"
4	Concept number 2 OR concept number 3
5	Concept number 1 AND concept number 4

Appendix 2 – Data Extraction Tool

To access the data extraction tool, click the link below.

https://unioxfordnexus-my.sharepoint.com/:x:/g/personal/scro4623_ox_ac_uk/EejOzCqlL9tAkP1zJQNqnAQBsgDrU9bbh0FpuDS_V9Ec7g?e=cmdMsC

Appendix 3 – Meta-Analysis Data Selection and Extraction Procedures

The procedures used to extract data from studies, where there were multiple ways in which data could be extracted, are detailed in **Table 10**.

Table 10

Meta-Analysis Data Selection Procedures

Study	Data Selection Procedures
Angelakis & Austin (2018)	Data from the 'contingent' condition was used because this examined participants' ability to learn to avoid noxious stimuli, whereas the 'baseline' and 'non-contingent' conditions did not assess associative learning because outcomes were not contingent upon stimuli.
Apergis-Schoute et al. (2017)	Data from the 'late,' rather than 'early,' trials were used because the authors indicated that this was the primary dependent variable. Of note, there was a group (OCD/control) by stage (early/late) interaction, perhaps indicating a more modest result would have been obtained if the early, rather than the late, trials were used.
Armstrong & Olatunji (2017)	'US expectancy' was used as the dependent variable, rather than 'disgust ratings,' because the former is a more direct measure of associative learning (Rescorla & Wagner, 1972), whereas the latter provides a measure of hedonic shift (Hankins et al., 1974).

Study	Data Selection Procedures
Banca et al. (2024)	For associative learning trials, data from the continuous, rather than variable, reward schedule was used, as this is a superior measure of associative learning (Rescorla & Wagner, 1972). As there was no interaction between the reward schedule (continuous versus variable) and group (OCD versus control), the choice of reward schedule may have had minimal effect on the results. Also, for associative learning trials, MT_L was used as the measure of learning, as the authors specified that this was the primary measure of learning. For the outcome devaluation task, data from the 'app sequence versus any three sequence' task was used because this was regarded by the authors as the superior measure of outcome devaluation.
Borelli et al. (2015)	Data from the 'threat' condition was used because this examined participants' ability to learn about the relationship between stimuli and noxious outcomes. The 'baseline' and 'safe' conditions were not assessing associative learning because outcomes were not contingent upon stimuli.
Bucci et al. (2007)	The spatial, rather than non-spatial, conditional associative learning task was used because the authors indicated this was the primary assessment of associative learning. Also, the number of errors, rather than the learned associations, was used as the dependent variable because the authors indicated that this was the primary dependent variable.
Cano et al. (2021)	Data from the extinction, not the extinction recall, phase was used to estimate extinction, as the former is regarded as a more valid measure of extinction (Le Pelley et al., 2016).

Study	Data Selection Procedures
De Kleine et al. (2023)	'US expectancy' was used as the dependent variable, rather than relief ratings,' because the former is indicated as the primary dependent variable and is assumed to provide a more direct measure of associative learning (Rescorla & Wagner, 1972), whereas the latter provides a measure of hedonic shift (Hankins et al., 1974). Regarding avoidance training, 'avoidance actions,' rather than 'US expectancy' or 'relief,' was used because the authors indicated this was the primary dependent variable. Finally, the trials from block one, rather than block two, of the avoidance phase were used, as the latter was inserted to investigate the effects of relearning CS-US associations, rather than avoidance.
Diniz et al. (2023)	The authors were asked to provide the means and SDs of the SCRs of both the OCD and control groups in the extinction phase; however, they did not provide this data. Therefore, the means and SDs of the extinction retention index were used because this was the only data reported in the paper.
Elsner et al. (2022)	Skin conductance response, rather than explicit contingency awareness, was selected as the dependent variable as the authors indicated that this was the primary dependent variable.

Study	Data Selection Procedures
Endrass et al. (2011)	Data from the associative learning, rather than the forced-choice, phase was used because performance in the former is a superior measure of associative learning (Rescorla & Wagner, 1972). Accuracy, rather than reaction time or explicit contingency awareness, was used as the dependent variable because the authors indicated that this was the primary dependent variable. In the learning phase, data from the AB, rather than CD and EF, comparison was used because this had the least conflict between stimulus choices. There was no group (OCD/control) by trial type (AB/CD/EF) interaction, indicating the trial type chosen may have had minimal impact.
Exner et al. (2014)	Data from the last block were used because learning about the relationships between stimuli should ostensibly be strongest in the final block (Rescorla & Wagner, 1972). The epidemic, rather than weather, prediction task was used because of its relevance to OCD, thus meaning the former is likely a more sensitive test of the effect of OCD on associative learning than the latter.
Gillan et al. (2011)	Accuracy, rather than reaction time or explicit contingency awareness, was used as the dependent variable because the authors indicated this was the primary dependent variable. Also, the 'standard' trial, rather than 'congruent' and 'incongruent' trials, was used in the analysis because this is most typical of associative learning paradigms. Relatedly, Gillan et al. (2011) report that there was not a group (OCD/control) by trial (standard/congruent/incongruent) interaction, suggesting the trial type may have minimal impact on the results.

Study	Data Selection Procedures
Gillan et al. (2014)	Accuracy, rather than skin conductance response or explicit contingency awareness, was used as the dependent variable because the authors indicated that this was the primary dependent variable.
Gillan et al. (2015)	Percentage of responses, rather than skin conductance response or urge, was used as the dependent variable because the authors indicated that this was the primary dependent variable.
Gimenez et al. (2020)	Data from the late block were used because learning about the relationships between stimuli should ostensibly be strongest in the final block (Rescorla & Wagner, 1972).
Gottwald et al. (2018)	The 'slips of action test,' rather than the 'choice test of response-outcome knowledge,' was used as the metric of outcome devaluation because the former was more similar to other tests of outcome devaluation, whereas the latter was unusual because it entailed several outcome devaluation events, rather than a single outcome devaluation event.
Hansmeier et al. (2018)	The epidemic, rather than weather, prediction task was used because of its relevance to OCD, thus meaning the former is likely a more sensitive test of the effect of OCD on associative learning than the latter. Data from the last block were used because learning about the relationships between stimuli should ostensibly be strongest in the final block (Rescorla & Wagner, 1972).
Hearne et al. (2023)	Arousal, rather than valence, was used as the dependent variable because the authors indicated this was the primary dependent variable.

Study	Data Selection Procedures
Hiebert et al. (2020)	Accuracy, rather than reaction times or 'slope learning,' was used as the dependent variable because the authors indicated this was the primary dependent variable.
Hunt et al. (2022)	The authors provided the data for the number of participants in the high and low OCD symptoms group, as determined by a median-split on the Obsessive-Compulsive Inventory-Revised (Foa et al., 2002). Threat probability, rather than anxiety level or electromyographic response, was used as the dependent variable because the authors indicated this was the primary dependent variable. Data from the second generalisation stimulus was used because it was considered dissimilar enough from the CS to not be confused, and thus an adequate measure of generalisation, but not so dissimilar that it would be perceived as unrelated to the CS or that measures of generalisation would be insensitive to generalisation. As the results were similar across generalisation stimuli, choice of generalisation stimulus may have had minimal impact on the results.
Kaczkurkin & Lissek (2013)	Startle response, rather than perceived risk of shock, was used as the dependent variable because the authors indicated that this was the primary dependent variable. Data from the second generalisation stimulus was used because it was considered dissimilar enough from the CS to not be confused, and thus an adequate measure of generalisation, but not so dissimilar that it would be perceived as unrelated to the CS or that measures of generalisation would be insensitive to generalisation. As the results were similar across generalisation stimuli, choice of generalisation stimulus may have had minimal impact on the results.

Study	Data Selection Procedures
Kaufmann et al. (2013)	The loss aversion, rather than the reward gain, task was used as a metric for associative learning, as theories posit that OCD entails a greater effect on loss aversion than reward gain (Gillan & Robbins, 2014; Graybiel & Rauch, 2000; Rachman, 1971).
Kelmendi et al. (2016)	Data from the unmedicated, rather than medicated, group of patients with OCD was used because medication may alter associative learning, confounding the effect of OCD on associative learning. Data from the last block were used because learning about the relationships between stimuli should ostensibly be strongest in the final block (Rescorla & Wagner, 1972).
Krypotos & Engelhard (2020)	Data from response two, rather than response one, was used, as it was more readily available. However, there were no statistical differences in responding between response one and two, suggesting the choice of response data may not significantly impact the results.
Marzuki et al. (2021)	Accuracy, rather than reaction times, was used as the dependent variable because the authors indicated this was the primary dependent variable. 'Proportion of switching in response to spurious (false) negative feedback' and 'proportion of switching in response to veridical (true) negative feedback' were not used as dependent variables as they are inadequate measures of associative learning.
McGuire et al. (2016)	Data from the last block were used because learning about the relationships between stimuli should ostensibly be strongest in the final block (Rescorla & Wagner, 1972).

Study	Data Selection Procedures
Novara et al. (2021)	Ratings of stimulus expectation, rather than disgust, was used as the dependent variable because the authors indicated that this was the primary dependent variable, and it is a more valid measure of associative learning.
Peng et al. (2022)	Performance in the 'good,' rather than 'bad,' shells task was used, as this was considered a more accurate measure of associative learning (Rescorla & Wagner, 1972). The results were similar if the 'bad' shells were used, indicating the choice of shell may have had minimal impact on the results. Data was used from trials where the outcomes of the stimuli were congruent, as this was a more accurate measure of PIT (Rescorla & Wagner, 1972).
Pertich et al. (2020)	The visual, rather than the audio or audiovisual, paradigm was used as the authors indicated that this was the primary experiment. Also, error ratio, rather than reaction time, was used as the dependent variable because the authors indicated that this was the primary dependent variable. Results were similar across all dependent variables, which may indicate the choice of dependent variable has minimal impact on the results.
Pohlchen et al. (2021)	Skin conductance response, rather than pupillometry or electromyography, was used as the dependent variable because the authors indicated that this was the primary dependent variable. Timepoint three, rather than timepoints one and two, was used because the largest amount of conditioning would ostensibly have happened by the latest timepoint. Of note, there was not a timepoint (one/two/three) by stimulus by group (OCD/control) interaction in either the conditioning or extinction phases, suggesting the selected timepoint may not influence the results.

Study	Data Selection Procedures
Remijnse et al. (2009)	Accuracy, rather than reaction time, was used as the dependent variable because the authors indicated this was the primary dependent variable. Probabilistic errors, probabilistic errors with shift, probabilistic errors without shift, final reversal errors, preceding reversal errors and spontaneous errors were not used as dependent variables as they are inadequate measures of associative learning.
Szabó et al. (2013)	Accuracy, rather than reaction time, was used as the dependent variable because the authors indicated that this was the primary dependent variable. Probabilistic errors with shift, probabilistic errors without shift, final reversal errors, preceding reversal errors, spontaneous errors and accumulated points were not used as dependent variables as they are inadequate measures of associative learning.
Vaghi et al. (2019)	Response rate, rather than causality judgement, was used as the dependent variable because the authors indicated that this was the primary dependent variable. Data was only used from block 1, where there was a positive contingency of .6 between the stimulus and outcome, because latter contingencies were confounded by the degraded contingency.
Valerius et al. (2008)	Number of reversal errors, rather than strategy changes after a probabilistic error, reaction times of hits, strategy changes after probabilistic errors, reversal errors preceding the last reversal error and last reversal errors, was used as the dependent variable because the authors indicated this was the primary dependent variable.

Study	Data Selection Procedures
Voon et al. (2015a)	The loss aversion, rather than the reward gain, task was used as a metric for associative learning, as theories posit that OCD entails a greater effect on loss aversion than reward gain (Gillan & Robbins, 2014; Graybiel & Rauch, 2000; Rachman, 1971).
Wang et al. (2024)	US expectancy ratings were used as the dependent variable because the authors indicated this was the primary dependent variable. The early, rather than late, extinction trials were used as the authors indicated this was the primary stage of analysis.
Zetsche et al. (2015a)	Data from the last block were used because learning about the relationships between stimuli should ostensibly be strongest in the final block (Rescorla & Wagner, 1972). The epidemic, rather than weather, prediction task was used because of its relevance to OCD, thus meaning the former is likely a more sensitive test of the effect of OCD on associative learning.
Zetsche et al. (2015b)	Data from the last block were used because learning about the relationships between stimuli should ostensibly be strongest in the final block (Rescorla & Wagner, 1972). The epidemic, rather than weather, prediction task was used because of its relevance to OCD, thus meaning the former is likely a more sensitive test of the effect of OCD on associative learning.

Where the data required to compute the effect size was not available in papers, the authors were contacted to request relevant data. The studies where authors provided data included Apergis-Schoute et al. (2017), Banca et al. (2024), Borelli et al. (2015), Bucci et al. (2007), De Kleine et al. (2023), Elsner et al. (2022), Endrass et al. (2011), Geller et al. (2017), Gillan et al. (2015), Gillan et al. (2014), Hassoulas et al. (2014), Hearne et al. (2023), Hunt et al. (2022), Kaczkurkin

and Lissek (2013), Kaplan et al. (2006), Marzuki et al. (2022), McGuire et al. (2016), Peng et al. (2022), Pertich et al. (2020), Rouhani et al. (2019), Swerdlow et al. (1996, 1999) and Zetsche et al. (2015a, 2015b).

Where the data required to compute the effect size was not available in the paper or upon request from the authors, means and SDs were estimated from relevant graphs using WebPlotDigitizer. The studies where WebPlotDigitizer was used included Gimenez et al. (2020), Kaufmann et al. (2013), Kelmendi et al. (2016) Krypotos & Engelhard (2020), Nanbu et al. (2010), Voon et al. (2015a) and Wang et al., 2024.

Appendix 4 – Data Extracted from Articles

Table 11

Data Extracted from Articles

Data Item	Definition
Study	The study's authors and year of publication.
Associative Phenomenon	A description of the associative phenomena being studied.
N (OCD/Control)	The number of participants in the OCD/high OCD symptoms and the control/low OCD symptoms groups.
Excluded N (OCD/Control)	The number of participants that were excluded in the OCD/high OCD symptoms and the control/low OCD symptoms groups.
Type of Control	The nature of the control group. For example, control participants may have had no psychiatric diagnoses or may have scored lowly on measures of OCD symptoms.

Data Item	Definition
Symptom Assessment	The means by which those in the 'patient group' were delineated. For example, assessment tools such as the Diagnostic and Statistical Manual of Mental Disorders V (APA, 2013) may have been used or psychometric questionnaires may have identified groups high in OCD symptoms.
Were Comorbidities Measured?	A description of whether comorbidities were documented.
Comorbidities	If measured, a description of the other psychiatric diagnoses participants had in the OCD/high OCD symptoms and control/low OCD symptoms groups.
Were Medications Measured?	A description of whether medications were documented.
Medications	If measured, a description of the medications that participants took in the OCD/high OCD symptoms and control/low OCD symptoms groups.
Age Mean	The mean age of participants in both the OCD and control groups.
Age Standard Deviation	The SD of the age of participants in both the OCD and control groups.

Data Item	Definition
Age Range	The highest and lowest age of participants in both the OCD and control groups.
Gender Distribution	The percentage of people of different genders in both the OCD and control groups.
Ethnicity	The percentage of people of different ethnicities in both the OCD and control groups.
Design	A brief outline of the experimental design.
Instrumental/Pavlovian Conditioning?	A description of whether the study examined instrumental or Pavlovian conditioning.
Conditioned Stimulus	The CS.
Unconditioned Stimulus	The US and a description of whether it had a positive, negative, neutral or both positive and negative valence.
Contingency	The contingency between the CS and US.
Dependent Variable	The measure of associative learning.
Results Summary	A summary of the findings.
Effect Size	The effect sizes for each result.
Standard Error	The standard error for each result.
Statistics Check	A description of any inaccuracies in the statistics (Epskamp & Nuijten, 2016).
Inclusion and Exclusion Criteria Defined?	A description of whether the inclusion and exclusion criteria were defined.

Data Item	Definition
Pre-Registration?	A description of whether the study was pre-registered.
Pre-Registration Followed?	If the study was pre-registered, a description of whether the pre-registration was adhered to.
Limitations	A list of the limitations of the study.
Strengths	A list of the strengths of the study.

Appendix 5 - Kmet et al.'s (2004) Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields

1. Question or objective sufficiently described?

Yes: Is easily identified in the introductory section (or first paragraph of methods section). Specifies (where applicable, depending on study design) all of the following: purpose, subjects/target population, and the specific intervention(s)/association(s)/descriptive parameter(s) under investigation. A study purpose that only becomes apparent after studying other parts of the paper is not considered sufficiently described.

Partial: Vaguely/incompletely reported (e.g. “describe the effect of” or “examine the role of” or “assess opinion on many issues” or “explore the general attitudes”...); or some information has to be gathered from parts of the paper other than the introduction/background/objective section.

No: Question or objective is not reported, or is incomprehensible.

N/A: Should not be checked for this question.

2. Design evident and appropriate to answer study question?

(If the study question is not given, infer from the conclusions).

Yes: Design is easily identified and is appropriate to address the study question/objective.

Partial: Design and/or study question not clearly identified, but gross inappropriateness is not evident; or design is easily identified but only partially addresses the study question.

No: Design used does not answer study question (e.g., a comparison group is required to answer the study question, but none was used); or design cannot be identified.

N/A: Should not be checked for this question.

3. Method of subject selection (and comparison group selection, if applicable) or source of information/input variables (e.g., for decision analysis) is described and appropriate.

Yes: Described and appropriate. Selection strategy designed (i.e., consider sampling frame and strategy) to obtain an unbiased sample of the relevant target population or the entire target population of interest (e.g., consecutive patients for clinical trials, population-based random sample for case-control studies or surveys). Where applicable, inclusion/exclusion criteria are described and defined (e.g., "cancer" -- ICD code or equivalent should be provided). Studies of volunteers: methods and setting of recruitment reported. Surveys: sampling frame/strategy clearly described and appropriate.

Partial: Selection methods (and inclusion/exclusion criteria, where applicable) are not completely described, but no obvious inappropriateness. Or selection strategy is not ideal (i.e., likely introduced bias) but did not likely seriously distort the results (e.g., telephone survey sampled from listed phone numbers only; hospital based case-control study identifi ed all cases admitted during the study period, but recruited controls admitted during the day/evening only). Any study describing participants only as "volunteers" or "healthy volunteers". *Surveys:* target population mentioned but sampling strategy unclear.

No: No information provided. Or obviously inappropriate selection procedures (e.g., inappropriate comparison group if intervention in women is compared to intervention in men). Or presence of selection bias which likely seriously distorted the results (e.g., obvious selection on "exposure" in a case-control study).

N/A: Descriptive case series/reports.

4. Subject (and comparison group, if applicable) characteristics or input variables/information (e.g., for decision analyses) sufficiently described?

Yes: Sufficient relevant baseline/demographic information clearly characterizing the participants is provided (or reference to previously published baseline data is provided). Where applicable, reproducible criteria used to describe/categorize the participants are clearly defi ned (e.g., ever-smokers, depression scores, systolic blood pressure > 140). If "healthy volunteers" are used, age and sex must be reported (at minimum). Decision analyses: baseline estimates for input variables are clearly specified.

Partial: Poorly defi ned criteria (e.g. "hypertension", "healthy volunteers", "smoking"). Or incomplete relevant baseline/demographic information (e.g., information on likely confounders not reported). Decision analyses: incomplete reporting of baseline estimates for input variables.

No: No baseline/demographic information provided. *Decision analyses:* baseline estimates of input variables not given.

N/A: Should not be checked for this question.

5. If random allocation to treatment group was possible, is it described?

Yes: True randomization done - requires a description of the method used (e.g., use of random numbers).

Partial: Randomization mentioned, but method is not (i.e. it may have been possible that randomization was not true).

No: Random allocation not mentioned although it would have been feasible and appropriate (and was possibly done).

N/A: Observational analytic studies. Uncontrolled experimental studies. Surveys. Descriptive case series/reports. Decision analyses.

6. If interventional and blinding of investigators to intervention was possible, is it reported?

Yes: Blinding reported.

Partial: Blinding reported but it is not clear who was blinded.

No: Blinding would have been possible (and was possibly done) but is not reported.

N/A: Observational analytic studies. Uncontrolled experimental studies. Surveys. Descriptive case series/reports. Decision analyses.

7. If interventional and blinding of subjects to intervention was possible, is it reported?

Yes: Blinding reported.

Partial: Blinding reported but it is not clear who was blinded.

No: Blinding would have been possible (and was possibly done) but is not reported.

N/A: Observational studies. Uncontrolled experimental studies. Surveys. Descriptive case series/reports.

8. Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?

Yes: Defined (or reference to complete definitions is provided) and measured according to reproducible, "objective" criteria (e.g., death, test completion – yes/no, clinical scores). Little or minimal potential for measurement/misclassification errors. Surveys: clear description (or reference to clear description) of questionnaire/interview content and response options. *Decision analyses:* sources of uncertainty are defi ned for all input variables.

Partial: Definition of measures leaves room for subjectivity, or not sure (i.e., not reported in detail, but probably acceptable). Or precise definition(s) are missing, but no evidence or problems in the paper that would lead one to assume major problems. Or instrument/mode of assessment(s) not reported. Or misclassification errors may have occurred, but they did not likely seriously distort the results (e.g., slight difficulty with recall of long-ago events; exposure is measured only at baseline in a long cohort study). *Surveys:* description of questionnaire/interview content incomplete; response options unclear. *Decision analyses:* sources of uncertainty are defi ned only for some input variables.

No: Measures not defined, or are inconsistent throughout the paper. Or measures employ only ill-defi ned, subjective assessments, e.g. "anxiety" or "pain." Or obvious misclassification errors/measurement bias likely seriously distorted the results (e.g., a prospective cohort relies on self-reported outcomes among the "unexposed" but requires clinical assessment of the "exposed"). *Surveys:* no description of questionnaire/interview content or response options. *Decision analyses:* sources of uncertainty are not defined for input variables.

N/A: Descriptive case series/reports.

9. Sample size appropriate?

Yes: Seems reasonable with respect to the outcome under study and the study design. When statistically significant results are achieved for major outcomes, appropriate sample size can usually be assumed, unless large standard errors (SE > ½ effect size) and/or problems with multiple testing are evident. *Decision analyses:* size of modelled cohort/number of iterations specified and justified.

Partial: Insufficient data to assess sample size (e.g., sample seems "small" and there is no mention of power/sample size/effect size of interest and/or variance estimates aren't provided). Or some statistically significant results with standard errors > ½ effect size (i.e., imprecise results). Or some statistically significant results in the absence of variance estimates. *Decision analyses:* incomplete description or justification of size of modelled cohort/number of iterations.

No: Obviously inadequate (e.g., statistically non-significant results and standard errors > ½ effect size; or standard deviations > _ of effect size; or statistically non-significant results with no variance estimates and obviously inadequate sample size). Decision analyses: size of modelled cohort/number of iterations not specified.

N/A: Most surveys (except surveys comparing responses between groups or change over time). Descriptive case series/reports.

10. Analysis described and appropriate?

Yes: Analytic methods are described (e.g. "chi square"/ "t-tests"/"Kaplan-Meier with log rank tests", etc.) and appropriate.

Partial: Analytic methods are not reported and have to be guessed at, but are probably appropriate. Or minor flaws or some tests appropriate, some not (e.g., parametric tests used, but unsure whether appropriate; control group exists but is not used for statistical analysis). Or multiple testing problems not addressed.

No: Analysis methods not described and cannot be determined. Or obviously inappropriate analysis methods (e.g., chi-square tests for continuous data, SE given where normality is highly unlikely, etc.). Or a study with a descriptive goal/objective is over-analyzed.

N/A: Descriptive case series/reports.

11. Some estimate of variance (e.g., confidence intervals, standard errors) is reported for the main results/outcomes (i.e., those directly addressing the study question/objective upon which the conclusions are based)?

Yes: Appropriate variances estimate(s) is/are provided (e.g., range, distribution, confidence intervals, etc.). Decision analyses: sensitivity analysis includes all variables in the model.

Partial: Undefined "+/-" expressions. Or no specific data given, but insufficient power acknowledged as a problem. Or variance estimates not provided for all main results/outcomes. Or inappropriate variance estimates (e.g., a study examining change over time provides a variance around the parameter of interest at "time 1" or "time 2", but does not provide an estimate of the variance around the difference). Decision analyses: sensitivity analysis is limited, including only some variables in the model.

No: No information regarding uncertainty of the estimates. Decision analyses: No sensitivity analysis.

N/A: Descriptive case series/reports. Descriptive surveys collecting information using open-ended questions.

12. Controlled for confounding?

Yes: Randomized study, with comparability of baseline characteristics reported (or non-comparability controlled for in the analysis). Or appropriate control at the design or analysis stage (e.g., matching, subgroup analysis, multivariate models, etc). Decision analyses: dependencies between variables fully accounted for (e.g., joint variables are considered).

Partial: Incomplete control of confounding. Or control of confounding reportedly done but not completely described. Or randomized study without report of comparability of baseline characteristics. Or confounding not considered, but not likely to have seriously distorted the results. *Decision analyses:* incomplete consideration of dependencies between variables.

No: Confounding not considered, and may have seriously distorted the results. *Decision analyses:* dependencies between variables not considered.

N/A: Cross-sectional surveys of a single group (i.e., surveys examining change over time or surveys comparing different groups should address the potential for confounding). Descriptive studies. Studies explicitly stating the analysis is strictly descriptive/exploratory in nature.

13. Results reported in sufficient detail?

Yes: Results include major outcomes and all mentioned secondary outcomes.

Partial: Quantitative results reported only for some outcomes. Or difficult to assess as study question/objective not fully described (and is not made clear in the methods section), but results seem appropriate.

No: Quantitative results are reported for a subsample only, or "n" changes continually across the denominator (e.g., reported proportions do not account for the entire study sample, but are reported only for those with complete data -- i.e., the category of "unknown" is not used where needed). Or results for some major or mentioned secondary outcomes are only qualitatively reported when quantitative reporting would have been possible (e.g., results include vague comments such as "more likely" without quantitative report of actual numbers).

N/A: Should not be checked for this question.

14. Do the results support the conclusions?

Yes: All the conclusions are supported by the data (even if analysis was inappropriate). Conclusions are based on all results relevant to the study question, negative as well as positive ones (e.g., they aren't based on the sole significant finding while ignoring the negative results). Part of the conclusions may expand beyond the results, if made in addition to rather than instead of those strictly supported by data, and if including indicators of their interpretative nature (e.g., "suggesting," "possibly").

Partial: Some of the major conclusions are supported by the data, some are not. Or speculative interpretations are not indicated as such. Or low (or unreported) response rates call into question the validity of generalizing the results to the target population of interest (i.e., the population defi ned by the sampling frame/strategy).

No: None or a very small minority of the major conclusions are supported by the data. Or negative findings clearly due to low power are reported as definitive evidence against the alternate hypothesis. Or conclusions are missing. Or extremely low response rates invalidate generalizing the results to the target population of interest (i.e., the population defi ned by the sampling frame/strategy).

N/A: Should not be checked for this question

Appendix 6 - Inter-Rater Reliability of the Risk of Bias Assessment

Table 12

Inter-Rater Reliability of the Risk of Bias Assessment

Kmet et al.'s (2004) Dimension	Kappa's Coefficient	Significance	Percentage Agreement
Question or objective sufficiently described?	1	P < .001	100%
Design evident and appropriate to answer study question?	1	P < .001	100%
Method of subject selection (and comparison group selection, if applicable) or source of information/input variables (e.g., for decision analysis) is described and appropriate?	.80	P = .005	91.7%
Subject (and comparison group, if applicable) characteristics or input variables/information (e.g., for decision analyses) sufficiently described?	1	P < .001	100%

Kmet et al.'s (2004) Dimension	Kappa's Coefficient	Significance	Percentage Agreement
If random allocation to treatment group was possible, is it described?	1	P < .001	100%
If interventional and blinding of investigators to intervention was possible, is it reported?	1	P < .001	100%
If interventional and blinding of subjects to intervention was possible, is it reported?	1	P < .001	100%
Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?	.80	P = .005	91.7%
Sample size appropriate?	1	P < .001	100%
Analysis described and appropriate?	1	P < .001	100%

Kmet et al.'s (2004) Dimension	Kappa's Coefficient	Significance	Percentage Agreement
Some estimate of variance (e.g., confidence intervals, standard errors) is reported for the main results/outcomes (i.e., those directly addressing the study question/objective upon which the conclusions are based)?	.867	P < .001	91.7%
Controlled for confounding?	*	*	100%
Results reported in sufficient detail?	.833	P < .001	91.7%
Do the results support the conclusions?	1	P < .001	100%

Note. 'Significance' pertains to the p value associated with the Kappa coefficient. * As both reviewers gave only one response for all studies, it was not possible to calculate a Kappa coefficient and its associated significance.

Appendix 7 – Sensitivity Analyses

The following analyses report the results of sensitivity analyses, whereby the meta-analysis was iteratively re-calculated whilst excluding one of the studies, for each associative phenomenon. Tables detail the meta-analytic effect size estimate, SE, p value, 95% CI, I^2, T^2 and Q statistic after removing each study.

Associative Learning

Table 13

Associative Learning Sensitivity Analysis

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Apergis-Schoute et al. (2017)	-.10	.10	.33	[-.31, .10]	79.46%	.27	130,85, p < .001
Armstrong & Olatunji (2017)	-.11	.11	.28	[-.32, .09]	80.05%	.28	134.80, p < .001
Banca et al. (2024)	-.14	.10	.17	[-.34, .06]	78.49%	.26	126.71, p < .001
Borelli et al. (2015)	-.10	.10	.32	[-.31, .10]	79.67%	.27	132.19, p < .001

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Bucci et al. (2007)	-.10	.10	.33	[-.30, .10]	79.47%	.27	131, p < .001
Cano et al. (2021)	-.13	.10	.19	[-.33, .07]	79.28%	.27	131.30, p < .001
De Kleine et al. (2023)	-.12	.11	.27	[-.32, .09]	79.97%	.28	134.95 p < .001
Diniz et al. (2023)	-.12	.10	.23	[-.33, .08]	79.93%	.28	134.25, p < .001
Elsner et al. (2022)	-.10	.10	.34	[-.30, .10]	79.24%	.27	129.42, p < .001
Endrass et al. (2011)	-.12	.10	.24	[-.32, .08]	80.11%	.28	134.76, p < .001
Exner et al., (2014), Zetsche et al. (2015a) and Zetsche et al. (2015b)	-.09	.10	.37	[-.29, .11]	78.52%	.26	126.01, p < .001
Geller et al. (2017)	-.13	.10	.19	[-.34, .07]	79.1%	.27	129.69, p < .001
Gillan et al. (2011)	-.11	.11	.28	[-.32, .09]	80.1%	.28	134.73, p < .001

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Gillan et al. (2014)	-.11	.10	.29	[-.32, .09]	80.05%	.28	134.42, p < .001
Gimenez et al. (2020)	-.13	.10	.22	[-.33, .08]	79.96%	.28	134.11, p < .001
Gottwald et al. (2018)	-.10	.10	.35	[-.30, .11]	78.96%	.27	127.7, p < .001
Hansmeier et al. (2018)	-.11	.10	.30	[-.31, .10]	80.01%	.28	134.27, p < .001
Hearne et al. (2023)	-.13	.11	.23	[-.33, .08]	79.68%	.28	133.73, p < .001
Hiebert et al. (2020)	-.07	.09	.43	[-.26, .11]	75.74%	.22	119.54, p < .001
Hunt et al. (2022)	-.12	.11	.26	[-.32, .09]	79.96%	.28	135.02, p < .001
Kaczkurkin & Lissek (2013)	-.11	.11	.28	[-.32, .09]	80.06%	.28	134.77, p < .001
Kaufmann et al. (2013)	-.12	.10	.24	[-.33, .08]	80.07%	.28	134.59, p < .001
Kelmendi et al. (2016)	-.12	.10	.24	[-.33, .08]	80.03%	.28	134.60, p < .001
Marzuki et al. (2021)	-.11	.11	.28	[-.32, .09]	79.77%	.28	134.58, p < .001

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Marzuki et al. (2022)	-.14	.10	.16	[-.34, .06]	78.07%	.25	124.48, p < .001
McGuire et al. (2016)	-.13	.10	.22	[-.33, .08]	79.79%	.27	133.41, p < .001
Morein-Zamir et al. (2010)	-.05	.08	.53	[-.21, .11]	68.68%	.15	100.17, p < .001
Nanbu et al. (2010)	-.12	.11	.26	[-.32, .09]	80.1%	.28	135.01, p < .001
Novara et al. (2021)	-.11	.10	.29	[-.32, .09]	80.07%	.28	134.48, p < .001
Pertich et al. (2020)	-.12	.10	.24	[-.33, .08]	79.98%	.28	134.52, p < .001
Pohlchen et al. (2021)	-.13	.11	.23	[-.33, .08]	79.72%	.28	133.97, p < .001
Vaghi et al. (2019)	-.12	.11	.27	[-.32, .09]	80.12%	.28	135.02, p < .001
Voon et al. (2015)	-.13	.10	.19	[-.34, .07]	79.06%	.27	129.47, p < .001
Wang et al. (2024)	-.14	.10	.17	[-.34, .06]	78.17%	.25	124.16, p < .001

Table 14

Avoidance Learning Sensitivity Analysis

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Angelakis & Austin (2018)	.53	.48	.27	[-.42, 1.48]	82.5%	.57	13.41, p < .001
De Kleine et al. (2023)	2.14	1.12	.06	[-.05, 4.33]	93.44%	3.47	22.72, p < .001
Endrass et al. (2011)	1.70	1.41	.23	[-1.06, 4.47]	96.62%	5.72	49.60, p < .001
Hassoulas et al. (2014)	1.66	1.41	.24	[-1.10, 4.42]	97.68%	5.75	50.58, p < .001

Table 15

Extinction Sensitivity Analysis

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Armstrong & Olatunji (2017)	.36	.09	< .001	[.17, .54]	0%	0	4.37, p = .74
Cano et al. (2021)	.37	.09	< .001	[.20, .55]	0%	0	4.37, p = .74
Diniz et al. (2023)	.37	.09	< .001	[.19, .56]	0%	0	4.4, p = .73
Geller et al. (2017)	.36	.10	< .001	[.18, .55]	0%	0	4.44, p = .73
Gimenez et al. (2020)	.38	.09	< .001	[.20, .55]	0%	0	4.29 p = .75
McGuire et al. (2016)	.37	.09	< .001	[.19, .55]	0%	0	4.45, p = .727
Nanbu et al. (2010)	.38	.09	< .001	[.20, .56]	0%	0	4.23, p = .75
Pohlchen et al. (2021)	.41	.10	< .001	[.22, .60]	0%	0	3.24, p = .86
Wang et al. (2024)	.30	.10	.002	[.11, .49]	0%	0	1.02, p = .99

Outcome Devaluation

Table 16

Outcome Devaluation Sensitivity Analysis

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Banca et al. (2024)	.51	.16	.002	[.19, .83]	34.81%	.04	4.74, p = .19
Gillan et al. (2011)	.33	.33	.32	[-.32, .99]	85.14%	.38	20.36, p < .001
Gillan et al. (2014)	.16	.32	.61	[-.47, .79]	84.07%	.35	19.29, p < .001
Gillan et al. (2015)	.16	.32	.63	[-.48, .79]	82.86%	.34	18.18, p < .001
Gottwald et al. (2018)	.16	.33	.62	[-.48, .80]	83.11%	.35	18.51 p < .001

Table 17

Reversal Learning Sensitivity Analysis

Excluded Study	Effect Size	Standard Error	P Value	Confidence Interval	I^2	T^2	Q
Apergis-Schoute et al. (2017)	.27	.16	.10	[-.05, .60]	65.36%	.12	17.38 p = .008
Elsner et al. (2022)	.15	.21	.48	[-.26, .55]	77.99%	.23	28.90, p < .001
Hearne et al., 2023)	.15	.21	.47	[-.26, .55]	77.48%	.23	28.92, p < .001
(Marzuki et al. (2021)	.03	.16	.78	[-.26, .35]	60.53%	.10	15.13, p = .02
Novara et al. (2021)	.09	.19	.63	[-.27, .45]	74.85%	.18	25.60, p < .001
Remijnse et al. (2009)	.18	.20	.37	[-.21, .58]	78.40%	.22	28.46, p < .001
Szabó et al. (2013)	.18	.20	.39	[-.22, .57]	78.30%	.22	28.62 p < .001
Valerius et al. (2008)	.23	.18	.20	[-.13, .59]	74.59%	.17	24.88, p < .001

Appendix 8 - Grading of Recommendations Assessment, Development and Evaluation

The GRADE criteria suggest that a body of evidence is more certain if studies utilise a randomised controlled trial design, report large effects, report dose responsiveness, have only confounds that would reduce an effect where an effect was found and/or have only confounds that would produce a spurious effect where no effect was found (Guyatt et al., 2011). Also, the criteria suggest that evidence is less certain if studies have risk of bias, are inconsistent in their results, provide only indirect evidence for the question, ascertain imprecise effect estimates and show evidence of publication bias. The levels of evidence and GRADE criteria are detailed in **Tables 18** and **19**, respectively.

Table 18

Levels of Evidence

Quality Level	Definition
High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
Very Low	We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

Table 19

GRADE Criteria

Study Design	**Quality of Evidence**	**Lower if**	**Higher if**
Randomised Trial	High	Risk of Bias	Large Effect
		-1 Serious	+1 Large
		-2 Very Serious	+2 Very Large
	Moderate	Inconsistency	Dose Response
		-1 Serious	+1 Evidence of a
		-2 Very Serious	Gradient
Observational Study	Low	Imprecision	All Plausible
		-1 Serious	Confounding
		-2 Very Serious	+1 Would Reduce a
			Demonstrated Effect
	Very Low	Publication Bias	+1 Would Suggest a
		-1 Serious	Spurious Effect
		-2 Very Serious	When Results Show
			No Effect

Appendix 9 – Study Summary Statistics for Each Meta-Analysis

The following tables detail the means, SDs and sample sizes of each study included in each meta-analysis.

Associative Learning

Table 20

Associative Learning Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Apergis-Schoute et al. (2017)	43	.979	.745	35	1.43	.971
Armstrong & Olatunji (2017)	32	81.4	19.9	30	85.5	24.5
Banca et al. (2024)	32	4070	1642	33	3162	988
Borelli et al. (2015)	18	49.4	2.45	63	50.8	2.8
Bucci et al. (2007)	30	-1.71	.33	30	-1.51	.35

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Cano et al. (2021)	18	.55	.25	18	.41	.21
De Kleine et al. (2023)	33	7.33	2.65	47	7.69	2.98
Diniz et al. (2023)	32	23.5	27.8	25	18.8	25.2
Elsner et al. (2022)	41	-.134	.23	32	.031	.3
Endrass et al. (2011)	18	77	14.7	18	75.2	15.6
Exner et al. (2014), Zetsche et al. (2015a) and Zetsche et al. (2015b)	30	65.2	14.9	30	77	12.1
Geller et al. (2017)	39	.4	.24	41	.29	.24
Gillan et al. (2011)	21	72	19.4	30	76	17.6
Gillan et al. (2014)	25	26.8	4.13	25	27.9	3.61
Giménez et al. (2020)	17	.415	.41	13	.303	.308

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Gottwald et al. (2018)	36	-21.4	14.1	36	-12	12.2
Hansmeier et al. (2018)	10	69.7	13.3	10	75.9	13
Hearne et al. (2023)	45	2.58	1.29	45	2.38	.936
Hiebert et al. (2020)	14	76.2	5.74	16	84.7	3.72
Hunt et al. (2022)	39	55	23.2	39	55.8	29.2
Kaczkurkin & Lissek (2013)	28	54.8	4.51	31	55.6	4.28
Kaufmann et al. (2013)	19	-26.9	17.4	19	-29.6	16.7
Kelmendi et al. (2016)	26	.653	.75	23	.558	.710
Marzuki et al. (2021)	50	.94	.1	53	.960	.110

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Marzuki et al. (2022)	27	.9	.55	46	.61	.25
McGuire et al. (2016)	19	.492	.434	22	.361	0.328
Morein-Zamir et al. (2010)	18	-4.2	1.05	18	-1.16	1.05
Nanbu et al. (2010)	39	.289	.674	21	.299	.248
Novara et al. (2021)	24	91.1	11	23	94.7	14.4
Pertich et al. (2020)	29	.089	.082	29	.08	.055
Pöhlchen et al. (2021)	37	.083	.535	56	.004	.488
Vaghi et al. (2019)	27	.49	.24	27	.510	.21
Voon et al. (2015a)	30	-5.35	4.97	53	-8.07	6
Wang et al. (2024)	41	3.36	.664	41	2.87	.769

Table 21

Avoidance Learning Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Angelakis & Austin (2018)	15	139	10.7	17	98.1	6.96
De Kleine et al. (2023)	33	.722	.345	47	.823	.288
Endrass et al. (2011)	18	70.0	11.5	18	52.9	20.9
Hassoulas et al. (2014)	7	55.6	52.1	12	8.80	31.9

Table 22

Extinction Learning Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Armstrong & Olatunji (2017)	32	51.8	33.9	30	37.8	29.7
Cano et al. (2021)	18	.26	.06	18	.24	.08
Diniz et al. (2023)	32	67.9	33.2	25	57.1	34.7
Geller et al. (2017)	39	.32	.23	41	.23	.23
Giménez et al. (2020)	17	.267	.135	13	.233	.17
McGuire et al. (2016)	19	.582	.526	22	.422	.342
Nanbu et al. (2010)	39	.162	.477	21	.0626	.14
Pöhlchen et al. (2021)	37	-.05	.441	56	-.125	.506
Wang et al. (2024)	41	3.39	.769	41	2.76	.874

Generalisation

Table 23

Generalisation Learning Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Hunt et al. (2022)	39	13.9	13.7	39	15.9	17.1
Kaczkurkin & Lissek (2013)	28	44.9	3.29	31	45.6	3.33
Pertich et al. (2020)	29	.152	.199	29	.221	.285

Table 24

Latent Inhibition Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Kaplan et al. (2006)	18	3.06	1.16	18	2.37	.766
Swerdlow et al. (1996)	107	15.8	8.89	19	20.4	7.75
Swerdlow et al. (1999)	48	12.5	9.54	63	4.74	2.31

Outcome Devaluation

Table 25

Outcome Devaluation Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Banca et al. (2024)	32	21.1	4.90	33	25.2	7.08
Gillan et al. (2011)	21	70.0	31.2	30	71.0	31.5
Gillan et al. (2014)	25	.840	1.25	25	.160	.600
Gillan et al. (2015)	37	32.2	45.0	33	7.27	23.4
Gottwald et al. (2018)	36	-59.7	22.0	36	-73.3	19.5

Table 26

Pavlovian-to-Instrumental Transfer Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Krypotos & Engelhard (2020)	28	4.33	5.57	20	8.11	7.89
Peng et al. (2022)	30	7.47	1.34	31	7.47	1.99

Reversal Learning

Table 27

Reversal Learning Summary Statistics

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Apergis-Schoute et al. (2017)	43	.887	.975	35	1.50	1.31
Elsner et al. (2022)	41	-.313	.155	32	-.353	.151
Hearne et al. (2023)	45	2.51	1.25	45	2.24	.933
Marzuki et al. (2021)	50	-.610	.310	53	-.830	.160
Novara et al. (2021)	24	31.6	32.4	23	11.4	20.9
Remijnse et al. (2009)	21	224	23.2	27	224	17.1

Study	OCD Sample	OCD Mean	OCD SD	Control Sample	Control Mean	Control SD
Szabó et al. (2013)	28	224	22.3	30	222	19.4
Valerius et al. (2008)	20	49.5	15.3	20f	56.9	18.7

Appendix 10 – Clinical Psychology Review Author Guidelines

About the journal

Aims and scope

Clinical Psychology Review publishes substantive reviews of topics germane to **clinical psychology**. Papers cover diverse issues including: psychopathology, psychotherapy, behavior therapy, cognition and cognitive therapies, behavioral medicine, community mental health, assessment, and child development. Papers should be cutting edge and advance the science and/or practice of clinical psychology.

Reviews on other topics, such as psychophysiology, learning therapy, experimental psychopathology, and social psychology often appear if they have a clear relationship to research or practice in **clinical psychology**. Integrative literature reviews and summary reports of innovative ongoing clinical research programs are also sometimes published. Reports on individual research studies and theoretical treatises or clinical guides without an empirical base are not appropriate.

Benefits to authors

We also provide many author benefits, such as free PDFs, a liberal copyright policy, special discounts on Elsevier publications and much more. Please click here for more information on our author services.

Please see our Guide for Authors for information on article submission. If you require any further information or help, please visit our Support Center

Peer review

This journal follows a single anonymized review process. Your submission will initially be assessed by our editors to determine suitability for publication in this journal. If your submission is deemed suitable, it will typically be sent to a minimum of two reviewers for an independent expert assessment of the scientific quality. The decision as to whether your article is accepted or rejected will be taken by our editors. Authors who wish to appeal the editorial decision for their manuscript may submit a formal appeal request in accordance with the procedure outlined in Elsevier's Appeal Policy. Only one appeal per submission will be considered and the appeal decision will be final.

Read more about peer review.

Our editors are not involved in making decisions about papers which:

- they have written themselves.
- have been written by family members or colleagues.
- relate to products or services in which they have an interest.

Any such submissions will be subject to the journal's usual procedures and peer review will be handled independently of the editor involved and their research group. Read more about editor duties.

Special issues and article collections

The peer review process for special issues and article collections follows the same process as outlined above for regular submissions, except, a guest editor will send the submissions out to the reviewers and may recommend a decision to the journal editor. The journal editor oversees the peer review process of all special issues and article collections to ensure the high standards

of publishing ethics and responsiveness are respected and is responsible for the final decision regarding acceptance or rejection of articles.

Open access

We refer you to our open access information page to learn about open access options for this journal.

Ethics and policies

Ethics in publishing

Authors must follow ethical guidelines stated in Elsevier's Publishing Ethics Policy.

Submission declaration

When authors submit an article to an Elsevier journal it is implied that:

- the work described has not been published previously except in the form of a preprint, an abstract, a published lecture, academic thesis or registered report. See our policy on multiple, redundant or concurrent publication.
- the article is not under consideration for publication elsewhere.
- the article's publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out.
- if accepted, the article will not be published elsewhere in the same form, in English or in any other language, including electronically, without the written consent of the copyright-holder.

To verify compliance with our journal publishing policies, we may check your manuscript with our screening tools.

Authorship

All authors should have made substantial contributions to all of the following:

1. The conception and design of the study, or acquisition of data, or analysis and interpretation of data.
2. Drafting the article or revising it critically for important intellectual content.
3. Final approval of the version to be submitted.

Authors should appoint a corresponding author to communicate with the journal during the editorial process. All authors should agree to be accountable for all aspects of the work to ensure that the questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Changes to authorship

The editors of this journal generally will not consider changes to authorship once a manuscript has been submitted. It is important that authors carefully consider the authorship list and order of authors and provide a definitive author list at original submission.

The policy of this journal around authorship changes:

- All authors must be listed in the manuscript and their details entered into the submission system.
- Any addition, deletion or rearrangement of author names in the authorship list should only be made prior to acceptance, and only if approved by the journal editor.
- Requests to change authorship should be made by the corresponding author, who must provide the reason for the request to the journal editor with written confirmation from

all authors, including any authors being added or removed, that they agree with the addition, removal or rearrangement.

- All requests to change authorship must be submitted using this form. Requests which do not comply with the instructions outlined in the form will not be considered.
- Only in exceptional circumstances will the journal editor consider the addition, deletion or rearrangement of authors post acceptance.
- Publication of the manuscript may be paused while a change in authorship request is being considered.
- Any authorship change requests approved by the journal editor will result in a corrigendum if the manuscript has already been published.
- Any unauthorised authorship changes may result in the rejection of the article, or retraction, if the article has already been published.

Declaration of interests

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence or bias their work. Examples of potential competing interests include:

- Employment
- Consultancies
- Stock ownership
- Honoraria
- Paid expert testimony
- Patent applications or registrations

- Grants or any other funding

The Declaration of Interests tool should always be completed.

Authors with no competing interests to declare should select the option, "I have nothing to declare".

The resulting Word document containing your declaration should be uploaded at the "attach/upload files" step in the submission process. It is important that the Word document is saved in the .doc/.docx file format. Author signatures are not required.

We advise you to read our policy on conflict of interest statements, funding source declarations, author agreements/declarations and permission notes.

Funding sources

Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of generative AI in scientific writing

Authors must declare the use of generative AI in scientific writing upon submission of the paper. The following guidance refers only to the writing process, and not to the use of AI tools to analyse and draw insights from data as part of the research process:

- Generative AI and AI-assisted technologies should only be used in the writing process to improve the readability and language of the manuscript.
- The technology must be applied with human oversight and control and authors should carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased. Authors are ultimately responsible and accountable for the contents of the work.
- Authors must not list or cite AI and AI-assisted technologies as an author or co-author on the manuscript since authorship implies responsibilities and tasks that can only be attributed to and performed by humans.

The use of generative AI and AI-assisted technologies in scientific writing must be declared by adding a statement at the end of the manuscript when the paper is first submitted. The statement will appear in the published work and should be placed in a new section before the references list. An example:

- Title of new section: Declaration of generative AI and AI-assisted technologies in the writing process.

- Statement: During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

The declaration does not apply to the use of basic tools, such as tools used to check grammar, spelling and references. If you have nothing to disclose, you do not need to add a statement.

Please read Elsevier's author policy on the use of generative AI and AI-assisted technologies, which can be found in our GenAI Policies for journals.

Please note: to protect authors' rights and the confidentiality of their research, this journal does not currently allow the use of generative AI or AI-assisted technologies such as ChatGPT or similar services by reviewers or editors in the peer review and manuscript evaluation process, as is stated in our GenAI Policies for journals. We are actively evaluating compliant AI tools and may revise this policy in the future.

Preprints

Preprint sharing

Authors may share preprints in line with Elsevier's article sharing policy. Sharing preprints, such as on a preprint server, will not count as prior publication.

We advise you to read our policy on multiple, redundant or concurrent publication.

Use of inclusive language

Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Authors should ensure their work uses inclusive language throughout and contains nothing which might imply one individual is superior to another on the grounds of:

- age
- gender
- race
- ethnicity
- culture
- sexual orientation
- disability or health condition

We recommend avoiding the use of descriptors about personal attributes unless they are relevant and valid. Write for gender neutrality with the use of plural nouns ("clinicians, patients/clients") as default. Wherever possible, avoid using "he, she," or "he/she."

No assumptions should be made about the beliefs of readers and writing should be free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions.

These guidelines are meant as a point of reference to help you identify appropriate language but are by no means exhaustive or definitive.

Reporting sex- and gender-based analyses

There is no single, universally agreed-upon set of guidelines for defining sex and gender. We offer the following guidance:

- Sex and gender-based analyses (SGBA) should be integrated into research design when research involves or pertains to humans, animals or eukaryotic cells. This should be done in accordance with any requirements set by funders or sponsors and best practices within a field.
- Sex and/or gender dimensions of the research should be addressed within the article or declared as a limitation to the generalizability of the research.
- Definitions of sex and/or gender applied should be explicitly stated to enhance the precision, rigor and reproducibility of the research and to avoid ambiguity or conflation of terms and the constructs to which they refer.

We advise you to read the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER checklist (PDF) on the EASE website, which offer systematic approaches to the use of sex and gender information in study design, data analysis, outcome reporting and research interpretation.

For further information we suggest reading the rationale behind and recommended use of the SAGER guidelines.

Definitions of sex and/or gender

We ask authors to define how sex and gender have been used in their research and publication. Some guidance:

- Sex generally refers to a set of biological attributes that are associated with physical and physiological features such as chromosomal genotype, hormonal levels, internal

and external anatomy. A binary sex categorization (male/female) is usually designated at birth ("sex assigned at birth") and is in most cases based solely on the visible external anatomy of a newborn. In reality, sex categorizations include people who are intersex/have differences of sex development (DSD).

- Gender generally refers to socially constructed roles, behaviors and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society.

Jurisdictional claims

Elsevier respects the decisions taken by its authors as to how they choose to designate territories and identify their affiliations in their published content. Elsevier's policy is to take a neutral position with respect to territorial disputes or jurisdictional claims, including, but not limited to, maps and institutional affiliations. For journals that Elsevier publishes on behalf of a third party owner, the owner may set its own policy on these issues.

- Maps: Readers should be able to locate any study areas shown within maps using common mapping platforms. Maps should only show the area actually studied and authors should not include a location map which displays a larger area than the bounding box of the study area. Authors should add a note clearly stating that "*map lines delineate study areas and do not necessarily depict accepted national boundaries*". During the review process, Elsevier's editors may request authors to change maps if these guidelines are not followed.

- Institutional affiliations: Authors should use either the full, standard title of their institution or the standard abbreviation of the institutional name so that the institutional name can be independently verified for research integrity purposes.

Writing and formatting

File format

We ask you to provide editable source files for your entire submission (including figures, tables and text graphics). Some guidelines:

- Save files in an editable format, using the extension .doc/.docx for Word files and .tex for LaTeX files. A PDF is not an acceptable source file.
- Lay out text in a single-column format.
- Use spell-check and grammar-check functions to avoid errors.

We advise you to read our Step-by-step guide to publishing with Elsevier.

Title page

You are required to include the following details in the title page information:

- Article title. Article titles should be concise and informative. Please avoid abbreviations and formulae, where possible, unless they are established and widely understood, e.g., DNA).
- Author names. Provide the given name(s) and family name(s) of each author. The order of authors should match the order in the submission system. Carefully check that all names are accurately spelled. If needed, you can add your name between parentheses in your own script after the English transliteration.

- Affiliations. Add affiliation addresses, referring to where the work was carried out, below the author names. Indicate affiliations using a lower-case superscript letter immediately after the author's name and in front of the corresponding address. Ensure that you provide the full postal address of each affiliation, including the country name and, if available, the email address of each author.

- Corresponding author. Clearly indicate who will handle correspondence for your article at all stages of the refereeing and publication process and also post-publication. This responsibility includes answering any future queries about your results, data, methodology and materials. It is important that the email address and contact details of your corresponding author are kept up to date during the submission and publication process.

- Present/permanent address. If an author has moved since the work described in your article was carried out, or the author was visiting during that time, a "present address" (or "permanent address") can be indicated by a footnote to the author's name. The address where the author carried out the work must be retained as their main affiliation address. Use superscript Arabic numerals for such footnotes.

Abstract

You are required to provide a concise and factual abstract which does not exceed 250 words. The abstract should briefly state the purpose of your research, principal results and major conclusions. Some guidelines:

- Abstracts must be able to stand alone as abstracts are often presented separately from the article.

- Avoid references. If any are essential to include, ensure that you cite the author(s) and year(s).

- Avoid non-standard or uncommon abbreviations. If any are essential to include, ensure they are defined within your abstract at first mention.

Keywords

You are required to provide 1 to 7 keywords for indexing purposes. Keywords should be written in English. Please try to avoid keywords consisting of multiple words (using "and" or "of").

We recommend that you only use abbreviations in keywords if they are firmly established in the field.

Highlights

You are required to provide article highlights at submission.

Highlights are a short collection of bullet points that should capture the novel results of your research as well as any new methods used during your study. Highlights will help increase the discoverability of your article via search engines. Some guidelines:

- Submit highlights as a separate editable file in the online submission system with the word "highlights" included in the file name.
- Highlights should consist of 3 to 5 bullet points, each a maximum of 85 characters, including spaces.

We encourage you to view example article highlights and read about the benefits of their inclusion.

Graphical abstract

You are encouraged to provide a graphical abstract at submission.

The graphical abstract should summarize the contents of your article in a concise, pictorial form which is designed to capture the attention of a wide readership. A graphical abstract will help draw more attention to your online article and support readers in digesting your research. Some guidelines:

- Submit your graphical abstract as a separate file in the online submission system.
- Ensure the image is a minimum of 531 x 1328 pixels (h x w) or proportionally more and is readable at a size of 5 x 13 cm using a regular screen resolution of 96 dpi.
- Our preferred file types for graphical abstracts are TIFF, EPS, PDF or MS Office files.

We encourage you to view example graphical abstracts and read about the benefits of including them.

Tables

Tables must be submitted as editable text, not as images. Some guidelines:

- Place tables next to the relevant text or on a separate page(s) at the end of your article.
- Cite all tables in the manuscript text.
- Number tables consecutively according to their appearance in the text.
- Please provide captions along with the tables.
- Place any table notes below the table body.
- Avoid vertical rules and shading within table cells.

We recommend that you use tables sparingly, ensuring that any data presented in tables is not duplicating results described elsewhere in the article.

Figures, images and artwork

Figures, images, artwork, diagrams and other graphical media must be supplied as separate files along with the manuscript. We recommend that you read our detailed artwork and media instructions. Some excerpts:

When submitting artwork:

- Cite all images in the manuscript text.
- Number images according to the sequence they appear within your article.
- Submit each image as a separate file using a logical naming convention for your files (for example, Figure_1, Figure_2 etc).
- Please provide captions for all figures, images, and artwork.
- Text graphics may be embedded in the text at the appropriate position. If you are working with LaTeX, text graphics may also be embedded in the file.

Artwork formats

When your artwork is finalized, "save as" or convert your electronic artwork to the formats listed below taking into account the given resolution requirements for line drawings, halftones, and line/halftone combinations:

- Vector drawings: Save as EPS or PDF files embedding the font or saving the text as "graphics."
- Color or grayscale photographs (halftones): Save as TIFF, JPG or PNG files using a minimum of 300 dpi (for single column: min. 1063 pixels, full page width: 2244 pixels).
- Bitmapped line drawings: Save as TIFF, JPG or PNG files using a minimum of 1000 dpi (for single column: min. 3543 pixels, full page width: 7480 pixels).

- Combinations bitmapped line/halftones (color or grayscale): Save as TIFF, JPG or PNG files using a minimum of 500 dpi (for single column: min. 1772 pixels, full page width: 3740 pixels).

Please do not submit:

- files that are too low in resolution (for example, files optimized for screen use such as GIF, BMP, PICT or WPG files).
- disproportionally large images compared to font size, as text may become unreadable.

Figure captions

All images must have a caption. A caption should consist of a brief title (not displayed on the figure itself) and a description of the image. We advise you to keep the amount of text in any image to a minimum, though any symbols and abbreviations used should be explained.

Provide captions in a separate file.

Color artwork

If you submit usable color figures with your accepted article, we will ensure that they appear in color online.

Please ensure that color images are accessible to all, including those with impaired color vision. Learn more about color and web accessibility.

For articles appearing in print, you will be sent information on costs to reproduce color in the printed version, after your accepted article has been sent to production. At this stage, please indicate if your preference is to have color only in the online version of your article or also in the printed version.

Generative AI and Figures, images and artwork

Please read our policy on the use of generative AI and AI-assisted tools in figures, images and artwork, which can be found in Elsevier's GenAI Policies for Journals. This policy states:

- We do not permit the use of Generative AI or AI-assisted tools to create or alter images in submitted manuscripts.
- The only exception is if the use of AI or AI-assisted tools is part of the research design or methods (for example, in the field of biomedical imaging). If this is the case, such use must be described in a reproducible manner in the methods section, including the name of the model or tool, version and extension numbers, and manufacturer.
- The use of generative AI or AI-assisted tools in the production of artwork such as for graphical abstracts is not permitted. The use of generative AI in the production of cover art may in some cases be allowed, if the author obtains prior permission from the journal editor and publisher, can demonstrate that all necessary rights have been cleared for the use of the relevant material, and ensures that there is correct content attribution.

Supplementary material

We encourage the use of supplementary materials such as applications, images and sound clips to enhance research. Some guidelines:

- Cite all supplementary files in the manuscript text.
- Submit supplementary materials at the same time as your article. Be aware that all supplementary materials provided will appear online in the exact same file type as received. These files will not be formatted or typeset by the production team.
- Include a concise, descriptive caption for each supplementary file describing its content.

- Provide updated files if at any stage of the publication process you wish to make changes to submitted supplementary materials.
- Do not make annotations or corrections to a previous version of a supplementary file.
- Switch off the option to track changes in Microsoft Office files. If tracked changes are left on, they will appear in your published version.

We recommend you upload research data to a suitable specialist or generalist repository. Please read our guidelines on sharing research data for more information on depositing, sharing and using research data and other relevant research materials.

Video

This journal accepts video material and animation sequences to support and enhance your scientific research. We encourage you to include links to video or animation files within articles. Some guidelines:

- When including video or animation file links within your article, refer to the video or animation content by adding a note in your text where the file should be placed.
- Clearly label files ensuring the given file name is directly related to the file content.
- Provide files in one of our recommended file formats. Files should be within our preferred maximum file size of 150 MB per file, 1 GB in total.
- Provide "stills" for each of your files. These will be used as standard icons to personalize the link to your video data. You can choose any frame from your video or animation or make a separate image.

- Provide text (for both the electronic and the print version) to be placed in the portions of your article that refer to the video content. This is essential text, as video and animation files cannot be embedded in the print version of the journal.

We publish all video and animation files supplied in the electronic version of your article.

For more detailed instructions, we recommend that you read our guidelines on submitting video content to be included in the body of an article.

Research data

We are committed to supporting the storage of, access to and discovery of research data, and our research data policy sets out the principles guiding how we work with the research community to support a more efficient and transparent research process.

Research data refers to the results of observations or experimentation that validate research findings, which may also include software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Please read our guidelines on sharing research data for more information on depositing, sharing and using research data and other relevant research materials.

For this journal, the following instructions from our research data guidelines apply.

Option B: Research data deposit, citation and linking

You are **encouraged** to:

- Deposit your research data in a relevant data repository.
- Cite and link to this dataset in your article.
- If this is not possible, make a statement explaining why research data cannot be shared.

Data statement

To foster transparency, you are encouraged to state the availability of any data at submission.

Ensuring data is available may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you can state the reason why (e.g., your research data includes sensitive or confidential information such as patient data) during the submission process. This statement will appear with your published article on ScienceDirect.

Read more about the importance and benefits of providing a data statement.

Data linking

Linking to the data underlying your work increases your exposure and may lead to new collaborations. It also provides readers with a better understanding of the described research.

If your research data has been made available in a data repository there are a number of ways your article can be linked directly to the dataset:

- Provide a link to your dataset when prompted during the online submission process.
- For some data repositories, a repository banner will automatically appear next to your published article on ScienceDirect.
- You can also link relevant data or entities within the text of your article through the use of identifiers. Use the following format: Database: 12345 (e.g. TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Learn more about linking research data and research articles in ScienceDirect.

Article structure

Article sections

Divide your manuscript into clearly defined sections covering all essential elements using headings.

Glossary

Please provide definitions of field-specific terms used in your article, in a separate list.

Footnotes

We advise you to use footnotes sparingly. If you include footnotes in your article, ensure that they are numbered consecutively.

You may use system features that automatically build footnotes into text. Alternatively, you can indicate the position of footnotes within the text and present them in a separate section at the end of your article.

Acknowledgements

Include any individuals who provided you with help during your research, such as help with language, writing or proof reading, in the acknowledgements section. Acknowledgements should be placed in a separate section which appears directly before the reference list. Do not include acknowledgements on your title page, as a footnote to your title, or anywhere else in your article other than in the separate acknowledgements section.

Author contributions: CRediT

Corresponding authors are encouraged to acknowledge co-author contributions using CRediT (Contributor Roles Taxonomy) roles:

- Conceptualization

- Data curation
- Formal analysis
- Funding acquisition
- Investigation
- Methodology
- Project administration
- Resources
- Software
- Supervision
- Validation
- Visualization
- Writing – original draft
- Writing – review and editing

Not all CRediT roles will apply to every manuscript and some authors may contribute through multiple roles.

We advise you to read more about CRediT and view an example of a CRediT author statement.

Funding sources

Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the

report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendices

We ask you to use the following format for appendices:

- Identify individual appendices within your article using the format: A, B, etc.
- Give separate numbering to formulae and equations within appendices using formats such as Eq. (A.1), Eq. (A.2), etc. and in subsequent appendices, Eq. (B.1), Eq. (B. 2) etc. In a similar way, give separate numbering to tables and figures using formats such as Table A.1; Fig. A.1, etc.

Journal specific information

Manuscripts should be prepared according to the guidelines set forth in the most recent publication manual of the American Psychological Association. Of note, section headings should not be numbered.

Manuscripts should ordinarily not exceed 50 pages, including references and tabular material. Exceptions may be made with prior approval of the Editor in Chief. Manuscript length can often be managed through the judicious use of appendices. In general the References section should be limited to citations actually discussed in the text. References to articles solely included in meta-analyses should be included in an appendix, which will appear in the on line version of the paper but not in the print copy. Similarly, extensive Tables describing study characteristics, containing material published elsewhere, or presenting formulas and other technical material should also be included in an appendix. Authors can direct readers to the appendices in appropriate places in the text.

It is authors' responsibility to ensure their reviews are comprehensive and as up to date as possible (at least to 3 months within date of submission) so the data are still current at the time of publication. Authors are referred to the PRISMA Guidelines (http://www.prisma-statement.org/) for guidance in conducting reviews and preparing manuscripts. Adherence to the Guidelines is not required, but is recommended to enhance quality of submissions and impact of published papers on the field.

References

References within text

Any references cited within your article should also be present in your reference list and vice versa. Some guidelines:

- References cited in your abstract must be given in full.
- We recommend that you do not include unpublished results and personal communications in your reference list, though you may mention them in the text of your article.
- Any unpublished results and personal communications included in your reference list must follow the standard reference style of the journal. In substitution of the publication date add "unpublished results" or "personal communication."
- References cited as "in press" imply that the item has been accepted for publication.

Linking to cited sources will increase the discoverability of your research.

Before submission, check that all data provided in your reference list are correct, including any references which have been copied. Providing correct reference data allows us to link to abstracting and indexing services such as Scopus, Crossref and PubMed. Any incorrect surnames, journal or book titles, publication years or pagination within your references may prevent link creation.

We encourage the use of Digital Object Identifiers (DOIs) as reference links as they provide a permanent link to the electronic article referenced.

Reference style

Citations in the text should follow the referencing style used by the American Psychological Association. You are referred to the *Publication Manual of the American Psychological Association,* Seventh Edition (2020) ISBN 978-1-4338-3215-4.

The reference list should be arranged alphabetically and then chronologically. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:

Reference to a journal publication:

Van der Geer, J., Handgraaf T., & Lupton, R. A. (2020). The art of writing a scientific article. Journal of Scientific Communications, 163, 51–59. https://doi.org/10.1016/j.sc.2020.00372.

Reference to a journal publication with an article number:

Van der Geer, J., Handgraaf, T., & Lupton, R. A. (2022). The art of writing a scientific article. Heliyon, 19, Article e00205. https://doi.org/10.1016/j.heliyon.2022.e00205.

Reference to a book:

Strunk, W., Jr., & White, E. B. (2000). The elements of style (4th ed.). Longman (Chapter 4).

Reference to a chapter in a book:

Mettam, G. R., & Adams, L. B. (2020). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), Introduction to the electronic age (pp. 281–304). E-Publishing Inc.

Reference to a website:

Powertech Systems. (2022). Lithium-ion vs lead-acid cost analysis. Retrieved from http://www.powertechsystems.eu/home/tech-corner/lithium-ion-vs-lead-acid-cost-analysis/. Accessed January 6, 2022.

Reference to a dataset:

Oguro, M., Imahiro, S., Saito, S., & Nakashizuka, T. (2015). Mortality data for Japanese oak wilt disease and surrounding forest compositions [dataset]. Mendeley Data, v1. https://doi.org/10.17632/xwj98nb39r.1.

Reference to a conference paper or poster presentation:

Engle, E.K., Cash, T.F., & Jarry, J.L. (2019, November). The Body Image Behaviours Inventory-3: Development and validation of the Body Image Compulsive Actions and Body Image Avoidance Scales. Poster session presentation at the meeting of the Association for Behavioural and Cognitive Therapies, New York, NY.

Reference to software:

Coon, E., Berndt, M., Jan, A., Svyatsky, D., Atchley, A., Kikinzon, E., Harp, D., Manzini, G., Shelef, E., Lipnikov, K., Garimella, R., Xu, C., Moulton, D., Karra, S., Painter, S., Jafarov, E., & Molins, S. (2020). Advanced Terrestrial Simulator (ATS) (Version 0.88) [Computer software]. Zenodo. https://doi.org/10.5281/zenodo.3727209.

Web references

When listing web references, as a minimum you should provide the full URL and the date when the reference was last accessed. Additional information (e.g. DOI, author names, dates or reference to a source publication) should also be provided, if known.

You can list web references separately under a new heading directly after your reference list or include them in your reference list.

Data references

We encourage you to cite underlying or relevant datasets within article text and to list data references in the reference list.

When citing data references, you should include:

- author name(s)
- dataset title

- data repository
- version (where available)
- year
- global persistent identifier

Add [dataset] immediately before your reference. This will help us to properly identify the dataset. The [dataset] identifier will not appear in your published article.

Preprint references

We ask you to mark preprints clearly. You should include the word "preprint" or the name of the preprint server as part of your reference and provide the preprint DOI.

Where a preprint has subsequently become available as a peer-reviewed publication, use the formal publication as your reference.

If there are preprints that are central to your work or that cover crucial developments in the topic, but they are not yet formally published, you may reference the preprint.

Reference management software

Most Elsevier journals have their reference template available in popular reference management software products. These include products that support Citation Style Language (CSL) such as Mendeley Reference Manager.

If you use a citation plug-in from these products, select the relevant journal template and all your citations and bibliographies will automatically be formatted in the journal style. We advise you to remove all field codes before submitting your manuscript to any reference management software product.

If a template is not available for this journal, follow the format given in examples in the reference style section of this Guide for Authors.

Submitting your manuscript

Submission checklist

Before completing the submission of your manuscript, we advise you to read our submission checklist:

- One author has been designated as the corresponding author and their full contact details (email address, full postal address and phone numbers) have been provided.
- All files have been uploaded, including keywords, figure captions and tables (including a title, description and footnotes) included.
- Spelling and grammar checks have been carried out.
- All references in the article text are cited in the reference list and vice versa.
- Permission has been obtained for the use of any copyrighted material from other sources, including the Web.
- For gold open access articles, all authors understand that they are responsible for payment of the article publishing charge (APC) if the manuscript is accepted. Payment of the APC may be covered by the corresponding author's institution, or the research funder.

After receiving a final decision

Article Transfer Service

If your manuscript is more suitable for an alternative Elsevier journal, you may receive an email asking you to consider transferring your manuscript via the Elsevier Article Transfer Service.

The recommendation could come from the journal editor, a dedicated in-house scientific managing editor, a tool-assisted recommendation or a combination.

If you agree with the recommendation, your manuscript will be transferred and independently reviewed by the editors of the new journal. You will have the opportunity to make revisions, if necessary, before the submission is complete at the destination journal.

Publishing agreement

Authors will be asked to complete a publishing agreement after acceptance. The corresponding author will receive a link to the online agreement by email. We advise you to read Elsevier's policies related to copyright to learn more about our copyright policies and your, and your employer's/institution's, additional rights for subscription and gold open access articles.

License options

Authors will be offered open access user license options which will determine how you, and third parties, can reuse your gold open access article. We advise that you review these options and any funding body license requirements before selecting a license option.

Open access

We refer you to our open access information page to learn about open access options for this journal.

Permission for copyrighted works

If excerpts from other copyrighted works are included in your article, you must obtain written permission from the copyright owners and credit the source(s) within your article using Elsevier's permission request and license form (Word).

Proof correction

To ensure a fast publication process we will ask you to provide proof corrections within two days.

Corresponding authors will be sent an email which includes a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to Word. You can edit text, comment on figures and tables and answer questions raised by our copy editor. Our web-based proofing service ensures a faster and less error-prone process.

You can choose to annotate and upload your edits on the PDF version of your article, if preferred. We will provide you with proofing instructions and available alternative proofing methods in our email.

The purpose of the proof is to check the typesetting, editing, completeness and correctness of your article text, tables and figures. Significant changes to your article at the proofing stage will only be considered with approval of the journal editor.

Share Link

A customized Share Link, providing 50 days free access to the final published version of your article on ScienceDirect, will be sent by email to the corresponding author. The Share Link can be used to share your article on any communication channel, such as by email or on social media.

For an extra charge, you will be provided with the option to order paper offprints. A link to an offprint order form will be sent by email when your article is accepted for publication.

A Share Link will not be provided if your article is published gold open access. The final published version of your gold open access article will be openly available on ScienceDirect and can be shared through the article DOI link.

Responsible sharing

We encourage you to share and promote your article to give additional visibility to your work, enabling your paper to contribute to scientific progress and foster the exchange of scientific developments within your field. Read more about how to responsibly share and promote your article.

Resources for authors

Elsevier Researcher Academy

If you would like help to improve your submission or navigate the publication process, support is available via Elsevier Researcher Academy.

Elsevier Researcher Academy offers free e-learning modules, webinars, downloadable guides and research writing and peer review process resources.

Language and editing services

We recommend that you write in American or British English but not a combination of both.

If you feel the English language in your manuscript requires editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English, you may wish to use the English Language Editing service provided by Elsevier's Author Services.

Getting help and support

Author support

We recommend that you visit our Journal Article Publishing Support Center if you have questions about the editorial process or require technical support for your submission. Some popular FAQs:

- How can I track the status of my submitted article?
- When will my article be published?

Appendix 11 – DIALOG+

1	2	3	4	5	6	7
Totally Dissatisfied	Very Dissatisfied	Fairly Dissatisfied	In the Middle	Fairly Satisfied	Very Satisfied	Totally Satisfied

Domain	Rating
1. How satisfied are you with your mental health?	
2. How satisfied are you with your physical health?	
3. How satisfied are you with your job situation?	
4. How satisfied are you with your accommodation?	
5. How satisfied are you with your leisure activities?	
6. How satisfied are you with your relationship with your partner/family?	
7. How satisfied are you with your friendships?	
8. How satisfied are you with your personal safety?	
9. How satisfied are you with your medication?	
10. How satisfied are you with the practical help you receive?	
11. How satisfied are you with your meetings with mental health professionals?	

Appendix 12 – Phase A Questionnaire

Clinician Conducting the Call:

Client's NHS Number:

Time Since Psychoeducation Group:

Presenting Problem:

1a) On a scale of 0-10, how well do you remember the skills that you learnt in the psychoeducation group, where 0 is remembering nothing and 10 is remembering everything?

1b) For the future, do you have any suggestions regarding how we could help clients to remember the skills that they learnt in the psychoeducation groups?

2a) On a scale of 0-10, how confident do you feel in applying the skills that you remember learning in the psychoeducation group, where 0 is not at all confident and 10 is completely confident?

2b) For the future, do you have any suggestions regarding how we could help clients to feel more confident in applying the skills that they learnt in the psychoeducation groups?

3a) On a scale of 0-10, how able do you feel to move towards your recovery goals whilst waiting for therapy, where 0 is completely unable and 10 is completely able? For example, you may have moved towards your recovery goals by using skills learnt in psychoeducation groups.

3b) For the future, do you have any suggestions regarding how we could improve clients' ability to move towards their recovery goals whilst waiting for therapy?

4a) On a scale of 0-10, how helpful was this call, where 0 is extremely unhelpful and 10 is extremely helpful?

4b) For the future, do you have any suggestions regarding how we could improve the helpfulness of these calls?

(Note: The final two questions are for the clinician conducting the call, not the client).

5a) On a scale of 0-10, how helpful do you think this call was for your client, where 0 is extremely unhelpful and 10 is extremely helpful?

5b) For the future, do you have any suggestions regarding how the team could improve these calls? (If you have responded to this question previously and have no further suggestions, you do not need to provide an answer).

Once completed, please email this form to Megan Stewart-Bateman on megan.stewart-bateman@nhs.net.

If you have any questions, please don't hesitate to contact Liam Myles on liam.myles@psy.ox.ac.uk. Also, if clients have any questions about this research, please pass Liam's details onto them.

Appendix 13 – Phase B Questionnaire

Clinician Conducting the Call:

Client's NHS Number:

Time Since Psychoeducation Group:

Presenting Problem:

Additions to Check in Call Protocol

Offer clients the opportunity to add anything they want to discuss to the agenda of the check in call.

Offer clients the opportunity to recap a skill they learnt in the psychoeducation groups during the check in call (e.g., grounding, mindfulness, problem solving, etc.).

Questions for the End of Check in Calls

1a) On a scale of 0-10, how well do you remember the skills that you learnt in the psychoeducation group, where 0 is remembering nothing and 10 is remembering everything?

2a) On a scale of 0-10, how confident do you feel in applying the skills that you remember learning in the psychoeducation group, where 0 is not at all confident and 10 is completely confident?

3a) On a scale of 0-10, how able do you feel to move towards your recovery goals whilst waiting for therapy, where 0 is completely unable and 10 is completely able? For example, you may have moved towards your recovery goals by using skills learnt in psychoeducation groups.

4a) On a scale of 0-10, how helpful was this call, where 0 is extremely unhelpful and 10 is extremely helpful?

(Note: The final two questions are for the clinician conducting the call, not the client).

5a) On a scale of 0-10, how helpful do you think this call was for your client, where 0 is extremely unhelpful and 10 is extremely helpful?

6) Did the client choose to rehearse a skill that they learnt in the psychoeducation groups (Yes/No)?

Once completed, please email this form to Megan Stewart-Bateman on megan.stewart-bateman@nhs.net.

If you have any questions, please don't hesitate to contact Liam Myles on liam.myles@psy.ox.ac.uk. Also, if clients have any questions about this research, please pass Liam's details onto them.

Appendix 14 – Patient and Public Informed Questionnaire Development

The changes made to the questionnaire based on patient and public involvement are detailed in Table **5**.

Table 5

Patient and Public Informed Changes to the Questionnaire

Initial Question	Feedback	Updated Question
Diagnosis.	Asking participants about their diagnosis may indicate that the researcher is disinterested in the holistic detail of their problems.	Presenting Problem.
2a) On a scale of 0-10, how confident do you feel in applying the skills that you remember learning in the psychoeducation group, where 0 is completely unconfident and 10 is completely confident?	Using the word 'completely unconfident' is confusing and makes this option sound as though one is confident.	2a) On a scale of 0-10, how confident do you feel in applying the skills that you remember learning in the psychoeducation group, where 0 is not at all confident and 10 is completely confident?

Initial Question	Feedback	Updated Question
3a) On a scale of 1-10, how able do you feel to make therapeutic progress (for example, by using skills learnt in Step 2 groups) whilst on the waitlist for therapy, where 10 is completely able and 1 is completely unable?	Participants may be unaware of what 'Step 2 groups' are. Also, participants may not assume they have made 'therapeutic progress' because they haven't had therapy. Furthermore, 'therapeutic progress' is a jargon-laden word. Moreover, it may be helpful to add a more detailed example to aid clarity.	3a) On a scale of 0-10, how able do you feel to move towards your recovery goals whilst waiting for therapy, where 0 is completely unable and 10 is completely able? For example, you may have moved towards your recovery goals by using skills learnt in psychoeducation groups.
4a) On a scale of 0-10, how satisfied are you with this call, where 0 is extremely unsatisfied and 10 is extremely satisfied?	As satisfaction is a multidimensional construct, it is unclear to which domain of satisfaction the question concerns.	4a) On a scale of 0-10, how helpful was this call, where 0 is extremely unhelpful and 10 is extremely helpful?

Appendix 15 – Telephone Call Protocol

Before Contacting, Please Check System One:	
Has the client contacted the service recently?	
Is there any relevant clinical or non-clinical information (e.g., risk issues, etc.)?	
Start of Phone Call and Information Gathering	
Confirm whether they are able to speak freely?	
Can you hear anyone in the background?	
Do you have the correct address on record?	
Do you have the correct email address on record?	
Who do you currently live with? (Retrieve names and dates of birth of children).	
Are you employed? How many hours do you work each week?	
Have you or a family member served in the armed forces?	
Presenting Difficulties	
I understand from your notes that you are experiencing difficulties with … and you are currently on a waiting list for …. Is this what you were expecting?	

Do you feel these difficulties are still impacting you? If no longer experiencing difficulties, does the client still need to be on the waitlist?	
If on a group waiting list, what is your preference - a face to face or online group? If the client has no preference, they will be contacted when the first group is available.	
Are there any new or recent events or difficulties that you feel we should be aware of (e.g., recent bereavement, changes in circumstances, etc.)?	
Risk	
Ask about safety. Over the past two weeks, have you had any thoughts that you would be better off dead, or thoughts of hurting yourself in some way? Identify protective factors.	

Potential Follow Up Questions – Suicidal Ideation	
Have you got any plans to end your life? Check the timeframe of this plan and the person's access to means.	
What stops you from acting on these thoughts?	
Do you feel able to keep yourself safe? Give the client the number for Samaritans and the crisis team.	
Potential Follow Up Questions – Self Harm	
Have you engaged in any self-harming behaviour?	
When was the last time you engaged in self-harming behaviour?	
Can I ask how you hurt yourself?	
Do you seek medical attention or tend to the injury yourself?	
Harm to Others?	
Harm from Others (e.g., bullying, domestic violence, etc.)?	
Substance Use?	
Physical Health?	
<u>Dialog +</u>	
What does my recovery mean to me?	
What matters to me in my life?	

What are my skills, strengths and experiences that will help me achieve my goals?	
How will my care plan help me?	
To achieve these goals, I will … Prompt for staff: Things the service user has agreed to do as part of the care plan.	
Members of the team will …… Prompt for staff: Specific actions of members of the care team to support the care plan goals, including who will do them and in what time frame.	
Other people I want to help me will … Prompt for staff: Who else would the service user like to help them with the care plan goals, what help will those people offer, etc? This may be friends, family, carers or other professionals outside the team.	
My Safety Plan	
Triggers - The triggers for when I become unwell are …	
Action Plan - What should I do and what should other people do?	
Early Warning Signs - The early warning signs for when I become unwell …	

Action Plan - How will I and others identify early warning signs? What support do I need?	
If things get worse, you can tell by …	
If things get worse what do I need?	
Safety Information	
Any safety information given? (e.g., STT duty, CNWL out of hours urgent line, Samaritans/shout, etc.) • To contact Duty for support if needed (within the hours of 9am-4pm Monday-Friday), however you are aware this is not to be used in crisis situations. You can access Duty by telephoning 01908 725 800. • Samaritans. You can also phone the Samaritans on 116 123 for emotional support and guidance. • Shout. A 24/7 confidential and free text message support service. You can send a text to 85258 for support.	

• Urgent advice & Crisis support. If you need urgent advice or support you can contact the Single Point of Access on 0800 0234 650 (lines are open 24 hours a day, seven days a week). • A&E or 999. In case of an emergency or a mental health crisis you should either attend your nearest Accident and Emergency or call 999 for urgent assistance. • Mind Crisis Café. If you need support or in crisis, you can use the Mind Crisis Café, which runs 7 days a week 5-11pm. You can contact them on 01908 724 365/01525 722 225 or CrisisCafe@mind-blmk.org.uk for support, or to book an appointment to see them in person at 226 Queensway, Bletchley.	
Additional Information/Comments	

Appendix 16 – Reflections on Thematic Analysis

The author made several, potentially erroneous, assumptions in the thematic analysis. These included, but are not limited to, the presuppositions that clients have insight into what makes check in calls better and/or worse, clients can articulate what makes check in calls better and/or worse, clients have insight into the basis of their mental health difficulties and that changes to check in calls can affect clients' mental health. These presuppositions, if erroneous, affect the validity of the interpretations of the thematic analysis.

When initially reading the data, LM noticed that clients appeared to seek memory aids for coping skills learnt in psychoeducation groups. LM wondered whether his research aims of improving check in calls increased the salience of such responses, as they readily lead to potential improvements for check in calls; he was concerned that other themes and relevant information was going unnoticed, perhaps due to their misalignment with the study's aims. Also, LM noticed that clients voiced an interest in normalising mental health problems as a collective experience shared by others. Such responses evoked a sense of isolation and abandonment, an emotionally salient experience which LM noted may influence thematic generation. Finally, LM noticed several responses pertaining to the inflexibility of check in calls, with requests to increase access to those with physical health problems. LM was curious whether the topical nature of inclusivity increased the salience of such responses.

When coding data, responses were read through three times before extracting codes (Braun & Clarke, 2006). Attempt was made to be overly inclusive, in line with the critical-realist epistemology, to avoid 'missing' themes. These codes were predominantly semantic rather than latent, as latent codes were regarded as more appropriate for generating multifaceted themes.

When developing themes, the author was mindful of this study's aims to evaluate clients' and clinicians' experiences of DIALOG+-informed check in calls and improve clients' competence and confidence using coping skills, waitlist experiences and empowerment to achieve goals. Accordingly, themes which bore little relevance to the research aims may have been missed, due to such LM's partially deductive approach to theme generation. Care was taken to avoid 'bucket themes' (Braun & Clarke, 2006), in which the codes from one question were clustered into one theme. LM noted he has a generalised desire for parsimony in research, distilling important theoretical propositions into the minimally necessary parameters (Myles & Johnson, 2023). He was curious whether his desire for parsimony may have culminated in too few and consequently heterogeneous themes. These concerns were brought to supervision with MC and GG to reduce the risk of such biases.

After devising themes, LM returned to the original data and his initial reflections on reading the original data, to elucidate whether any additional themes were missing and whether LM's initial preconceptions may have influenced subsequent coding. Whilst LM's initial postulations of themes were included, albeit in a revised manner, other themes were generated which extended beyond LM's initial observations on the data. These themes appeared to sufficiently encapsulate the data.

Appendix 17 – Additional Themes and Subthemes

An additional theme of 'Feedback for the Team' was generated, with subthemes of 'The Team and Psychoeducation Groups are Helpful,' 'Improving Psychoeducation Groups' and 'Coping Skills do not Help.' This was not included in the main thematic analysis, as it extends beyond the scope of this study, but is detailed in **Table 6**.

Table 6

Additional Theme and Subthemes

Theme	Subtheme	Example Quotes
Feedback for the Team	The Team and Psychoeducation Groups are Helpful	I think you have done a great job (P3). You have helped me, and this helps in my recovery. I am aware that the waiting times for therapy are a wider issue, however, I feel you are doing what you can to improve the service and that is nice to hear (P6). Group therapy did help (P31).

Theme	Subtheme	Example Quotes
Feedback for the Team		At the end, I felt like it was over. (I) would like the group to be clearer, as I was unsure where this left me after the group (P8).
		Have set times for talking, because a particular person kept interrupting. (There were) long talks with that person at the end of every slide and it was long winded (P12).
	Improving Psychoeducation Groups	Make sure people are understanding of the group. (I) was unwell once and contacted them, and said they'd go through it again but never did. I have deafness in one ear. Zoom calls weren't always great because I couldn't understand … half of what was said during the group. I was meant to be sent forms weekly before the day, so I could read through it first, but they didn't come through (P13).
		I was anxious in the group as I felt uncomfortable (P31).
		(It would be good if calls were) more hard-of-hearing friendly (P37).
	Coping Skills do not Help	(I) don't find the skills helpful (P39).
		(I) already knew the skills and they don't work for me (P41).

'P' and 'C' refer to the participant number and participant with which the clinician was conducting the call, respectively. For example, if the same clinician conducted check in calls for the first two participants, 'P1' and 'P2,' they would be assigned the code 'C1' and 'C2,' respectively.

Appendix 18 – Participant Suggestions and Corresponding Actions

Improving Memory and Practice of Coping Skills

Revising Coping Skills

Participant Suggestions	Corresponding Actions
1) Reminding clients of skills learnt in the groups.	The 'Skill of the Month' email reminds clients of a skill learnt in groups.
2) Ensuring clients have paperwork from the groups.	The 'Skill of the Month' email offers to email/post copies of the skills learnt in groups.
3) Provision of additional psychoeducation literature e.g., referral to Recovery College.	Many clients report feeling overwhelmed by the quantity of information in the psychoeducation groups. Therefore, we agreed not to send further literature to clients. However, we provided referrals to local services with further information in the 'Accessing Extra Email.'
4) Provision of 'skills pack' from the groups.	The 'Skill of the Month' email offers to email/post copies of the skills learnt in groups.

Participant Suggestions	Corresponding Actions
5) Prompting clients to review paperwork from the group.	The 'Skill of the Month' email reminds clients to review skill learnt in groups.
6) Shorter waiting times for one-to-one therapy.	Unfortunately, the team do not have the resources to reduce waiting times for one-to-one therapy any further.
7) Longer groups to consolidate the skills learnt.	Unfortunately, the team do not have the resources to offer longer psychoeducation groups.
8) Offering to send out paperwork from the groups physically and electronically.	The 'Skill of the Month' email offers to email/post copies of the skills learnt in groups.

Practicing Coping Skills

Participant Suggestions	**Corresponding Actions**
1) One-to-one practice implementing coping skills with clients.	The 'Skill of the Month' email suggests clients call the duty service or ask the clinician in their next check in call to recap skills. Also, the check in call protocol was updated to offer clients the opportunity to recap a skill they learnt in the groups.
2) Helping clients to devise methods to remember to use coping skills.	The 'Skill of the Month' email reminds clients to use coping skills learnt in groups and provides a more detailed reminder of a specific skill.
3) Discuss examples of appropriate scenarios for using coping skills.	The 'Skill of the Month' email bullet points appropriate scenarios when the skill may be used.
4) Setting homework to use skills in the groups.	The psychoeducation groups currently set homework for the skills to be used. The 'Skill of the Month' email reminds clients of a skill learnt in groups.
5) Trouble-shooting problems with implementing skills.	The 'Skill of the Month' email suggests clients call the duty service or speak to the clinician in their next check in call if they have any issues implementing skills.

Participant Suggestions	Corresponding Actions
6) Suggesting fellow group members encourage each other to use coping skills.	Due to risk concerns, the service has a policy against encouraging clients to connect with each other outside of the groups. Nevertheless, the 'Accessing Extra Support Email' refers clients to support groups where they can meet others with mental health difficulties.

Support from Family and Friends to Implement Coping Skills

Participant Suggestions	Corresponding Actions
1) Enquiring whether family members can support clients to remember and use coping skills learnt in the groups.	The 'Skill of the Month' email suggests clients seek support from friends and/or family to use and remembering to use the skill.
2) Allowing family members to attend psychoeducation groups.	Due to consent and confidentiality concerns, the service has a policy against allowing family members to attend psychoeducation groups.

Connecting with Understanding Others

Normalising Struggles Through Connecting with People with Mental Health Difficulties

Participant Suggestions	**Corresponding Actions**
1) Meeting others with mental health difficulties.	The 'Accessing Extra Support Email' refers clients to support groups where they can meet others with mental health difficulties.
2) Including people with lived experience of mental health difficulties in facilitating groups.	People with lived experience of mental health difficulties were included in the creation of the group materials. The team agreed to emphasise this more when delivering the groups. Also, the team are looking into including people with lived experience of mental health difficulties as facilitators for the groups.

Feeling Valued and Understood by Professionals

Participant Suggestions	**Corresponding Actions**
1) Regular check in calls e.g., every three months.	The service currently offers check in calls every 90 days (approx. 3 months).
2) Referrals to Recovery College.	The 'Accessing Extra Support Email' refers clients to Recovery College.
3) Offers of face-to-face check in appointments.	Unfortunately, the team do not have the resources to offer face-to-face check in calls to everyone because there are a limited number of rooms in the building. However, they offer face-to-face check in calls to those who struggle to access telephone calls (e.g., those with hearing difficulties).
4) Offering keyworkers.	Unfortunately, the team do not have the resources to offer keyworkers.
5) Referrals to other services where clients can speak about difficulties.	The 'Accessing Extra Support Email' refers clients to support groups where they can discuss difficulties.

Relatedly, the 'Skill of the Month' and 'Accessing Extra Support' emails aim to implicitly communicate that clients are valued by the team and are being held in mind.

Cultivating Flexible and Predictable Check in Calls

Conducting Predictable Check in Calls

Participant Suggestions	**Corresponding Actions**
1) Plan check in appointments at least two weeks in advance.	The team currently plan calls at least two weeks in advance. Admin staff currently send reminders via email, letters and text.
2) Where possible, have the same clinician checking in with clients on each check in call.	Whilst clinicians can endeavour to do this, unfortunately, it is not feasible to make a mandatory rule. That is because clinicians may be sick, have annual leave, etc. Having check-in calls with different team members also affords an opportunity to build relationships with the wider team.
3) Standardise the delivery of check in calls across staff.	The DIALOG+ protocol used in the check in calls aims to standardise the delivery of check in calls. However, flexibility is built into this because clinicians are only instructed to follow up on the dimensions of the DIALOG+ protocol that are relevant to their current problems. The full DIALOG+ is updated once every six months. Furthermore, a check-in call protocol has

	been drawn up by Ashleigh, one of the assistant psychologists, and will be implemented in the check-in calls in phase B.

Cultivating Flexible Check in Calls

Participant Suggestions	**Corresponding Actions**
1) Encouraging clients, rather than clinicians, to set agendas for check in calls.	The check in call protocol will be adjusted to ask clients whether they have anything they would like to discuss.
2) Making check in calls optional, rather than mandatory.	The team will update the check in call protocol such that it is optional, rather than mandatory.
3) Offering to reschedule check in calls if clients feel unable to engage.	The team are changing the check in call protocol to be one in which clients can opt-in to receive check in calls, rather than it being mandatory. Thus, rescheduling will be possible.
4) Offering face-to-face and telephone check in appointments.	Unfortunately, the team do not have the resources to offer face-to-face check in calls to everyone because there are a limited number of rooms in the building. However, they plan to offer face-to-face check in calls to those who struggle to access telephone calls (e.g., those with hearing difficulties).
5) Offer clients support to access other services e.g., helplines.	The 'Accessing Extra Support Email' refers clients to services where they can access additional support.

Empowerment to Cultivate Progress

Powerlessness to Change without Therapy

Participant Suggestions	Corresponding Actions
1) Reduce wait times for one-to-one therapy.	Unfortunately, the team do not have the resources to reduce waiting times for one-to-one therapy any further.
2) Increase contact with the team following the cessation of the psychoeducation groups.	Unfortunately, the team do not have the resources to increase one-to-one contact with the team following the cessation of the psychoeducation groups. However, the 'Skill of the Month' and 'Accessing Extra Support' emails aim to implicitly communicate that clients are valued by the team and are being held in mind.

Responsibility for Progress

Consistent with social constructivist epistemology, the term 'waitlists' may be part of the issue, as it implies that individuals are expected to 'wait to improve.' This may contribute to the sense that change is hopeless without therapeutic intervention. Accordingly, we agreed to change the name of therapy waitlists to 'Pre-Therapy List.' Also, we agreed to refer to the time between psychoeducational groups and one-to-one therapy as the 'Skill Consolidation Period.'

Furthermore, the 'Skill of the Month' and 'Accessing Extra Support' emails aim to communicate that clients can make therapeutic change and progress whilst on waitlists. This is reinforced by explicit the assertions that using the skills and accessing the extra support aims to help you make progress whilst on the pre-therapy list.

Appendix 19 – Skill of the Month Email Template

Subject: Therapies Pathway - Skill of the Month

Good morning/afternoon,

Welcome to our 'Skill of the Month' email!

This month, the skill is SKILL NAME. SKILL NAME involves DESCRIPTION OF SKILL. You may wish to seek support from your friends and/or family in using and remembering to use SKILL NAME.

This skill can be helpful if you are feeling SITUATIONS WHERE THE SKILL MAY BE HELPFUL.

Here is a video on how to use the skill: LINK TO YOUTUBE VIDEO ON THE SKILL.

INCLUDE IMAGE EXPLAINING SKILL

Using these skills aims to help you make progress whilst on the pre-therapy list. If you would like more information on this skill or any of the other skills you learnt in the psychoeducation groups, please review the paperwork from your psychoeducation groups. Please let us know if you would like us to email and/or post another copy of this paperwork.

If you would like to discuss these skills or practice using them with a clinician, you are welcome to call our duty service on 01908 725 800 or to ask the clinician to recap the skill at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Appendix 20 – Skill of the Month Emails

Subject: Therapies Pathway - Skill of the Month

Good morning/afternoon,

Welcome to our 'Skill of the Month' email!

This month, the skill is Grounding. Grounding involves identifying 5 things you can see, 4 things you can touch, 3 things you can hear, 2 things you can smell, and 1 thing you can taste. You may wish to seek support from your friends and/or family in using and remembering to use Grounding.

This skill can be helpful if you feel overwhelmed by lots of thoughts, feel anxious, feel panicked, notice that your attention is focused on your thoughts and feelings, and/or experience lots of negative thoughts about yourself, others, and the future.

Here is a five minute video on how to use the skill:

https://www.youtube.com/watch?v=30VMIEmA114



Using these skills aims to help you make progress whilst on the pre-therapy list. If you would like more information on this skill or any of the other skills you learnt in the psychoeducation groups, please review the paperwork from your psychoeducation groups. Please let us know if you would like us to email and/or post another copy of this paperwork.

If you would like to discuss these skills or practice using them with a clinician, you are welcome to call our duty service on 01908 725 800 or to ask the clinician to recap the skill at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Subject: Therapies Pathway - Skill of the Month

Good morning/afternoon,

Welcome to our 'Skill of the Month' email!

This month, we are discussing the TIPP techniques. TIPP stands for **t**ip the temperature, **i**ntense exercise, **p**aced breathing and **p**aired muscle relaxation. Tipping the temperature involves changing your temperature (e.g., by splashing your face with cold water). Intense exercise involves exercising, even if just for a short period of time. Paced breathing involves slowing your breathing so that your breath flows deep into your stomach. Paired muscle relaxation involves tightening and then relaxing different muscle groups.

This skill can be helpful if you are feeling anxious, nervous, scared, overwhelmed, frustrated or angry. You may wish to seek support from your friends and/or family in using and remembering to use TIPP techniques.

Here is a video on how to use the skill: https://www.youtube.com/watch?v=8nVady7A3Qo.



Using these skills aims to help you make progress whilst on the pre-therapy list. If you would like more information on this skill or any of the other skills you learnt in the psychoeducation groups, please review the paperwork from your psychoeducation groups. Please let us know if you would like us to email and/or post another copy of this paperwork.

If you would like to discuss these skills or practice using them with a clinician, you are welcome to call our duty service on 01908 725 800 or to ask the clinician to recap the skill at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Subject: Therapies Pathway - Skill of the Month

Good morning/afternoon,

Welcome to our 'Skill of the Month' email!

This month, the skill is mindfulness. Mindfulness involves focusing your attention on the present moment. You may wish to seek support from your friends and/or family in using and remembering to use mindfulness.

This skill can be helpful if you are feeling stressed, worried, low in mood, panicked, frustrated and/or angry.

Here is a video on how to use the skill: https://www.youtube.com/watch?v=e0f9wa2SUX0



Using these skills aims to help you make progress whilst on the pre-therapy list. If you would like more information on this skill or any of the other skills you learnt in the psychoeducation groups, please review the paperwork from your psychoeducation groups. Please let us know if you would like us to email and/or post another copy of this paperwork.

If you would like to discuss these skills or practice using them with a clinician, you are welcome to call our duty service on 01908 725 800 or to ask the clinician to recap the skill at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Subject: Therapies Pathway - Skill of the Month

Good morning/afternoon,

Welcome to our 'Skill of the Month' email!

This month, the skill is 'worry time.' Worry time involves setting aside a specific amount of time each day to focus on your worries. You may wish to seek support from your friends and/or family in using and remembering to use worry time.

This skill can be helpful if you are feeling anxious, worried, nervous, overwhelmed and/or panicked.

Here is a video on how to use the skill: https://www.youtube.com/watch?si=ErMaoYTZpTI9kkrI&v=9Uoef3M_hzE&feature=youtu.be

Worry Time:

- Decide on a time each day (e.g., 15 minutes at 10am) where you will allow yourself to worry about problems.
- During your worry time, make sure to focus on your worries and try not to get distracted.
- If you begin to worry outside of your worry time, write your worries down and return to them during your worry time. Remind yourself that you will deal with worries during your worry time and try to distract yourself with another activity.

- During your worry time, consider how you were feeling when you wrote down the worry, how you are feeling now, whether the worry has come true, how you dealt with the worry and whether any worries are no longer there.
- At the end of the worry time, do something fun and/or relaxing.

Using these skills aims to help you make progress whilst on the pre-therapy list. If you would like more information on this skill or any of the other skills you learnt in the psychoeducation groups, please review the paperwork from your psychoeducation groups. Please let us know if you would like us to email and/or post another copy of this paperwork.

If you would like to discuss these skills or practice using them with a clinician, you are welcome to call our duty service on 01908 725 800 or to ask the clinician to recap the skill at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Subject: Therapies Pathway - Skill of the Month

Good morning/afternoon,

Welcome to our 'Skill of the Month' email!

This month, the skill is safe place visualisation. Safe place visualisation involves immersing yourself in a pleasant, relaxing and safe mental image. You may wish to seek support from your friends and/or family in using and remembering to use visualisation.

This skill can be helpful if you are feeling stressed, worried, low in mood, panicked, frustrated and/or angry.

Here is a video on how to use the skill: https://www.youtube.com/watch?v=miU4pBZ0hXQ



Using these skills aims to help you make progress whilst on the pre-therapy list. If you would like more information on this skill or any of the other skills you learnt in the psychoeducation groups, please review the paperwork from your psychoeducation groups. Please let us know if you would like us to email and/or post another copy of this paperwork.

If you would like to discuss these skills or practice using them with a clinician, you are welcome to call our duty service on 01908 725 800 or to ask the clinician to recap the skill at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Subject: Therapies Pathway - Skill of the Month

Good morning/afternoon,

Welcome to our 'Skill of the Month' email!

This month, the skill is problem solving. Problem solving involves identifying a problem, brainstorming solutions, evaluating which solution is best, selecting the best solution, planning to implement the solution and carrying out the plan to solve the problem. You may wish to seek support from your friends and/or family in using and remembering to use problem solving.

This skill can be helpful if you are feeling overwhelmed, anxious, worried, frustrated, stressed, sad, angry, helpless or confused.

Here is a video on how to use the skill: https://www.youtube.com/watch?v=QOjTJAFyNrU



Using these skills aims to help you make progress whilst on the pre-therapy list. If you would like more information on this skill or any of the other skills you learnt in the psychoeducation

groups, please review the paperwork from your psychoeducation groups. Please let us know if you would like us to email and/or post another copy of this paperwork.

If you would like to discuss these skills or practice using them with a clinician, you are welcome to call our duty service on 01908 725 800 or to ask the clinician to recap the skill at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Appendix 21 – Accessing Extra Support Email Template

Subject: Therapies Pathway – Accessing Extra Support

Good morning/afternoon,

Welcome to our 'Accessing Extra Support' email!

It can be helpful to seek support from friends and/or family. We know this is not always possible, so we have provided information below on how to access SERVICE NAME.

PROVIDE BRIEF SYNOPSIS OF THE SERVICE.

PROVIDE REFERRAL INFORMATION FOR AND CONTACT DETAILS OF THE SERVICE.

Accessing SERVICE NAME aims to help you make progress whilst on the pre-therapy list. If you would like to discuss SERVICE NAME with a clinician, you are welcome to call our duty service on 01908 725 800 or at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Appendix 22 – Accessing Extra Support Emails

Subject: Therapies Pathway – Accessing Extra Support

Good morning/afternoon,

Welcome to our 'Accessing Extra Support' email!

It can be helpful to seek support from friends and/or family. We know this is not always possible, so we have provided information below on how to access the Recovery College.

The Recovery College offer face-to-face training courses and workshops. These are a safe, empowering and non-stigmatising space to explore, share and learn together and support each other on a journey of self-discovery.

To browse the Recovery College courses, please visit https://www.cnwl.nhs.uk/application/files/5317/0541/6713/Mini_Prospectus.pdf. To enrol with the Recovery College so that you can attend their courses, please visit https://cnwllearning.org/login/signup.php. Alternatively, you can contact the Recovery College via email (cnwl.mkrecoverycollege@nhs.net) or telephone (01908 725351).

Accessing the Recovery College aims to help you make progress whilst on the pre-therapy list. If you would like to discuss the Recovery College with a clinician, you are welcome to call our duty service on 01908 725 800 or at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Subject: Therapies Pathway – Accessing Extra Support

Good morning/afternoon,

Welcome to our 'Accessing Extra Support' email!

It can be helpful to seek support from friends and/or family. We know this is not always possible, so we have provided information below on how to access Bedfordshire, Luton and Milton Keynes Mind.

Mind aims to improve and promote positive mental health in the community by providing leading mental health services and influencing the way mental health is perceived and supported. Mind prides itself on inspiring hope and being respectful, inclusive and compassionate.

To browse the Mind website, please visit https://www.mind-blmk.org.uk/. To access support from Mind, please visit https://external-forms.viewsapp.net/forms/v/22eb81be-61ba-496a-874d-96cb118bbdd8. Alternatively, you can contact Mind via email (hq@mind-blmk.org.uk) or telephone (0300 330 0648).

Accessing Mind aims to help you make progress whilst on the pre-therapy list. If you would like to discuss Mind with a clinician, you are welcome to call our duty service on 01908 725 800 or at your next check in call.

With warm wishes,

Milton Keynes Therapies Pathway

Appendix 23 – Service Improvement Project Supplementary Analyses

Supplementary Analysis 1 – Tests of Assumptions of Tests Examining Demographic Differences Between Groups

For 'age,' the data met the assumption of homogeneity of variance, $F(1, 72) = .121$, $p = .729$, but violated the assumption of normality, $W = .937$, $p = .001$. Therefore, the Mann-Whitney U test was used to examine whether there were differences between phases in the mean age of participants.

For 'time since completed psychoeducation groups,' the data met the assumptions of homogeneity of variance, $F(1, 35) = .551$, $p = .463$, and the assumption of normality, $W = .966$, $p = .317$. However, given that phase A had only 6 participants and phase B had 31 participants, these tests may have been underpowered. Therefore, the Mann-Whitney U test was used to examine whether there were differences between phases in the time since participants completed the psychoeducation groups. Nevertheless, the results were similar using an independent samples t test, $t(35) = -2.1$, $p = .043$.

Supplementary Analysis 2 – Tests of Assumptions of Tests Examining the Effect of Phase on Questionnaire Scores

Construct	Levene's Test	Shapiro-Wilk Test
Memory of Coping Skills	$F(1, 72) = 1.15$, $p = .287$	$W = .959$, $p = .018$
Confidence Using Coping Skills	$F(1,70) = 1.906$, $p = .172$	$W = .941$, $p = .002$
Perceived Ability to Progress Towards Goals	$F(1, 70) = .199$, $p = .657$	$W = .959$, $p = .021$
Client's Perspective on the Helpfulness of the Call	$F(1, 71) = .163$, $p = .688$	$W = .849$, $p < .001$
Clinician's Perspective on the Helpfulness of the Call	$F(1, 69) = 2.23$, $p = .14$	$W = .948$, $p = .005$

Supplementary Analysis 3 – ANCOVAs Examining the Effect of Phase on Questionnaire Scores Whilst Controlling for Time Since Completing the Psychoeducation Groups

A series of ANCOVAs examined the effect of phase on questionnaire scores, whilst controlling for the time since completing the psychoeducation groups. For clients' memory of coping skills, the data conformed to the assumptions of homogeneity of variances, $F(1, 34) = 1$, $p = .323$, and normality, $W = .963$, $p = .259$. Phase was not associated with differences in clients' memory of coping skills, $F(1, 33) = .399$, $p = .532$, $\eta^2p = .012$. For clients' confidence using coping skills, the data conformed to the assumption of homogeneity of variances, $F(1, 34) = 2.72$, $p = .109$,

but not normality, W = .931, p = .027. Nevertheless, phase was not associated with differences in clients' confidence using coping skills, F(1, 33) = .235, p = .631, η^2p = .007. For clients' perception of their ability to progress towards their goals, the data conformed to the assumption of homogeneity of variances, F(1, 34) = .013, p = .909, and normality, W = .962, p = .251. Phase was associated with clients' perception of their ability to progress towards their goals, F(1, 33) = 4.771, p = .036, η^2p = .126. Specifically, scores were lower in phase B than phase A. For clients' perception of the helpfulness of check in calls, the data conformed to the assumption of homogeneity of variances, F(1, 35) = 2.52, p = .121, but not normality, W = .833, p < .001. Nevertheless, phase was not associated with differences in clients' perception of the helpfulness of the call, F(1, 34) = 1.348, p = .254, η^2p = .038. For clinicians' perception of the helpfulness of check in calls, the data conformed to the assumption of homogeneity of variances, F(1, 33) = 3.03, p = .091, but not normality, W = .895, p = .003. Nevertheless, phase was not associated with differences in clinicians' perception of the helpfulness of the call, F(1, 32) = 1.206, p = .28, η^2p = .036.

Supplementary Analysis 4 – Examining the Effect of Practicing a Coping Skill on Questionnaire Scores

The effect of whether participants practiced a coping skill on questionnaire scores was examined. For clients' memory of coping skills, the data conformed to the assumptions of homogeneity of variances, F(1, 31) = .687, p = .413, and normality, W = .95, p = .134. Practicing a coping skill was not associated with differences in clients' memory of coping skills, t(31) = -.703, p = .487, d = -.286. For clients' confidence using coping skills, the data did not conform to the assumptions of homogeneity of variances, F(1, 31) = 7.55, p = .01, or normality,

W = .916, p = .014. Practicing a coping skill was not associated with differences in clients' confidence using coping skills, U = 86, p = .567, r_{rb} = .14. For clients' perception of their ability to progress towards their goals, the data conformed to the assumption of homogeneity of variances, F(1, 31) = 1.7, p = .202, and normality, W = .937, p = .056. Practicing a coping skill was not associated with differences in clients' perception of their ability to progress towards their goals, t(31) = -.951, p = .349, d = -.386. For clients' perception of the helpfulness of check in calls, the data did not conform to the assumptions of homogeneity of variances, F(1, 32) = 9.7, p = .004, or normality, W = .9, p = .005. Practicing a coping skill was not associated with differences in clients' perception of the helpfulness of check in calls, U = 66, p = .121, r_{rb} = .365. For clinicians' perception of the helpfulness of check in calls, the data conformed to the assumption of normality, W = .948, p = .107, but not homogeneity of variances, F(1, 32) = 11.2, p = .002. Clinicians rated calls as more helpful when clients practiced a coping skill (Mean = 7.75, SD = .707), as compared to scenarios where clients did not elect to practice a coping skill (Mean = 4.73, SD = 2.89), U = 31, p = .003, r_{rb} = .702.

Appendix 24 – Journal Guidelines

Preparing your Submission

Checklist: What to Include

Authors will be asked to confirm the following elements are included during submission. Any omissions may cause delays.

Word Document:

1. **Title** – The title should be brief and relevant. Titles should not announce the results of articles and (apart from editorials) they should not be phrased as questions.
2. **Author Names** – The full names of the authors should appear on the title page in the form that is wished for publication. When submitting a manuscript authored by a group, please specify the name of the group and identify the group members on the title page who can take credit and responsibility for the work as authors. Other group members (non-author contributors) should be listed under Acknowledgements or in Supplementary Material.
3. **Main Text** – See relevant Article Type for individual specification.
4. **Clinical Trials Registration** – In accordance with ICMJE guidelines, the *BJPsych* requires all clinical trials to be registered in a public trials registry at the beginning of the research process (prior to patient enrolment). Trial registration numbers should be included in the abstract, with full details of the trial in the Methods section.
5. **Ethics Statement** – All authors are required to follow the ICMJE guidelines on the protection of research participants. Reports on research involving human participants

must include the following statement in the Methods section: *The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2013. All procedures involving human subjects/patients were approved by [name of the relevant local, regional or national review body and approval number]*.

Ethical Oversight / Research with Humans or Animals. We expect any authors who submit content to *British Journal of Psychiatry* to have obtained the necessary ethical approvals and consents for their research and its publication, and to be able to produce evidence of this if requested. For more information on clinical trial requirements and consent statement requirements, see the 'Preparing your submission' section.

6. **Consent Statement** – Authors must include a statement in the Methods section detailing the procedure for obtaining consent from study participants. For example:

   - Written [or verbal] informed consent was obtained from all subjects/patients.

   - Verbal consent was obtained from all subjects/patients. Verbal consent was witnessed and formally recorded.

   - This confirms that any participant has consented to the inclusion of material pertaining to themselves, that they acknowledge that they cannot be identified via the manuscript; and that the participant has been fully anonymized by the author.

   - If consent was not obtained from all participants, please state the reasons for this and note whether this was approved by the ethics committee.

   - If research participants are identifiable, authors should complete a **Consent Form** and email it to the editorial team at BJP@rcpsych.ac.uk. Where someone is deceased, please ensure you have written consent from the family or estate.

7. **Author Details** – At the end of the manuscript list the affiliations and countries at the time the work described in the paper was carried out. Identify one corresponding author with an email address appropriate for publication.

8. **References** – References should be numbered in the order that they appear in the text and listed at the end of the manuscript using the Vancouver style. Unpublished doctoral theses may be cited but no other citation of unpublished work, including unpublished conference presentations, is permissible. Authors are responsible for checking all references for accuracy and relevance before submission. Read our guide to Vancouver referencing here.

Required Statements:

1. **Declaration of Interest** – Authors should include a Declaration of Interest statement in their manuscript, detailing all conflicts of interest. Conflicts of interest are situations that could be perceived to exert an undue influence on an author's presentation of their work. They may include, but are not limited to, financial, professional, contractual or personal relationships or situations. Conflicts of interest do not necessarily mean that an author's work has been compromised. Authors should declare any real or perceived conflicts of interest in order to be transparent about the context of their work. If the manuscript has multiple authors, the author submitting the manuscript must include a Declaration of Interest statement relevant to all contributing authors. Example wording for your declaration is as follows: "Declaration of Interest: Author A is employed at company B. Author C owns shares in company D, is on the Board of company E and is a member of organisation F. Author G has received grants from company H." If no Conflicts of Interest exist, your declaration should state "Declaration of Interest: None".

2. **Funding** – Authors must include a Funding Statement in their manuscript. Within this statement please provide details of the sources of financial support for all authors, including grant numbers, for example: “Funding Statement: This work was supported by the Medical Research Council (grant number XXXXXXX)”. Grants held by different authors should be identified as belonging to individual authors by the authors’ initials, for example: “Funding Statement: This work was supported by the Wellcome Trust (AB, grant numbers XXXX, YYYY), (CD, grant number ZZZZ); the Natural Environment Research Council (EF, grant number FFFF); and the National Institutes of Health (AB, grant number GGGG), (EF, grant number HHHH).” Where no specific funding has been provided for research, you should include the following statement: “Funding Statement: This research received no specific grant from any funding agency, commercial or not-for-profit sectors.”

3. **Acknowledgements** – Authors may acknowledge individuals or organisations who provided non-financial advice and/or support. Names and descriptions of the contributions of all non-author contributors should be included (as identified in the ICMJE guidelines). We are aware that authors sometimes receive assistance from technical writers, language editors, artificial intelligence (AI) tools, and/or writing agencies in drafting manuscripts for publication. Such assistance must be noted in the Acknowledgements section. Failure to acknowledge assistance from technical writers, language editors, AI tools and/or writing agencies in drafting manuscripts for publication in the Acknowledgements section may lead to disqualification of the paper. Examples of how to acknowledge assistance in drafting manuscripts: • “The author(s) thank [name and qualifications] of [company, city, country] for providing [medical/technical/language] writing support/editorial support [specify and/or expand as appropriate], which was funded by [sponsor, city, country]." • “The author(s) made

use of [AI system/tool] to assist with the drafting of this article. [AI version details] was accessed/obtained from [source details] and used with/without modification [specify and/or expand as appropriate] on [date(s)]."

4. **Author Contribution** – All authors should meet all four ICMJE criteria for authorship. Please provide a very brief description of the contribution of each author to the research including their roles in formulating the research question(s), designing the study, carrying it out, analysing the data and writing the article. The journal will follow COPE guidance to investigate if ghost, guest or gift authorship is suspected in a paper.

5. **Transparency Declaration -** The lead author and manuscript guarantor will be required to affirm that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

6. **Data Availability –** In the interests of research transparency, authors are required to maintain accurate records of data associated with their manuscript, and to supply or provide access to these data on reasonable request for purposes of reproducing results or replicating procedures. Authors are encouraged to deposit data in a recognized data repository that can mint a persistent digital identifier (e.g. DOI), provides timestamped entries and recognizes a long-term preservation plan. Please include a brief statement indicating whether the materials supporting the findings are available, and if so, where readers may access them. For example:

- The data that support the findings of this study are openly available in [repository name] at http://doi.org/[doi], reference number [reference number].

- The data that support the findings of this study are available on request from the corresponding author, [initials]. The data are not publicly available due to [restrictions e.g. their containing information that could compromise the privacy of research participants].
- Data availability is not applicable to this article as no new data were created or analysed in this study.
- The data that support the findings of this study are available from the corresponding author, [author initials], upon reasonable request.
- Please find more sample statements here.

7. **Analytic Code Availability** - In the interests of research transparency, authors are required to maintain accurate records of analytic code associated with their manuscript, and to supply or provide access to the analytic code on reasonable request for purposes of reproducing results or replicating procedures. Authors are encouraged to deposit analytic code in a recognized repository that can mint a persistent digital identifier (e.g. DOI), provides timestamped entries and recognizes a long-term preservation plan. Please include a brief statement indicating whether or not the analytic code supporting the findings are available to other researchers, and if so, where readers may access them.

8. Research Material Availability- In the interests of research transparency, authors are required to maintain accurate records of materials associated with their manuscript, and to supply or provide access to the materials on reasonable request for purposes of reproducing results or replicating procedures. Authors are encouraged to deposit materials in a recognized repository that can mint a persistent digital identifier (e.g. DOI), provides timestamped entries and recognizes a long-term preservation plan. Please include a brief statement

indicating whether or not the materials supporting the findings are available to other researchers, and if so, where readers may access them.

Thesis Citing

The journal welcomes research that has been completed as part of a thesis. All submissions are required to meet the standards of the journal and will be subject to the usual peer review process.

In accordance with the journal's Publishing Ethics Policy, it is mandatory for authors to disclose whether the research is part of a thesis by following the below points:

- Authors are required to indicate in ScholarOne and disclose in their covering letter their work is part of or is a whole thesis.
- Authors are required to update the title page of the thesis with a link to the new version of record.
- Authors are required to cite and reference their thesis.
- Authors should refer to the general rights detailed in the thesis and confirm they hold copyright/have permission to reuse this material in the new paper.
- Authors are reminded that final decisions are at the discretion of the Editor in Chief.

Failure to disclose this information will result in the submission being withdrawn and the University notified.

Other Documents:

1. **Tables** - Tables should be numbered (e.g. Table 1, Table 2…) and referenced in the text of the manuscript. Authors must indicate the desired position of the table in the

manuscript. Authors must obtain permission from the original publisher if they intend to use tables from other sources, and due acknowledgement should be made in a footnote to the table as follows: *Permission to replicate this table has been given to the authors by XXX.* Please ensure tables are a reasonable size. Tables over two typeset pages (around 1,400 words) will be moved to supplementary material.

2. **Figures** - Figures should be numbered (e.g. Fig 1, Fig 2, Fig 3…) and referenced in the text of the manuscript. Authors must indicate the desired position of the figure in the manuscript. Please consult the journal artwork guide for a detailed specification on accepted file formats. Authors must obtain permission from the original publisher if they intend to use figures from other sources, and due acknowledgement should be made in the legend as follows: *Permission to replicate this figure has been given to the authors by XXX.*

   Any figures supplied in colour will be published online in colour but converted to tints of the journal's Pantone shade for printing. The optional charge for full colour figure print publication is £200/$320 per figure (up to a maximum of £1000/$1600 per article). To request colour figures in print, please tick the appropriate box when submitting your manuscript.

3. **Supplementary Material** – Material related to a paper but not essential to a general understanding of the paper will be published as an online data supplement. This material includes, but is not restricted to:

   - Additional data presented as tables or figures
   - Details of a search strategy employed in a literature review
   - Details of the literature retrieved but not further discussed in the body of the manuscript

- Technical details of specialist (but not novel) methodology, statistical analysis and supporting references
- Long lists of contributors who don't qualify for an authorship credit (e.g. group authorship) should be added to supplementary material. Shorter lists can be included in the acknowledgement section.

Supplementary material is peer reviewed but will not be copyedited or typeset and should be supplied as authors wish it to appear online. Supplementary material should be uploaded as a separate file and referenced in the manuscript. Please see our general guidance on supplementary materials for further information.

4. **CONSORT, PRISMA, or CHEERS Checklist/Flow Diagram** – If relevant,see here for more information.

During Online Submission:

The following must be provided as part of the online submission process:

1. **Relevance statement -** Authors are required to provide a relevance statement that explains in no more than 100 words the relevance of the research to practising psychiatrists.
2. **Fast-track assessment -** Authors of editorials addressing fast moving debates and topical areas may request expedited assessment and publication. To do this please select the 'fast-track assessment' option during online submission. In your relevance statement please justify clearly why you feel your article should be considered for fast-track assessment.

   The word count should not exceed 1,500 words with a summary paragraph of less than 50 words and may include one figure or table and up to 5 essential references.

The submission should also include full author names, brief biographical details (up to 25 words) for each author, a photograph of the lead author (optional), and a declaration of interest statement for each author to ensure expedited publication. Examples of reasons why an article may qualify for fast-track assessment include but are not limited to:

- Comment on clinical guidelines or policies that are to be released imminently
- Opinion piece on fast moving key debates in clinical, academic or social and political spheres of psychiatry
- Response to recently published government documents, papers and other editorials - especially those featured in *BJPsych*
- Opinion piece that is likely to significantly influence public policy.

A decision regarding the fast-track route will be made within 1 week of submission. All manuscripts approved for the fast-track route will be assessed and published within **30 days** of submission.

3. **ORCID -** The corresponding author is required to register for an ORCID profile during manuscript submission. We recommend that all authors register for an ORCID profile and link their ORCID to their ScholarOne account. Please find more information about registration here.

Article Types

Jump to: Original Article | Review | BJPsych Editorial | Guest Editorial | Feature | Commentary | Letters | Extra | Book Reviews |

Case reports, cost-of-illness and cost studies are not considered for publication in the BJPsych and should be submitted to BJPsych Open.

Original Article

Article that reports original research findings and analysis.

The word count should be between 3,000 and 4,000 words (excluding references, tables and figure legends) and may include up to 40 essential references beyond those describing statistical procedures, psychometric instruments and diagnostic guidelines used in the study.

Structured abstract of up to 250-300 words with the headings: Background; Aims; Method; Results; Conclusions (Trial Registration Number and Data Set Information where appropriate). Please find further guidance on writing an effective abstract here.

- Quantitative studies: abstracts should provide effect sizes with confidence intervals (not P- values alone).
- Conclusions, in isolation, are likely to be used by others citing or promoting the work and must therefore be an accurate reflection of the study's main findings.

Main text should include the following sections: Introduction, Method, Results and Discussion.

Introductions should be no more than one paragraph. Longer introductions may be permissible but should be split with subheadings if they exceed two paragraphs.

Discussion section should always include limitations of the paper to ensure balance and use of subheadings is encouraged in this section. Authors should summarize the conclusions of the study at the end of the Discussion.

In total, up to four tables and figures may be included in the main article (e.g. three tables and one figure). Additional tables and figures may be included as online only supplementary material. All large tables (exceeding one journal page) will be published as online only supplementary material. Authors are encouraged to present key data within smaller tables within the article itself.

Original Articles are subject to external peer review.

- For the purposes of Gold Open Access funding, this journal considers this article type to be a research article. If publishing Gold OA, all or part of the publication costs for this article type may be covered by one of the agreements Cambridge University Press has made to support open access.

Review

Definition: Systematic reviews that are ‘first in field’; narrative review articles in exceptional cases only

Systematic reviews submitted to BJPsych should be 'first in field', explicating important findings in fields where no systematic review has yet been published or where information in the literature is conflicting. They are expected to be a clear building block upon which further research in the field is undertaken.

If you are interested in submitting a narrative review, please contact the Editorial Office first at bjp@rcpsych.ac.uk

We require authors to register the protocol for **systematic reviews** before data extraction on an accessible, searchable site such as PROSPERO. If the review has not been registered, or registration has taken place following data extraction, we are unable to consider your submission. Please include the following information in the Methods section:

- Registration number (eg, PROSPERO registration number).
- Date of registration (please note that we require the date of registration rather than the date of submission).
- Date of data extraction

The word count should not exceed 6,000 words (excluding references, tables and figure legends) and may include up to 150 essential references in total. Additional references may be included with permission of the Editor in Chief. Only papers directly referred to should be directly referenced in the main manuscript file; large data sets should be included in the supplementary material.

Please include a structured abstract of up to 250-300 words with the headings: Background, Aims, Method (including data sources, study selections, synthesis approach), Results, Conclusions.

The main text should include the following sections: Introduction, Method, Results and Discussion and conclusion.

It is important that the **Method** section clearly describes the search strategy, study selection criteria and synthesis approach in sufficient detail to ensure the method can be replicated to extract the same data with the same or similar analysis. This should include information about the protocol registration, review software, data sources (bibliographic databases such as PubMed/MEDLINE, Embase, CINAHL, PsycINFO and reference lists from journals or books), MeSH and free text search terms and filters, dates included in the search, screening process, language limitations, inclusion and exclusion criteria, study selection and synthesis approach. To ensure a comprehensive review of the literature, we encourage consideration of publications in non-English languages. Ideally the search should be as current as possible

with the search date noted in the manuscript. Please describe how the quality of evidence was evaluated and explain whether heterogeneity between studies was investigated and explored.

The **results** section should report the results and summarise the quality of the evidence. Where necessary, a statement should be made as to how quality has been used to inform interpretation of results and/or analysis.

The **Discussion** section should summarise key findings and describe the impact of the results on clinical practice. Authors should discuss both the strengths and the limitations of the evidence and the review.

Tables and figures identifying the primary finding(s) may be included in the print version of each paper. Additional tables and figures will be included as online only supplementary material. All large tables (exceeding one journal page) will be published as online only supplementary material. Authors are encouraged to present key data within smaller tables for print publication.

Supplementary tables, figures and data should include (in this order):

1. PRISMA-P (or equivalent) table
2. Search strings used for various platforms such as MEDLINE, Scopus etc.
3. PICOS table (if relevant)
4. List of all included papers
5. Additional sensitivity analyses or additional analyses (if relevant)
6. Publication bias: a funnel plot and additional analyses undertaken where necessary
7. Quality Assessment

Authors should include a GRADE assessment of the findings or equivalent approach to place the importance of the findings in context.

Previously published Reviews for groups such as the Cochrane Collaboration and the National Institute for Health and Care Excellence should be submitted with the latest version of the parent review and its status, so an informed decision can be made about the added value of the submitted paper.

Reviews are subject to external peer review.

- For the purposes of Gold Open Access funding, this journal considers this article type to be a research article. If publishing Gold OA, all or part of the publication costs for this article type may be covered by one of the agreements Cambridge University Press has made to support open access.

BJPsych Editorial

- Opinion, policy, or commentary piece written by members of the Editorial Board.
- BJPsych Editorials are invited submissions only.
- BJPsych Editorials do not require a photograph or biographical details.
- May include up to 5 essential references, however this can be increased to up 9 at the discretion of the Editor in Chief.
- The word count must not exceed 2000 words, however this can be increased at the discretion of the Editor in Chief.
- BJPsych Editorials require an unstructured summary paragraph not exceeding 50 words.

- BJPsych Editorials are subject to internal review by the Editorial Board and Editor-in-Chief.
- Note that this article type is **not** eligible for Gold Open Access funding under the agreements Cambridge University Press has made to support open access.

Guest Editorial (Previously Editorial)

- Opinion or perspective piece from outside the BJPsych.
- Authors interested in submitting a Guest Editorial should send a pre-submission proposal of 200-250 words to bjp@rcpsych.ac.uk. Authors may also be invited by the journal to submit.
- Guest Editorials no longer require a photograph or biographical details.
- The word count must not exceed 2000 words and may include one figure or table and up to 5 essential references, however this can be increased up to 9 with permission from the Editor in Chief.
- Guest Editorials require an unstructured summary paragraph not exceeding 50 words.
- Editorials may only exceed two printed pages at the Editor's discretion and may require further editing after acceptance.
- Guest Editorials are subject to external peer review and /or review by the Editorial Board and EiC.
- Note that this article type is **not** eligible for Gold Open Access funding under the agreements Cambridge University Press has made to support open access.

Feature

- These articles will present novel concepts or provide a state-of-the-art summary of a particular aspect of psychiatry. They may be speculative and hypothesis-generating or provocative and challenging.
- Unsolicited Features will be considered, but will require a pre-submission proposal of 300-350 words including a brief outline and this should be sent to bjp@rcpsych.ac.uk.
- Features require an unstructured abstract of 100-200 words.
- The word count must not exceed 3500 words and may include up to 30 references, however this may be increased at the discretion of the Editor-in-Chief.
- Features are subject to review by the Editorial Board, however external peer review will be sought if required.
- For the purposes of Gold Open Access funding, this journal considers this article type to be a research article. If publishing Gold OA, all or part of the publication costs for this article type may be covered by one of the agreements Cambridge University Press has made to support open access.

Commentary

- Commentary relates to specific material **already published in the journal.**
- The word count should be up to 1000 words and may include up to 9 essential references. Please note the maximum number of references cannot be exceeded.
- Authors of the original submission are encouraged to and have the right to reply to Commentaries.

- Commentaries are subject to review by the Editorial Board, however external peer review will be sought if required.

Authors must follow the below format for commentaries, when submitting to ScholarOne. Should authors format the title differently to the below, the submission may be returned, and edits requested ahead of further processing.

Title of original submission: Commentary, *Surname et al*

For example: Impact of the COVID-19 pandemic on psychotropic medication uptake: Commentary, Brown et al

Authors of an original submission must follow the format below when responding to a Commentary submitted in response to their manuscript:

Title of original submission: Commentary, *Author Response*

For example: Impact of the COVID-19 pandemic on psychotropic medication uptake: Commentary, Author Response

- Note that this article type is **not** eligible for Gold Open Access funding under the agreements Cambridge University Press has made to support open access.

Letters

- Letter to the publication, can be on any topic related to psychiatry, its research and clinical practice.
- The word count should be up to 1000 words and may include up to 9 essential references. Please note the maximum number of references cannot be exceeded.

- Letters are subject to review by the Editorial Board, however external peer review will be sought if required.
- Note that this article type is **not** eligible for Gold Open Access funding under the agreements Cambridge University Press has made to support open access.

Extra

- These comprise a wide range of material considered to be of interest to readers of the BJPsych.
- Extras may be up to 500 words in length and should not include references.
- Authors should specify the type of Extra they are submitting in their manuscript file.
- Extra types include: Psychiatry in music, Psychiatry in movies, Psychiatry in history, Psychiatry in literature, Psychiatry in pictures, Psychiatry in theatre, Psychiatry in the Bible, Psychiatry in sacred texts, Reflections, Poems (including poems by doctors), 100 years ago, 100 words and miscellaneous.
- Note that this article type is **not** eligible for Gold Open Access funding under the agreements Cambridge University Press has made to support open access.

Book Reviews

- Book reviews are usually commissioned but may be submitted unsolicited to bjp@rcpsych.ac.uk and should include the name and email address of the corresponding author as well as full book details (title, author(s), price, publisher, publication year and number of pages) and a picture of the book cover.

- Note that this article type is **not** eligible for Gold Open Access funding under the agreements Cambridge University Press has made to support open access.

Transparent Reporting

BJPsych believes in the importance of transparent and reproducible research.

Where possible we encourage authors to make evidence, data, code, and other materials that underpin their findings available to readers.

We also encourage authors to cite materials and data they have used in their research, alongside literature citations, to recognise the importance of all kinds of research outputs.

We expect authors to follow best practices in reporting their methodology. Reporting guidelines for many study designs, including quantitative and qualitative scholarship across many disciplines, can be found in the EQUATOR Network.

Authors must follow the reporting guidelines relevant to their submission. This is a condition of publication. The journal, or an entity acting on behalf of the journal, will verify that the appropriate guidelines were adopted and correctly followed.

- CONSORT guidelines: **Randomised controlled trials** (submit a completed checklist and flowchart). Note: Trials assessed by the Cochrane Risk of Bias Tool 2 as having low risk of bias are more likely to be published in the BJPsych, though topic areas which may inevitably score less will not be penalised.
- STROBE guidelines: Cohort, case-control, and cross-sectional **observational studies in in epidemiology**
- PRISMA guidelines: **systematic reviews or meta-analyses of evaluations studies** including randomised controlled trials (submit a completed checklist and flowchart)

- MOOSE guidelines.: **meta-analyses of observational studies in epidemiology**
- CHEERS guidelines: **economic evaluations** (submit a completed checklist)
- SAGER Guidelines: We encourage authors to consult the Sex and Gender Equity in Research (SAGER) Guidelines for reporting sex and gender information in study design, data analyses, results and interpretation. Authors should use the terms sex and gender carefully in order to avoid confusing both terms and include separate reporting and interpretation of the data by sex and gender. If sex and/or gender information are not reported, this should be explained.
- PPI Guidelines: The journal encourages active patient and public involvement (PPI) in research. If appropriate, please report PPI in your manuscript using GRIPP2-LF, a longer checklist for studies where PPI forms the primary focus of a study or GRIPP2-SF, a short checklist for studies where PPI is a secondary or tertiary focus.

Statistics

Attention should be paid to providing a clear description of study designs and objectives, and evidence that the statistical procedures used were both appropriate for the hypotheses tested and correctly interpreted. The statistical analyses should be planned before data are collected and full explanations given for any post hoc analyses carried out. The value of test statistics used (e.g. t, F-ratio) should be given as well as their significance levels so that their derivation can be understood. Standard deviations and errors should not be reported as ± but should be specified and referred to in parentheses.

Trends should not be reported unless they have been supported by appropriate statistical analyses for trends. The use of percentages to report results from small samples is

discouraged, other than where this facilitates comparisons. The number of decimal places to which numbers are given should reflect the accuracy of the determination and estimates of error should be given for statistics. Use of confidence intervals is encouraged but not mandatory. Authors are encouraged to include estimates of statistical power where appropriate. To report a difference as being statistically significant is generally insufficient, and comment should be made about the magnitude and direction of change.

Economic evaluations

Trial-based economic evaluations

Priority will be given to trial-based economic evaluations submitted to the *BJPsych* that meet the following criteria (in order of importance):

- Submitted with the main clinical trial outcome results in a single manuscript
- Submitted alongside the main clinical trial manuscript, or subsequent to the main clinical trial manuscript being accepted for publication in the *BJPsych* and demonstrating added value in the form of original and important results not reported in the clinical trial manuscript
- Submitted in isolation from the main clinical trial manuscript, published elsewhere and demonstrating added value in the form of original and important results not reported in the clinical trial manuscript.

Economic evaluations based on decision analysis

Priority will be given to economic evaluations based on decision modelling that meet all the following criteria:

- Original and important results, not reported elsewhere, that are likely to have an impact on real decisions in clinical practice or on mental health policy
- Methods/results that are described and reported clearly enough to be accessible to a primarily clinical audience
- Based on data from systematic literature reviews/meta-analyses, randomised controlled trials and/or routine data sources (such as hospital episode statistics or patient registries).

Manuscripts that do not meet this criterion may still be considered, if the first two criteria are clearly met.

Qualitative research

The Editorial team recognises that the term 'qualitative research' encompasses diverse methods, manuscripts will be evaluated based on the appropriateness of the selected framework, the coherence of the report and its adherence to quality criteria consistent with the methodology and method as follows:

Epistemological and/or theoretical frameworks

- The epistemological underpinnings and/or theoretical framework are made explicit and applied consistently

Study design and method

- The research goal is clear, justified and in context regarding the literature
- The approach matches the purpose of research and is justified

- Methods of sampling, data collection, data management and analysis are made explicit and consistent with the methodology
- Analytical and interpretative processes are described in full

Findings, discussion and implications

- Findings represent the depth and breadth of data
- Findings and interpretations are supported by the data
- Direct quotations, exemplars or other data presentations are used judiciously to illustrate the findings
- Findings are presented in a way that is consistent with the methodology, method and study aims
- Authors are appropriately cautious about knowledge claims
- Findings are explored theoretically and applications discussed

Process issues

- The report provides an account of reflexive practice in keeping with the methodology

Use of artificial intelligence (AI) tools

We acknowledge the increasing use of artificial intelligence (AI) tools in the research and writing processes. To ensure transparency, we expect any such use to be declared and described fully to readers, and to comply with our plagiarism policy and best practices

regarding citation and acknowledgements. We do not consider artificial intelligence (AI) tools to meet the accountability requirements of authorship, and therefore generative AI tools such as ChatGPT and similar should not be listed as an author on any submitted content.

In particular, any use of an AI tool:

- **to generate images** within the manuscript should be accompanied by a full description of the process used, and declared clearly in the image caption(s)
- **to generate text** within the manuscript should be accompanied by a full description of the process used, include appropriate and valid references and citations, and be declared in the manuscript's Acknowledgements.
- **to analyse or extract insights** from data or other materials, for example through the use of text and data mining, should be accompanied by a full description of the process used, including details and appropriate citation of any dataset(s) or other material analysed in all relevant and appropriate areas of the manuscript
- must not present ideas, words, data, or other material produced by third parties without appropriate acknowledgement or permission

Descriptions of AI processes used should include at minimum the version of the tool/algorithm used, where it can be accessed, any proprietary information relevant to the use of the tool/algorithm, any modifications of the tool made by the researchers (such as the addition of data to a tool's public corpus), and the date(s) it was used for the purpose(s) described. Any relevant competing interests or potential bias arising as a consequence of the tool/algorithm's use should be transparently declared and may be discussed in the article.

Appendix 25 – Lay Summary

The Milton Keynes Community Mental Health Team uses 'DIALOG+' to conduct check-in calls with clients on waitlists for psychological therapy. DIALOG+ involves asking clients for ratings of their satisfaction with eight life domains and three aspects of treatment, determining what additional support could improve satisfaction and devising corresponding action plans. This study assessed clients' and clinicians' experiences of DIALOG+-informed check-in calls and aimed to improve clients' competence and confidence using coping skills, clients' empowerment to achieve goals and the helpfulness of DIALOG+.

In an initial phase of the study, 41 clients rated their memory of and confidence using coping skills, their empowerment to achieve goals whilst on therapy waitlists and the helpfulness of DIALOG+; clinicians also rated the helpfulness of DIALOG+. Clients and clinicians were asked for suggestions to improve each of these dimensions. Clients wanted to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists.

A service improvement initiative was devised, in which clients were invited to revise coping skills during check-in calls, sent monthly emails outlining coping skills, offered copies of psychological educational materials, sent emails regarding the referral processes for services where they could seek extra support, encouraged to seek support from friends and/or family, offered face-to-face check-in appointments, invited to collaboratively set agendas for check-in calls and offered the opportunity to opt-out of check-in calls. Clinicians arranged check-in calls two weeks in advance and reframed the 'waitlist' as the 'pre-therapy list.'

In a second phase of the study, 34 clients who had received this service improvement initiative completed measures of their memory of and confidence using coping skills, their empowerment

to achieve goals whilst on therapy waitlists and the helpfulness of DIALOG+; clinicians also rated the helpfulness of DIALOG+. However, there were no improvements in clients' memory of and confidence using coping skills, clients' perceived ability to progress towards goals or the perceived helpfulness of check-in calls by either clients or staff following the introduction of the service improvement initiative.

Therefore, whilst clients wanted to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists, the service improvement initiative failed to produce measurable changes in clients' memory of and confidence using coping skills, clients' perceived ability to progress towards goals or the helpfulness of check-in calls. Milton Keynes Community Mental Health Team may wish to explore alternative initiatives to improve clients' opportunities to revise and practice using coping skills, feel valued and understood by others, have flexible and predictable check-in calls and feel able to achieve goals whilst on waitlists.

Appendix 26 – Milton Keynes Community Mental Health Team Response to the Service Improvement Project

This has been an important and much needed project that contributes to our understanding of how to better support those clients who have completed a step 2 intervention and are awaiting a step 3/4 intervention. It was important to the service that any changes came from suggestions and feedback from clients. This project coupled important service user feedback with the views of clinicians and relevant research to identify and implement a number of changes. Whilst the impact of these changes did not meet statistical significance we agree with the implications and our goal remains to find ways to improve client's opportunities to revise and practise skills, have flexible and predictable check-in calls and feel able to achieve goals whilst awaiting step 3/4 intervention. We will be seeking feedback from service users and clinicians regarding the acceptability of the changes implemented. In addition, we will be exploring how we can build on the work of this project in line with the highlighted service user goals.

Appendix 27 – Recruitment Locations

The recruitment locations are listed detailed below.

NHS Trusts

- Berkshire Healthcare NHS Foundation Trust
- Central and North West London NHS Foundation Trust
- Oxford Health NHS Foundation Trust

Social Media

- Facebook
- Instagram
- LinkedIn
- Reddit
- Tumblr

Charitable Organisations

- Change Mental Health
- McPin Foundation
- National Hearing Voices Network

Appendix 28 - Specific Psychotic Experiences Questionnaire (Ronald et al., 2014)

Paranoia Subscale

Question	Not At All	Rarely	Once A Month	Once A Week	Several Times A Week	Daily
I need to be on my guard against others.						
There might be negative comments being spread about me.						
People are deliberately trying to irritate me.						
I might be being observed or followed.						
People are trying to upset me.						
People are looking at me in an unfriendly way.						
People are being hostile towards me.						
Bad things are being said about me behind my back.						
Someone has bad intentions towards me.						
Someone has it in for me.						
People would harm me if given an opportunity.						
People might be conspiring against me.						
People are laughing at me.						
I am under threat from others.						
I can detect coded messages about me in the press/TV/internet.						

Hallucinations Subscale

Question	Not At All	Rarely	Once A Month	Once A Week	Several Times A Week	Daily
Hear noises or sounds when there is nothing about to explain them?						
Feel that someone is touching you, but when you look nobody is there?						
Hear sounds or music that people near you don't hear?						
Detect smells which don't seem to come from your surroundings?						
See things that other people cannot?						
Experience unusual burning sensations or other strange feelings in or on your body that can't be explained?						
See shapes, lights, or colours even though there is nothing really there?						
Hear voices commenting on what you're thinking or doing?						
Notice smells or odours that people next to you seem unaware of?						

Cognitive Disorganisation Subscale

Question	Yes	No
Are you easily confused if too much happens at the same time?		
Do you frequently have difficulty in starting to do things?		
Are you a person whose mood goes up and down easily?		
Do you dread going into a room by yourself where other people have already gathered and are talking?		
Do you find it difficult to keep interested in the same thing for a long time?		
Do you often have difficulties in controlling your thoughts?		
Are you easily distracted from work by daydreams?		
Do you ever feel that your speech is difficult to understand because the words are all mixed up and don't make sense?		
Are you easily distracted when you read or talk to someone?		
Is it hard for you to make decisions?		
When in a crowded room, do you often have difficulty in following a conversation?		

Grandiosity Subscale

Question	Not At All	Somewhat	A Great Deal	Completely
I have a special mission.				
I have many great ideas.				
Everything I do is great.				
I am, or am destined to be, someone very important.				
I am a very special or unusual person.				
I have special abilities that others do not.				
I am much more unique than anyone else.				
Everyone is going to know about me because of my greatness.				

Anhedonia Subscale

Question	Very False for Me	Moderately False for Me	Slightly False for Me	Slightly True for Me	Moderately True for Me	Very True for Me
When something exciting is coming up in my life, I really look forward to it.						
When I think about eating my favourite food, I can almost taste how good it is.						
I don't look forward to things like eating out at restaurants.						
When I'm on my way to an amusement park, I can hardly wait to ride the roller coasters.						
I get so excited the night before a major holiday I can hardly sleep.						
When I think of something tasty, like a chocolate biscuit, I have to have one.						
Looking forward to a pleasurable experience is in itself pleasurable.						
I look forward to a lot of things in my life.						
When ordering something off a menu, I imagine how good it will taste.						

Question	Very False for Me	Moderately False for Me	Slightly False for Me	Slightly True for Me	Moderately True for Me	Very True for Me
When I hear about a new movie starring my favourite actor, I can't wait to see it.						

Appendix 29 – Participant Information Sheet

Liam Myles

Email: liam.myles@psy.ox.ac.uk

Address: ISIS Centre, Warneford Ln, Headington, Oxford OX3 7JX

PARTICIPANT INFORMATION SHEET FOR PARTICIPANTS WITH PSYCHOSIS

Understanding the Causes of Hallucinations in Psychosis

We'd like to invite you to take part in our research study. Before you decide, it is important that you understand why the research is being done and what it would involve for you. Please read this information sheet and discuss it with others if you wish. If anything is not clear, or if you would like more information, please ask us.

Summary

The purpose of this study is to investigate factors that influence hallucinations. We are recruiting people from three groups: 1) people with psychosis who experience hallucinations,

2) people with psychosis who do not currently experience hallucinations, and 3) people without a diagnosis of a severe mental health condition. You will be asked to complete a brief questionnaire and a pattern-spotting computer game. If you are interested in participating in this study, please either contact Liam Myles, the lead researcher of this study, at liam.myles@psy.ox.ac.uk or on 07775 111 007, or inform a clinician in your service that you are interested in participating and that you are happy for them to pass on your details to Liam.

What is the purpose of the study?

Psychosis is a mental health condition characterised by unusual beliefs (e.g. paranoia) and experiences (e.g. hallucinations). Many people with psychosis can experience hallucinations (hearing, seeing, feeling, smelling or tasting things that others do not). It is important to understand the causes of hallucinations, to help improve therapies for people with distressing hallucinations. However, researchers are unsure what factors cause hallucinations. The purpose of this study is to investigate some factors that might influence hallucinations.

Why have I been invited?

You have been invited to participate in this study because you have a diagnosis of psychosis. We are recruiting both people with a diagnosis of psychosis who experience hallucinations and people with a diagnosis of psychosis who do not currently experience hallucinations. We understand that many people hallucinate on occasion, but not very often, and therefore may be unsure whether they are eligible to participate. We would encourage you to get in touch with us if you are interested in participating, as we would like to hear from people with a range of experiences.

Do I have to take part?

No. You are under no obligation to take part, and any contact you have with us is entirely voluntary. Also, please be assured that you can withdraw from the study at any time, even if we have started, and you do not have to give a reason for this. Importantly, this will not affect any clinical care that you are receiving now or in the future.

What will happen to me if I decide to take part?

If you are happy to participate, we will arrange a video call to complete the study. You will be sent a link to an online study which will ask you about your age, gender, diagnoses of mental health difficulties, etc. Then, we will ask you about any recent difficulties with hallucinations, low mood and confusion. Following this, you will complete a short computer game. This game will involve spotting patterns and will last about 15 minutes. In total, the study is expected to last less than one hour. Participation can be done either in the clinic or from home, and therefore you do not need to visit us to complete the study.

What should I consider?

We want to encourage everyone interested in participating to contact us, so that we can answer any questions you may have. However, all participants must be between 18-65 years of age, able to read English and have access to a PC or laptop. If you do not have access to a computer, we can provide this for the study. Please note that taking medications and/or participating in other studies **does not** prevent you from taking part in this study. However, we require that you do not have a diagnosis of a learning disability, a severe drug/alcohol

addiction or a neurodegenerative disorder (e.g., multiple sclerosis, dementia, etc), either historically or currently.

Are there any possible disadvantages or risks from taking part?

We do not anticipate any major risks in taking part in this study. If you become tired at any point during this study, you will be able to take a break before continuing. Also, completing the questionnaire about hallucinations, low mood and confusion could be upsetting. If this happens, we will arrange appropriate support from your care co-ordinator or primary worker. If we think that you are at risk of harm (e.g., if you state you are a risk to yourself or others), we will need to contact your care co-ordinator or primary worker to let them know so that they can provide you with support. We will also provide you with suggestions of how to access additional support.

What are the possible benefits of taking part?

Your participation would help clinicians better understand hallucinations, which can help us to better support people with distressing hallucinations and improve therapies. Whilst this will not directly benefit your experience of therapy, it may benefit others' experience of therapy in the future. Also, we will provide you with a summary of the research outcomes once the project is completed (if you wish).

Will my General Practitioner (GP) be informed of my participation?

No. However, we will inform your care co-ordinator if you choose to participate.

Will my clinical care team be informed that I am taking part?

Yes, the researcher will write a short note in your electronic patient notes informing the team that you have taken part in the study. This will only include the name of the study, the date you took part and the contact details of the research team.

Will my taking part in the study be kept confidential?

Yes. All study records will be identified only by a code. We will only use your name and contact details to contact you to arrange participation.

Confidentiality will be maintained as far as it is possible, unless you tell us something which implies that you or someone you mention might be in significant danger of harm. In this case, we would have to inform the relevant agencies, but we would discuss it with you first.

Responsible members of the University of Oxford, regulatory authorities and the relevant NHS Trust(s) may be given access to study data for monitoring and/or audit of the study to ensure that the research is complying with applicable regulations.

Will I be reimbursed for taking part?

Unfortunately, we do not have funding to pay participants. However, we will reimburse any travel expenses if needed.

What will happen to my data?

Data protection regulation requires that we state the legal reasons for processing information about you. Research is considered a task in the public interest. The University of Oxford is

the sponsor for this study. It is the data controller, and is responsible for looking after your information and using it properly.

We will be using information provided by you in order to undertake this study and will use the minimum personally-identifiable information possible.

We will store any research documents with personal information, such as consent forms, securely at the University of Oxford as part of the research record until the end of the study. The study will be completed by January 2026, by which time Liam Myles will have submitted this research project as part of his doctoral thesis. We will not keep any identifiable information about you after the study has finished. If you consent, your data will be anonymised and retained for future research.

NHS Trust teams may use your contact information (e.g., name, email address and telephone number) to contact you about participating in this research. A copy of the consent form from this study will be kept in your medical records for as long as those records are retained. They will not keep any other identifiable information about you from this study after the study has finished.

Data protection regulation provides you with control over your personal data and how it is used. When you agree to your information being used in research, however, some of those rights may be limited in order for the research to be reliable and accurate. Further information about your rights with respect to your personal data is available at https://compliance.web.ox.ac.uk/individual-rights

You can find out more about how we use your information by contacting Liam Myles, the Principal Investigator, at liam.myles@psy.ox.ac.uk.

What will happen if I don't want to carry on with the study?

You are free to withdraw from the study at any time before finishing, and you do not have to provide a reason. Your participation is voluntary and withdrawal will not affect the care you receive from any services. If you withdraw from the study before finishing, we will keep the data you have already provided. You can withdraw from the study at any time during the appointment and decide whether you want to withdraw the data you have already provided. After the study appointment, it is not possible to withdraw the data that you provided.

What happens at the end of the study and what will happen to the results of this study?

At the end of the study, if you want to be provided with feedback, this will be available. Also, you will be given more information about this research and offered support, as needed. Support may involve signposting to your GP.

Following all data collection, Liam Myles, the lead researcher, will write up this study as part of his Doctorate in Clinical Psychology thesis. Also, we will write a scientific article and publish the results of this study. We do this so that we can share the results with other clinicians and researchers, so that they can use this information to guide the care provided for clients with psychosis. You will be provided with a summary of the research findings and a copy of any academic articles for free, if you wish. Again, we want to confirm that no identifiable information will be used, and so no one will be able to determine who has participated in this study. However, if you wish to receive a summary of the research findings and a copy of any academic articles, we will keep your email address until the study is complete; we will delete all records of your email address after sending you this information.

What if there is a problem?

If you have a concern about any aspect of this study, please speak with Liam Myles, the Principal Investigator, who will do his best to answer your questions.

The University of Oxford, as Sponsor, has appropriate insurance in place in the unlikely event that you suffer any harm as a direct consequence of your participation in this study.

If you wish to complain about any aspect of the way in which you have been approached or treated, or how your information is handled during the course of this study, contact Liam Myles on liam.myles@psy.ox.ac.uk or 07775 111 007 or Dr Louise Johns (Liam's research supervisor) on louise.johns@psych.ox.ac.uk. Alternatively, you may contact University of Oxford Research Governance, Ethics & Assurance (RGEA) on 01865 616480, or the director of RGEA at rgea.complaints@admin.ox.ac.uk.

How have patients and the public been involved in this study?

People with a diagnosis of psychosis have been consulted in the development of this project. They have helped to create the information, consent and debrief forms, helped to design the pattern spotting game, helped to decide the participation eligibility criteria, and ensured that participants are able to get the most out of this study, for example by receiving an email update on the results of the study.

Who is organising and funding the study?

The University of Oxford is sponsoring the study. Liam Myles is the Chief Investigator and is supervised by Dr Louise Johns and Dr Emmeline Goodby.

Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect participants' interests. This study has been reviewed and given a favourable opinion by South East Scotland Research Ethics Committee 02.

Further information and contact details:

If you are interested in participating in this study, please either contact Liam Myles, the lead researcher of this study, at liam.myles@psy.ox.ac.uk or inform a clinician in your service that you are interested in participating and that you are happy for them to pass on your details to Liam. If you are unsure about participating, we would like to encourage you to contact us at the above email address, as we are happy to answer any questions that you may have. If you would prefer to contact someone knowledgeable of the study, but independent from the research team, please contact Professor Paul Salkovskis on paul.salkovskis@hmc.ox.ac.uk.

Thank you for considering taking part.

Appendix 30 – Participant Consent Form

Liam Myles

liam.myles@psy.ox.ac.uk

Study Code: *Site ID Code:*

		–		

CONSENT FORM FOR PARTICIPANTS WITH PSYCHOSIS

Understanding the Causes of Hallucinations in Psychosis

Please write your initials in the boxes to record that the question has been asked by the researcher and that you have consented:

1. I confirm that I have read the information sheet dated …… (version …..) for this study. I have had the opportunity to consider the information and ask questions, and have received satisfactory answers to all questions.	

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my medical care or legal rights being affected.	
3. I understand that relevant sections of my medical notes and data collected during the study may be looked at by individuals from University of Oxford, from regulatory authorities and from the NHS Trust(s), only where it is relevant to my taking part in this research. This would involve checking documents and entries relevant to research, such as consent forms. I give permission for these individuals to have access to my records.	
4. I consent for my data to be anonymised and retained in an online data repository to be used for future research.	
5. I would like to receive feedback at the end of this study.	
6. I agree to take part in this study.	

_____ _____ _____

Name of Participant *Date* *Signature*

_____ _____ _____

Name of Researcher taking consent *Date* *Signature*

If you would like to be contacted with the results of this study, please insert your email below.

_____

This consent form will be retained until January 2026, at which point it will be destroyed.

When completed, 1 copy of this consent form will be emailed securely to the participant; 1 copy of this consent form will be kept in the researcher site file (original); 1 copy of this consent form will be kept in medical notes (if participant is a patient).

Appendix 31 – Bot Check

Participants completed a bot check. They were instructed, “this task checks that bots do not complete this study. Please answer the following question. What is the opposite of long? If the answer is 'short,' press 's.' If the answer is 'wide,' press 'w.' If the answer is 'long,' press 'l.'” If participants correctly selected ‘s,’ they received the message, “well done, you passed the bot checker!”

Appendix 32 – Participant Debrief Sheet

Chief Investigator: Liam Myles

Email: liam.myles@psy.ox.ac.uk

Debrief Sheet

Study Title: Understanding the Causes of Hallucinations in Psychosis

Congratulations, you have completed the study! Thank you for participating in this study.

What was the purpose of this study?

The purpose of this study was to investigate the causes of hallucinations in psychosis. Some theories suggest that hallucinations arise because individuals find their thoughts particularly attention-grabbing. This makes them seem very real, so much so that thoughts may feel like they have come from outside one's body. This study aimed to examine this idea using the pattern-spotting task. Your participation has helped us to answer this question, and we are massively grateful for your support.

If you would like to learn more about the topic of the research, please feel free to reach out to the researchers, as we would be happy to recommend further reading.

Further Information

If you are interested, we are more than happy to provide further information about the study and/or update you on the findings of the study. Unfortunately, we cannot provide you with your individual results. If taking part in this study has raised any mental health concerns for you, we advise that you contact your care co-ordinator if you are being supported by an Early Intervention Service; otherwise, please contact your GP. Also, we have listed the details of helplines that may be helpful below.

Oxfordshire and Buckinghamshire Mental Health Helpline: Telephone: 111

Shout Text Service: Text 'Shout' to 85258

Oxfordshire Mind: Telephone: 01865 247788 Text: 07451 277973 Email: info@oxfordshiremind.org.uk

Bedfordshire, Luton and Milton Keynes Mind: Telephone: 0300 330 0648 Crisis Café Opening Hours: 5pm – 11pm

Berkshire Mind: Telephone: 01494 463364 Email: info@bucksmind.org.uk

Samaritans: Telephone: 116 123 Email: jo@samaritans.org

Oxford Safe Haven: Telephone: 01865 903 037 between 11:30am and 9:30pm

In a life-threatening emergency, please telephone 999 or attend Accident & Emergency.

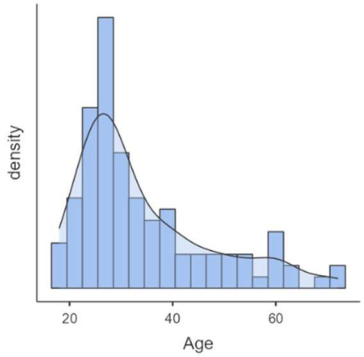
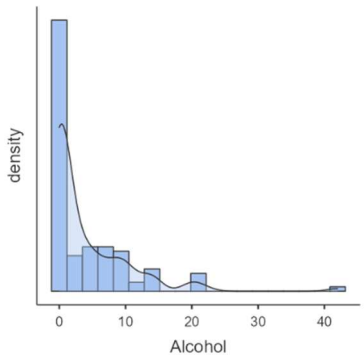
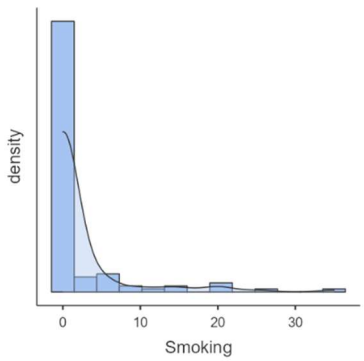
Thank you once again for your help with this research, your support is greatly appreciated.

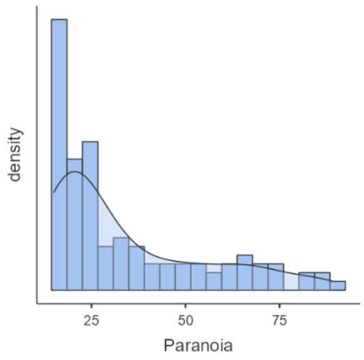
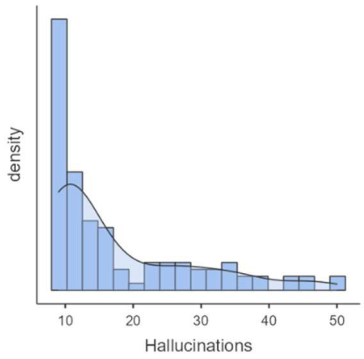
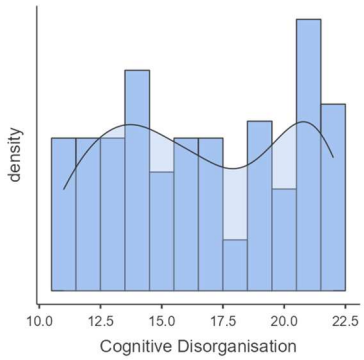
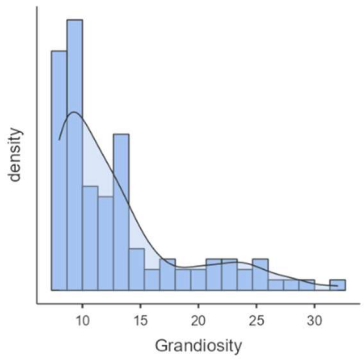
Primary Researcher: Liam Myles (liam.myles@psy.ox.ac.uk)

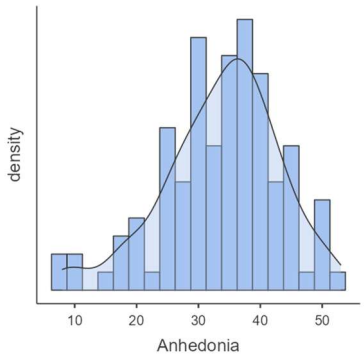
Supervisors: Dr Louise Johns (louise.johns@psych.ox.ac.uk) and Dr Emmeline Goodby (emmeline.goodby@oxfordhealth.nhs.uk)

Appendix 33 – Theory Driven Research Project Supplementary Analyses

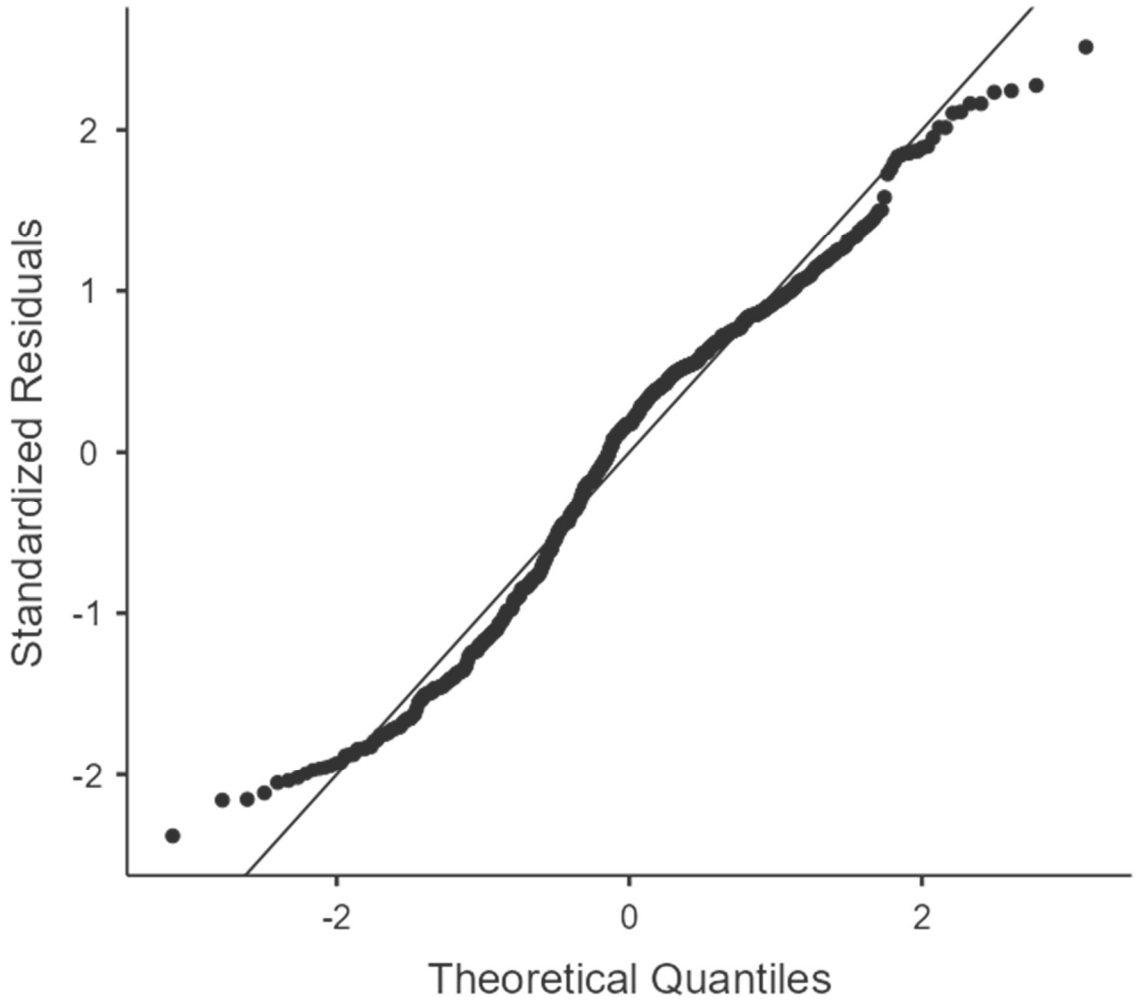
Supplementary Analysis 1 – Tests of Assumptions of Statistical Tests Examining Group Differences in Demographic and Clinical Information

Demographic/ Symptom	Levene's Test	Shapiro-Wilk Test	Histogram
Age	F(2, 108) = 4.33, p = .015	W = .90, p < .001	
Alcohol	F(2, 107) = .135, p = .87	W = .69, p < .001	
Smoking	F(2, 108) = 12.2, p < .001	W = .57, p < .001	

Demographic/ Symptom	Levene's Test	Shapiro-Wilk Test	Histogram
Paranoia	F(2, 108) = 22.82, p < .001	W = .95, p < .001	
Hallucinations	F(2, 108) = 17.41, p < .001	W = .90, p < .001	
Cognitive Disorganisation	F(2, 108) = 4.54, p = .013	W = .96, p = .002	
Grandiosity	F(2, 108) = 8.1, p < .001	W = .88, p < .001	

Demographic/ Symptom	Levene's Test	Shapiro-Wilk Test	Histogram
Introvertive Anhedonia	F(2, 108) = 3.93, p = .022	W = .99, p = .47	

Supplementary Analysis 2 – Quantile-Quantile Plot for The Effect of Group and Stimuli on Reaction Times

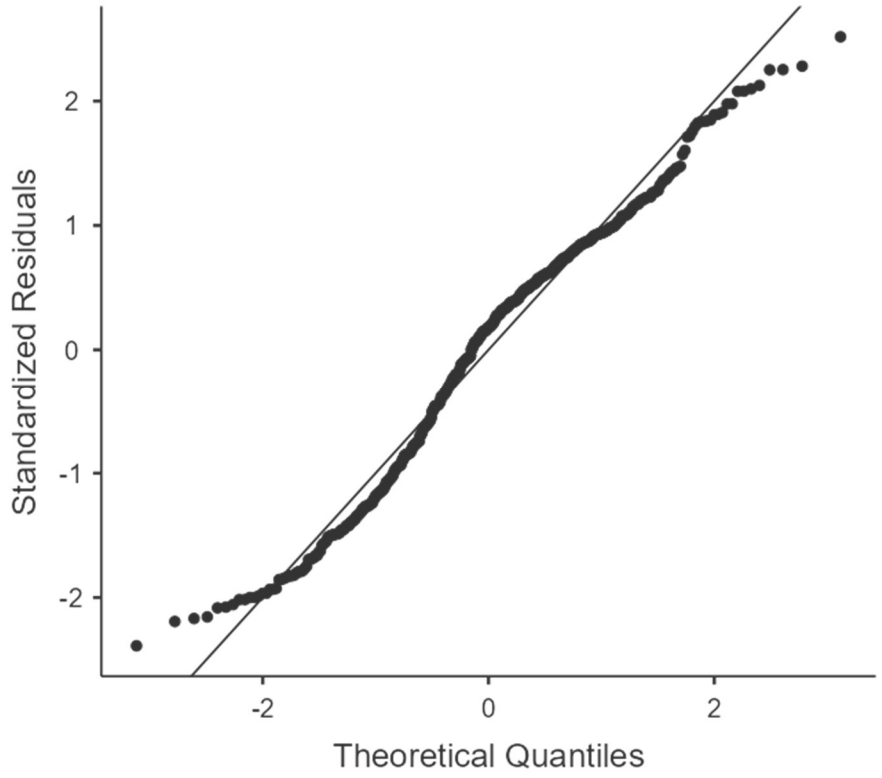


Supplementary Analysis 3 – The Effect of Group and Stimuli on Reaction Times When Controlling for Smoking and Alcohol Consumption

A mixed ANCOVA examined the effect of group (controls, hallucinators and non-hallucinators) and stimuli (A, B, X, Y and Z) on RTs whilst controlling for smoking and alcohol consumption, as these variables varied between groups. As Mauchly's test indicated the assumption of sphericity was violated, $W = .795$, $p = .005$, the Greenhouse-Geisser correction was applied, $\varepsilon = .914$. Inspection of the quantile-quantile plot (see **Figure 5**) suggested residuals approximated a normal distribution. The stimulus had a small effect on RTs, $F(3.66, 383.78) = 2.744$, $p = .033$, $\eta^2_p = .025$. However, RTs were not significantly affected by the group, $F(2, 105) = 2.383$, $p = .097$, $\eta^2_p = .043$, alcohol use, $F(1, 105) = .027$, $p = .869$, $\eta^2_p < .001$, smoking, $F(1, 105) = .224$, $p = .637$, $\eta^2_p = .002$, the interaction between the stimulus and group, $F(7.31, 383.78) = 1.338$, $p = .229$, $\eta^2_p = .025$, the interaction between the stimulus and alcohol consumption, $F(3.66, 383.78) = .628$, $p = .628$, $\eta^2_p = .006$, or the interaction between the stimulus and smoking, $F(3.66, 383.78) = .927$, $p = .442$, $\eta^2_p = .009$.

Figure 5

Quantile-Quantile Plot for The Effect of Group and Stimuli on Reaction Times When Controlling for Smoking and Alcohol Consumption



Pairwise comparisons indicated RTs to A were higher than B, p = .009, Y, p = .008, and Z, p < .001, but not X, p = .377. Also, RTs to X were marginally greater than B, p = .07, and Y, p = .083, and significantly higher than Z, p < .001. Furthermore, RTs to B were higher than Z, p = .027, but no different to Y, p = .827. Finally, RTs for Y were greater than Z, p = .044.

Supplementary Analysis 4 - Post-Hoc Tests Examining the Effect of Stimuli on Reaction Times

Post Hoc Comparisons - Stimulus

Comparison							
Stimulus		**Stimulus**	**Mean Difference**	**SE**	**df**	**t**	**p**
A	-	B	.05308	.0199	108	2.671	.009
	-	X	.02059	.0223	108	.923	.358
	-	Y	.05776	.0209	108	2.762	.007
	-	Z	.10240	.0225	108	4.558	< .001
B	-	X	-.03248	.0182	108	-1.781	.078
	-	Y	.00469	.0159	108	.295	.769
	-	Z	.04933	.0220	108	2.244	.027
X	-	Y	.03717	.0209	108	1.781	.078
	-	Z	.08181	.0236	108	3.467	< .001
Y	-	Z	.04464	.0225	108	1.983	.050

Supplementary Analysis 5 – Corrected Pairwise Comparisons Between Reaction Times to Stimuli

Table 3 details the results of pairwise comparisons between RTs to stimuli applying the Tukey, Scheffe, Bonferroni and Holm corrections.

Table 3

Tukey, Scheffe, Bonferroni and Holm Corrected Pairwise Comparisons Between Reaction Times to Stimuli

Comparison											
Stimulus		**Stimulus**	**Mean Difference**	**SE**	**df**	**t**	**p**	**p_{tukey}**	**$p_{scheffe}$**	**$p_{bonferroni}$**	**p_{holm}**
A	-	B	.05308	.0199	108	2.671	.009	.065	.137	.087	.061
	-	X	.02059	.0223	108	.923	.358	.888	.931	1.000	.717
	-	Y	.05776	.0209	108	2.762	.007	.052	.114	.067	.054

Comparison

Stimulus		Stimulus	Mean Difference	SE	df	t	p	p_{tukey}	$p_{scheffe}$	$p_{bonferroni}$	p_{holm}
	-	Z	.10240	.0225	108	4.558	< .001	< .001	< .001	< .001	< .001
B	-	X	-.03248	.0182	108	-1.781	.078	.390	.532	.778	.311
	-	Y	.00469	.0159	108	.295	.769	.998	.999	1.000	.769
	-	Z	.04933	.0220	108	2.244	.027	.172	.291	.269	.161
X	-	Y	.03717	.0209	108	1.781	.078	.390	.532	.777	.311
	-	Z	.08181	.0236	108	3.467	< .001	.007	.021	.008	.007
Y	-	Z	.04464	.0225	108	1.983	.050	.281	.420	.499	.250

Supplementary Analysis 6 - Post-Hoc Tests Examining the Effect of Group on Reaction Times for Each Stimulus

One-way ANOVAs examined the effect of the group (controls, hallucinators and non-hallucinators) on RTs to each stimulus (A, B, X, Y and Z). Reaction times were normally distributed for B, W = .978, p = .059, and Y, W = .979, p = .071, but not for A, W = .972, p = .02, X, W = .959, p = .002, or Z, W = .973, p = .025. Therefore, parametric ANOVAs examined the effect of the group on RTs to B and Y and non-parametric ANOVAs evaluated the effect of the group on RTs to A, X and Z. Levene's test was not significant for both B, $F(2, 108) = .464$, p = .63, and Y, $F(2, 108) = 2.357$, p = .1, indicating the assumption of homogeneity of variance was met. The group did not significantly affect RTs to B, $F(2, 108) = 1.52$, p = .223, or Y, $F(2, 108) = 1.09$, p = .339. The group significantly affected RTs to Z, $\chi^2(2) = 7.42$, p = .025, but not A, $\chi^2(2) = 2.9$, p = .235, or X, $\chi^2(2) = 4.55$, p = .103. Post-hoc non-parametric Dwass-Steel-Critchlow-Fligner pairwise comparisons indicated non-hallucinators responded significantly slower than controls, W = -3.81, p = .019, but that RTs did not differ between hallucinators and both non-hallucinators, W = 1.98, p = .341, and controls, W = -1.93, p = .358.

Supplementary Analysis 7 – Additional Power Analyses

A total of 111 participants were recruited, divided into three groups of 37 each. This sample size provided 90% power to detect small sized interaction effects between stimuli and groups ($f = .13$), 80% power to detect medium-large sized main effects of stimuli ($f = .34$) and 80% power to detect medium sized main effects of the group ($f = .30$). Additionally, post-hoc tests had 80% power to detect medium sized effects for differences between groups ($d = .54$) and small sized effects for differences between stimuli ($d = .27$).

Supplementary Analysis 8 – Cronbach's (1951) Alpha Coefficients for Specific Psychotic Experiences Questionnaire Dimensions

Specific Psychotic Experiences Questionnaire Dimension	Cronbach's (1951) Alpha Coefficient
Paranoia	.966
Hallucinations	.919
Cognitive Disorganisation	.874
Grandiosity	.906
Introvertive Anhedonia	.799

Appendix 34 – Schizophrenia Bulletin Author Guidelines

Information for Authors

Schizophrenia Bulletin is an international peer-reviewed journal that publishes unsolicited and invited reports and reviews of clinical and experimental research relating to all aspects of schizophrenia. First Person Accounts, Historical perspectives from patients and their families, are also welcome.

Editorial Policies

Manuscripts must be written in English and are accepted for consideration with an explicit understanding that the material has not been previously published in whole or substantial part and is not currently under consideration for publication by any other journal. All matters relating to the editorial policies of Schizophrenia Bulletin should be addressed to Prof. James Gold, Ph.D., Editor-in Chief, at schizophreniabulletin@som.umaryland.edu. Manuscripts should be submitted through the journal's web-based manuscript submission system as instructed below.

Copyright

Schizophrenia Bulletin does not require authors to transfer copyright of their submitted material. Rather, it is a condition of publication in the journal that authors grant an exclusive license to the Maryland Psychiatric Research Center and Oxford University Press. This ensures that requests from third parties to reproduce articles are handled efficiently and consistently and will also allow the article to be as widely disseminated as possible. In assigning the license, authors may use their own material in other publications provided that the Journal is acknowledged as the original place of publication, and that the Maryland

Psychiatric Research Center and Oxford University Press are notified in writing and in advance.

Informed Consent and Ethics Committee Approval

Manuscripts reporting experiments on patients or healthy volunteers must record the fact that the subjects' consent was obtained and include a statement that the research was approved by the responsible ethical committee of the institution (e.g., an institutional review board) and was consistent with the principles outlined in an internationally recognized standard for the ethical conduct of human research. Consent must be also recorded when photographs of patients are shown or other details given that could lead to the identification of the individuals. Authors may be required to provide tangible proof that the necessary permissions and consents have been obtained from study participants.

Authorship

The proper assignment of credit and accountability to the intellectual property of a scientific manuscript necessitates a considered approach to the designation of authorship. In general, authors are expected to have been substantially involved in the planning and execution of the study and to have actively participated in the writing or editing of the manuscript. It is essential that all authors acknowledge their approval of the final document prior to submission. In addition to being directly accountable for their own work, authors share in the credit attributed to the published paper and thus implicitly and explicitly indorse the contributions made by their co-authors.

Individuals who have contributed to the manuscript in a meaningful way but do not meet the criteria for authorship, should be identified in the Acknowledgement section of the manuscript.

Team Science and Consortia Authorship

Manuscripts including a consortium of authors will be considered for publication in Schizophrenia Bulletin provided the following criteria are met. First, all members of the consortium that meet the journal's criteria for authorship must be listed by name in the author byline. Individuals who contributed substantially to the manuscript but do not meet the criteria for authorship must be listed in the Acknowledgements section under the heading "Collaborators" together with their affiliations. Second, it is the obligate responsibility of the corresponding author (CA) to obtain and record assurances from each author that the journal's conflict of interest policies have been fully satisfied. During submission, the CA will be asked to certify on behalf of all authors that this information has been obtained and properly disclosed. In addition, it is the responsibility of the CA to obtain permission from nonauthor collaborators to be identified as such in the Acknowledgements section.

Laboratory Animals

Manuscripts reporting the results of experiments involving laboratory animals must be contain a statement indicating that the procedures used were in accordance with the guidelines published in the Institute of Laboratory Animals Resources Commission on Life Sciences' 1996 Guide for the Care and Use of Laboratory Animals (Washington, DC: National Academic Press;) or a similar internationally recognized standard. The species, sex, source, and genetic background of the animals as well as a detailed description of the experimental procedures, including any anesthetics and/or analgesics, must be provided in the Methods section of the manuscript.

Manuscripts containing data from human or animal experimentation may be rejected if the ethical aspects are open to question. The corresponding author will be held responsible for false statements or for failure to meet the aforementioned requirements.

Originality

Schizophrenia Bulletin does not publish articles that overlap substantially with articles already published or accepted for publication, whether in print or in the electronic media, even if the new submission contains data not included in the published or accepted work. Schizophrenia Bulletin 's policy is governed by international copyright laws, ethical conduct, and the cost-effective use of resources. Readers of primary-source periodicals trust that the material they are reading is original unless there is a statement that the article is being republished with the knowledge of the author and Editor and the permission of the original copyright holder. This policy does not preclude consideration of a report that follows a presentation at a meeting or expands preliminary findings published or presented as an abstract. A published article that the author thinks may overlap substantially with the manuscript submitted for review should be included with the submission.

By submitting your manuscript to the journal, it is understood that this is an original manuscript and is unpublished work not under consideration elsewhere. Plagiarism, including duplicate publication of the author’s own work, in whole or in part without proper citation is not tolerated by the journal. Manuscripts submitted to the journal may be checked for originality using anti-plagiarism software. If an attempt at undisclosed duplicate publication is identified, the article will be rejected, the owners of the copyright will be notified, and the violation may be reported to the

Conflict of Interest

At the point of submission, Schizophrenia Bulletin's policy requires that each author reveal any financial interests or connections, direct or indirect, or other situations that might raise the question of bias in the work reported or the conclusions, implications, or opinions stated - including pertinent commercial or other sources of funding for the individual author(s) or for

the associated department(s) or organization(s), personal relationships, or direct academic competition. When considering whether you should declare a conflicting interest or connection please consider the conflict of interest test: Is there any arrangement that would embarrass you or any of your co-authors if it was to emerge after publication and you had not declared it?

Examples of potential conflicts include a proprietary interest in a drug or product mentioned in the study, equity interest in the sponsor of the study or any other commercial entity with a potential financial interest in its outcome, or payments with a cumulative monetary value exceeding $2,000 made by the sponsor to the investigators or their family members during or within two years of the completion of the study. Institutional support for the study should be included in the Acknowledgments section of the manuscript.

Funding

All manuscripts submitted for publication will contain a Conflict of Interest statement. The corresponding author will describe each circumstance in sufficient detail to enable the editors and reviewers to assess its scope and to identify the author(s) with whom the conflict(s) exist. If the corresponding author has indicated that no conflict exists, the following statement will be inserted by the publisher and will appear at the end of the published manuscript:

The sentence should begin: ‘This work was supported by …’

The full official funding agency name should be given, i.e. ‘the National Cancer Institute at the National Institutes of Health’ or simply 'National Institutes of Health', not 'NCI' (one of the 27 subinstitutions) or ‘NCI at NIH’.

Grant numbers should be complete and accurate and provided in parentheses as follows: ‘(grant number xxxx)’

Multiple grant numbers should be separated by a comma as follows: ‘(grant numbers xxxx, yyyy)’

Agencies should be separated by a semi-colon (plus ‘and’ before the last funding agency)

Where individuals need to be specified for certain sources of funding the following text should be added after the relevant agency or grant number 'to [author initials]'.

“The Authors have declared that there are no conflicts of interest in relation to the subject of this study.”

Details of all funding sources for the work in question should be given in a separate section entitled 'Funding'. This should appear before the 'Acknowledgments' section.

The following rules should be followed:

An example is given here: ‘This work was supported by the National Institutes of Health (P50 CA098252 and CA118790 to R.B.S.R.) and the Alcohol & Education Research Council (HFY GR667789).'

Crossref Funding Data Registry

In order to meet your funding requirements authors are required to name their funding sources, or state if there are none, during the submission process. For further information on this process or to find out more about CHORUS, visit the CHORUS initiative.

Manuscript Preparation

All manuscripts are submitted and reviewed via the journal's web-based manuscript submission system accessible at the submission webpage. New authors should create an account prior to submitting a manuscript for consideration.

Manuscripts submitted to Schizophrenia Bulletin should be prepared following the American Medical Association Manual of Style, 10th edition. The manuscript text (including tables) should be prepared using a word processing program and saved as an .rtf or .doc file. Other file formats will not be accepted. Figures must be saved as individual .tif files and should be numbered consecutively (i.e., Figure 1.tif, Figure 2.tif, etc.). The text must be double-spaced throughout and should consist of the sections described below.

Title Page

This page should consist of (i) the complete title of the manuscript, (ii) a running title not to exceed 50 characters including spaces, (iii) the full name of each author and the authors' institutional affiliations, (iv) name, complete address, telephone, fax, and e-mail address of the corresponding author, and (v) separate word counts of the abstract and text body. Please note that there can only be one corresponding author, per journal style

Manuscript Length

Manuscripts should be concisely worded and must not exceed 6,000 words for regular articles and major reviews, 2,500 words for invited special features, or 1,500 words for editorials and first-person accounts. The word count is inclusive of the text body (excluding abstract, figure legends, acknowledgements, references) and must appear together with the abstract word count on the title page of the manuscript. Word counts are checked upon submission and at revision and manuscripts exceeding the prescribed limits will be returned.

Abstract

For both major reviews and regular articles, provide a structured abstract of no more than 250 words comprised of the following sections with a blank line between each section: Background and Hypothesis, Study Design, Study Results, Conclusions. Unstructured abstracts are acceptable for invited special features. Abstracts should not

contain unexplained abbreviations. Up to six key words that do not appear as part of the title should be provided at the end of the abstract.

Video Abstract

Authors of Regular Articles and Major Reviews are allowed to submit a video abstract as part of the article, in addition to the text abstract. The video abstract should be a maximum of 5 minutes long and should clearly summarize the focus and findings of the article and will be published as part of the article online and in PDF. The video abstract should be submitted for peer review as a separate file, selecting the appropriate file-type designation in the journal's online submission system. The file should be clearly named, e.g. video_abstract.mp4. See this page for guidance on appropriate file format and resolution for video.

Main Text

Unsolicited original manuscripts reporting novel experimental findings should be comprised of these sections, in this order: Abstract, Introduction (maximum of 650 words for Introduction), Methods, Results, Discussion (maximum of 1500 words for Discussion section), Acknowledgments, References, and Figure Legends.

The Introduction (maximum of 650 words for Introduction) should situate the study in the context of the literature and explain the goals of the study and the hypotheses tested.

The Methods section should provide sufficient detail to enable replication of the study. Citing earlier work is appropriate (even necessary) but using the citation in lieu of a full and clear description of methodology is not. Supplementary materials can be used for detailed presentation of unusually complicated study protocols and methods.

The Results section should present the results of the statistical analyses of all major study hypotheses clearly and succinctly. Each statistical test should be presented in detail with

precise reporting of p-values to the appropriate number of decimal places considering the measures involved. Reporting of confidence intervals should accompany the primary results. Statistical tests should be accompanied by an estimate of effect size.

The validity of statistical testing methods and model assumptions should be carefully examined. All missing data should be reported. Statistical strategies for handling incomplete data including mixed models and multiple imputation methods should be described by clearly defined model specification and assumptions. Sensitivity analysis are strongly recommended. Multiple testing correction is required for simultaneous multiple comparisons. When publicly available data is used (e.g., in meta-analysis), reproducible statistical analysis reports should be included to ensure high reproducibility.

Supplementary materials can be used for more detailed presentation of descriptive data, individual subject data where appropriate, and additional statistical analyses that are not critical for understanding the main findings of the study.

The Discussion section (maximum of 1500 words for Discussion section) should highlight the main findings of the study and concisely relate the findings to the published literature in the area. Both the significance and limitations of the work should be addressed. Extensive speculation is discouraged.

Review articles must contain an abstract; however, the body of the text can be organized in a less structured format. Meta-analysis, scoping, and umbrella reviews should provide explicit information on how articles were searched and criteria for inclusion. The review should serve to also guide future research, not simply summarize evidence. Authors of review articles are encouraged to use section headers to improve the readability of their manuscript.

Number pages consecutively beginning with the title page. Spelling should conform to that used in Merriam-Webster's Collegiate Dictionary, eleventh edition. Clinical laboratory data may be expressed in conventional rather than Système International (SI) units.

Acknowledgments

These should be as brief as possible but include the names of sources of logistical support.

References

Authors are encouraged to be circumspect in compiling the reference section of their manuscripts.

Please note: references to other articles appearing in the same issue of the journal must be cited fully in the reference list.

Each reference should be cited in consecutive numerical order using superscript arabic numerals, and reference style should follow the recommendations in the American Medical Association Manual of Style, 11th edition.

Book: Talairach J, Tournoux P. Co-planar stereotaxic atlas of the human brain. Thieme Medical Publishers; 1998.

Book chapter: Goldberg TE, David A, Gold JM. Neurocognitive deficits in schizophrenia. In: Hirsch SR, Weinberger DR, eds. Schizophrenia. Blackwell Science; 2003:168-184.

Journal article: Thaker GK, Carpenter WT. Advances in schizophrenia. Nat Med 2001;7:667-671.

Journal article with more than 6 authors: Egan MF, Straub RE, Goldberg TE, et al. Variation in GRM3 affects cognition, prefrontal gluatamate, and risk for schizophrenia. Proc Natl Acad Sci USA. 2004;101:12604-12609.

Article published on Advance Access only: Gilad, Y. and Lancet, D. March 5, 2003. Population Differences in the Human Functional Olfactory Repertoire. Mol Biol Evol. doi:10.1093/molbev/msg013.

Article first published on Advance Access: Gilad, Y. and Lancet, D. 2003. Population Differences in the Human Functional Olfactory Repertoire. Mol Biol Evol. 2003;20:307-314. First published on March 5, 2003, doi:10.1093/molbev/msg013.

Journal names should be abbreviated in accordance with Index Medicus.

Manuscripts in which the references do not follow this format will be returned for retyping. References to meeting abstracts, material not yet accepted for publication, or personal communications are not acceptable as listed references and instead should be listed parenthetically in the text. It is the authors' responsibility for obtaining the necessary permissions from colleagues to include their work as a personal communication.

Note : In the online version of Schizophrenia Bulletin there are automatic links from the reference section of each article to cited articles in Medline. This is a useful feature for readers, but is only possible if the references are accurate. It is the responsibility of the author to ensure the accuracy of the references in the submitted article. Downloading references directly from Medline is highly recommended.

Figures and Tables

Full length manuscripts including regular and invited theme articles should contain no more than a combined total of 5 tables and figures. Theme introductions and special features are limited to 2 tables or figures (total). Figures and tables must be referred to using arabic numbers in order of their appearance in the text (e.g., Figure 1, Figure 2, Table 1, Table 2, etc.).

Tables should be created with the table function of a word processing program; spreadsheets are not acceptable. Include only essential data, and format the table in a manner in which it should appear in the text. Each table must fit on a single manuscript page and have a short title that is self-explanatory without reference to the text. Footnotes can be used to explain any symbols or abbreviations appearing in the table. Do not duplicate data in tables and figures.

Please be aware that the figure requirements for initial online submission (peer review) and for reproduction in the journal are different. Initially, it is preferred to embed your figures within the word processing file or upload them separately as low-resolution images (.jpg, .tif, or .gif files). However, upon submission of a revised manuscript, you will be required to supply high-resolution .tif files for reproduction in the journal (1200 d.p.i. for line drawings and 300 d.p.i. for color and half-tone artwork). It is advisable to create high-resolution images first as these can be easily converted into low-resolution images for online submission. Figure legends should be typed separately from the figures in the main text document. Additional information on preparing your figures for publication can be found at OUP's Preparing and submitting your manuscript page.

Wherever possible figures should be submitted in their desired final size, to fit the width of a single (88 mm) or at most a double (180 mm) column width. All letters and numerals appearing in a particular figure should be of the same size and in proportion to the overall dimensions of the drawing. Letter labels used in figures should be in upper case in both the figure and the legend. The journal reserves the right to reduce the size of illustrative material.

Each figure should have a separate legend that clearly identifies all symbols and abbreviations used. The legend should be concise and self-explanatory and should contain enough information to be understood without reference to the text.

Note: All tables and figures reproduced from a previously published manuscript must cite the original source (in the figure legend or table footnote) and be accompanied by a letter of permission from the publisher of record or the copyright owner.

Figure accessibility and alt text

Incorporating alt text (alternative text) when submitting your paper helps to foster inclusivity and accessibility. Good alt text ensures that individuals with visual impairments or those using screen readers can comprehend the content and context of your figures. The aim of alt text is to provide concise and informative descriptions of your figure so that all readers have access to the same level of information and understanding, and that all can engage with and benefit from the visual elements integral to scholarly content. Including alt text demonstrates a commitment to accessibility and enhances the overall impact and reach of your work.

Alt text is applicable to all images, figures, illustrations, and photographs.

Alt text is only accessible via e-reader and so it won't appear as part of the typeset article.

Detailed guidance on how to draft and submit alt text.

Supplementary Material

Supporting material that is not essential for inclusion in the full text of the manuscript, but would nevertheless benefit the reader, can be made available by the publisher as supplementary material, linked to the online manuscript. The material should not be essential to understanding the conclusions of the paper, but should contain data that is additional or complementary and directly relevant to the article content. Such information might include more detailed methods, extended data sets/data analysis, or additional figures (including color). All text and figures must be provided in separate files from the manuscript files

labeled as supplementary material in suitable electronic formats. Instructions for the preparation of supplementary material can be found on the supplementary material webpage.

All material to be considered as supplementary material must be submitted at the same time as the main manuscript for peer review. It cannot be altered or replaced after the paper has been accepted for publication. Please indicate clearly the material intended as supplementary material upon submission. Also ensure that the supplementary material is referred to in the main manuscript where necessary.

Proofs

Page proofs will be sent to the corresponding author through an online proofing tool. Please check text, tables, legends, and references carefully. Proofs must be returned within three days of receipt. The editors and publisher reserve the right to proceed with publication if this period is exceeded. Only typographical errors can be corrected at this stage; substantial changes to the text will not be accepted.

Announcements

Announcements of future meetings, congresses, courses, awards, or other events that are likely to be of interest to the readers of Schizophrenia Bulletin may be submitted to the editorial office for consideration for publication in a future issue. Please provide a brief summary of the nature of the event and the name and e-mail address of a contact person.

Language Editing

Language editing, if your first language is not English, to ensure that the academic content of your paper is fully understood by journal editors and reviewers is optional. Language editing does not guarantee that your manuscript will be accepted for publication. For further information on this service, please visit the Language Services webpage. Several specialist

language editing companies offer similar services and you can also use any of these. Authors are liable for all costs associated with such services.

License To Publish Form

Upon receipt of accepted manuscripts at Oxford Journals authors will be invited to complete an online license to publish form.

Please note that by submitting an article for publication you confirm that you are the corresponding/submitting author and that Oxford University Press ("OUP") may retain your email address for the purpose of communicating with you about the article. You agree to notify OUP immediately if your details change. If your article is accepted for publication OUP will contact you using the email address you have used in the registration process. Please note that OUP does not retain copies of rejected articles.

Open Access Option For Authors

Schizophrenia Bulletin authors have the option to publish their paper under the open access initiative; whereby, for a charge, their paper will be made freely available online immediately upon publication. After your manuscript is accepted the corresponding author will be required to accept a mandatory license to publish agreement. As part of the licensing process you will be asked to indicate whether or not you wish to pay for open access. If you do not select the open access option, your paper will be published with standard subscription-based access and you will not be charged.

Open access articles are published under Creative Commons licenses.

RCUK/Wellcome Trust funded authors publishing in Schizophrenia Bulletin can use the Creative Commons Attribution license (CC BY) for their articles.

All other authors may use the following Creative Commons licenses:

Creative Commons Attribution Non-Commercial license (CC BY-NC)

Creative Commons Attribution Non-Commercial No Derivatives license (CC BY-NC-ND)

Visit the OUP licensing website to find out more about Creative Commons licences.

You can pay Open Access charges using our Author Portal. The applicable open access charges vary according to which Creative Commons license you select.

Schizophrenia Bulletin offers the option of publishing under either a standard license or an open access license. Please note that some funders require open access publication as a condition of funding. If you are unsure whether you are required to publish open access, please do clarify any such requirements with your funder or institution.

Should you wish to publish your article open access, you should select your choice of open access license in our online system after your article has been accepted for publication. You will need to pay an open access charge to publish under an open access license.

Details of the open access licenses and open access charges.

OUP has a growing number of Read and Publish agreements with institutions and consortia which provide funding for open access publishing. This means authors from participating institutions can publish open access, and the institution may pay the charge. Find out if your institution is participating.

Third-Party Content in Open Access Papers

If you will be publishing your paper under an Open Access license but it contains material for which you do not have Open Access re-use permissions, please state this clearly by supplying the following credit line alongside the material:

Title of content, author, original publication, year of original publication, by permission of [rights holder]. This image/content is not covered by the terms of the Creative Commons license of this publication. For permission to reuse, please contact the rights holder.

Permissions For Illustrations And Figures

In order to reproduce any third party material, including figures or tables, in an article authors must obtain permission from the copyright holder and be compliant with any requirements the copyright holder may have pertaining to this reuse.
When seeking to reproduce any kind of third party material authors should request the following:

non-exclusive rights to reproduce the material in the specified article and journal;

electronic rights, preferably for use in any form or medium;

the right to use the material for the life of the work; and

world-wide English-language rights.

Further guidelines on clearing permissions can be found at the Access and Purchase Resource Centre.

Authors should also include a statement indicating that permission has been obtained in the relevant legend/footnote and provide the Editorial Office with copies of any relevant paperwork.

A template permissions request letter can be found at the end of the above document.