The University Of Sheffield.

Exploring Obsessive Thinking and Compulsive Behaviour in the Context of Real and Imagined Relationships

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A thesis submitted in partial fulfilment of the requirements for the award of Doctor of Clinical Psychology.

The University of Sheffield

Faculty of Science

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Submission Date: 27 September 2023

Declaration

I, the author, declare that this thesis has been submitted for the award of Doctorate in Clinical Psychology at the University of Sheffield. It has not been submitted for any other qualification or to any other academic institution.

Structure and Word Count

Section One: Literature Review

Excluding tables, references and appendices: 7,999

Including tables and references, excluding appendices: 14,615

Section Two: Empirical Research Report

Excluding tables, references and appendices: 8,000

Including tables and references, excluding appendices: 10,866

Total Word Count

Excluding tables, references and appendices: 15,999

Including tables and references, excluding appendices: 25,481

Lay Summary

The thesis consists of two papers. Paper one describes the results of a scoping review systematically examining and summarising the evidence base on relationship obsessive-compulsive disorder (ROCD) whilst also identifying current gaps in knowledge and making recommendations for future research. Relationship obsessive-compulsive disorder is a condition where sufferers experience obsessions and compulsions in the context of close personal relationships. This review focused on exploring the evidence base of ROCD symptoms within the context of intimate relationships. Twenty-eight studies were reviewed. There was evidence to suggest ROCD is associated with an anxious attachment style, poor general mental health, perfectionism, and the tendency to catastrophise in relationships. There was also evidence to suggest that an app-based cognitive intervention was effective in reducing ROCD symptoms in non-clinical samples. It is recommended that researchers recruit clinical populations and use more robust research methods when investigating ROCD.

Section two describes a study on a condition named limerence. Limerence refers to an obsessional state concerning another person (termed a limerent object; LO). This was a combined study using questionnaires and experience sampling (where participants were signalled eight times a day for 7-days) to explore the association between limerence severity, attachment styles, limerence-specific obsessive-compulsive symptoms, and explore the frequency and characteristics of mind-wandering and how it relates to mood over time. The findings suggest that although limerent individuals appear to have anxious attachment styles towards their LOs, they can form secure attachments in romantic relationships. Furthermore, it is proposed that limerence could potentially be treated through an OCD framework. Finally, limerent individuals appear to spend a large proportion of time mind-wandering about their LO, which appears to have a negative impact on mood, suggesting that frequency of mind-wandering about an LO may be a beneficial target for intervention.

Acknowledgements

Firstly, I would like to thank the online limerence support groups who welcomed me into their communities and allowed me to learn about limerence from the people living with it. Thank you to everybody who dedicated their time sharing their personal experiences, especially the two women who helped co-design this research, and everybody who participated in the study and shared it with others. Without you, this research would not have been possible.

Thank you the wonderful women who have supported me over the last three years whilst completing the doctorate. Becky, Chelsea, Evi, Kerry, and Laura, thank you for supporting me throughout the tough times, celebrating every achievement, and being truly wonderful friends. A special thanks to Roxanne for herpatience, love, and encouragement. I am so grateful to have had you by my side.

Finally, I would like to thank my research supervisor, Dr Stephen Kellett and Dr Giulia Poerio. Thank you to Steve for introducing me to the concept of limerence, and for your flexibility, timely feedback, and knowledge. Thank you to Giulia for being so generous with your time, encouragement, and kindness. You are the mentor I aspire to be.

Contents

Section One: Literature Review

Relationship Obsessive-Compulsive Disorder (ROCD): A Scoping Review

Abstract

Objectives: Relationship obsessive-compulsive disorder is a condition where sufferers experience obsessive-compulsive symptoms, specifically in the context of close interpersonal relationships. This scoping review sought to systematically examine and synthesise the published and peer-reviewed ROCD evidence base in the context of intimate relationships, identify current knowledge gaps, and make recommendations for future research.

Methods: Database searches (SCOPUS, PsycINFO, Medline, CINAHL, and Google Scholar) and forward and backward citation searches of included papers were conducted, and authors of relevant literature were contacted to identify further appropriate literature. Data were extracted and presented in a data charting table, and a descriptive summary and narrative overview were provided.

Results: Twenty-eight studies were identified, and the literature is composed of cross-sectional, longitudinal, experimental, qualitative, and intervention studies. Consistent associations between ROCD and an anxious attachment style, affective dysfunction, perfectionism, and relationship catastrophisation were found. There was evidence to suggest that an app-based cognitive intervention was effective in reducing ROCD symptoms in non-clinical samples. The small number of experimental and qualitative studies made conclusions difficult to draw.

Conclusions: The main criticisms of the evidence base are the over-reliance on cross-sectional methods, the lack of qualitative studies, the lack of clinical samples, poor diagnostic processes, and the small number of intervention studies. It is recommended that research recruits clinical samples and uses more robust research methods such as longitudinal designs, experience-sampling methods, and experimental work when investigating ROCD.

Relationship Obsessive-Compulsive Disorder (ROCD): A Scoping Review

Obsessive-compulsive disorder (OCD) is among the most prevalent and disabling mental health conditions worldwide, affecting 1-3% at any one time (National Institute for Health and Care Excellence (NICE), 2005). OCD is characterised by both obsessions (i.e., persistent, repetitive, intrusive, unwanted and distressing thoughts, images, or urges) and overt and covert compulsions (i.e., repetitive behaviours, including mental acts, that the sufferer feels compelled to complete in response to an obsession), with sufferers commonly experiencing both aspects (World Health Organisation (WHO), 2019). Another key feature identified is avoidance, with individuals avoiding various activities to prevent triggering the obsession (Stein et al., 2019). To be diagnosed with OCD, the International Classification of Diseases, Eleventh Edition (ICD-11; WHO, 2019) criteria stipulates that the obsessions or compulsions must be time-consuming, a source of serious distress or significantly impair functioning. Although core symptoms of obsession and compulsion are central to all obsessive-compulsive disorders, OCD is a highly heterogeneous condition: the manifestation of symptoms varies considerably from individual to individual, and those seeking treatment present with unique clinical presentations (Abramowitz et al., 2008; McKay et al., 2015).

A newly recognised subtype of OCD is relationship obsessive-compulsive disorder (ROCD), where sufferers experience obsessive-compulsive (OC) symptoms, specifically in the context of close interpersonal relationships (Derby et al., 2021). ROCD is characterised by obsessive doubt and preoccupation regarding the relationship (e.g., worrying about whether they are attracted to their partner), and compulsive behaviours performed to alleviate the associated distress (e.g., reassurance seeking from the partner; Doron, Derby et al., 2014). Most evidence is in the context of ROCD symptoms in intimate relationships. However, studies have found evidence of OC symptoms in other relational contexts, such as parent-child dyads (Doron et al., 2017; Levy et al., 2020) and scrupulosity (Doron, Derby et al.,

2014). Although not currently defined in the Diagnostic and Statistical Manual, fifth edition (DSM-V; American Psychiatric Association, 1994) or ICD-11 or with formal diagnostic criteria, ROCD has gained increased research attention over the past decade (Derby et al., 2021).

In the context of intimate relationships, two types of ROCD have been identified: relationship-centred (RC) (type 1) and partner-focused (PF) (type 2; Doron, Szepsenwol, et al., 2012). The two types can exist separately but often co-occur (Doron, Derby, et al., 2014). RC-OC symptoms are focused on the relationship itself. Obsessions include repetitive doubts about relational compatibility or questioning whether they love their partner and vice versa (Doron, Szepsenwol, et al., 2012). Compulsions to alleviate RC distress involve seeking reassurance (e.g., asking their partner if they love them), monitoring feelings or behaviours (e.g., asking themselves, "Do I love them?"), checking (e.g., searching the internet for information about relationships), or avoiding stimuli that may trigger repetitive thoughts (e.g., being in the company of other couples; Doron, Szepsenwol, et al., 2012; Doron, Derby, et al., 2014).

PF-OC symptoms involve obsessions and preoccupation centred on the partner, often around their perceived flaws or deficits (Doron, Szepsenwol, et al., 2012). Obsessional content includes flaws in physical appearance, morality, sociability, emotional stability, or competence (Doron, Szepsenwol et al., 2012), which are thought to be triggered by exposure to others with desirable attributes, eliciting downward comparisons (e.g., "my partner is not intelligent"). PF compulsions may involve constantly comparing one's partner to others, monitoring and checking partner behaviour (e.g., "Are they responding intelligently?"), and avoidance of stimuli that trigger the obsession (e.g., individuals who possess the desired qualities or attributes that their partner is thought to lack) (Doron, Szepsenwol, et al., 2012).While some OCD subtypes have been subject to more recent investigations, leading to

significant theoretical and clinical advancements (Stein et al., 2019), research on relationship-related OCD is still in its infancy (Doron, Derby et al., 2014), and the literature has yet to have been comprehensively reviewed. Completing a review would help summarise the ROCD evidence base, identify what is not currently known from the existing literature, and pave the way for future research. Scoping reviews are a relatively new approach to evidence synthesis, which follow the same structured, rigorous process as systematic reviews and are completed when a systematic review cannot meet the review's objectives or requirements (Munn et al., 2018). Munn et al. (2018) provide guidance regarding when a scoping review should be conducted instead of a systematic review, and this includes (1) when the purpose is to identify gaps in knowledge, (2) to scope a body of literature, (3) to clarify concepts or investigate research conduct, and/or (4) as a pre-cursor to completing a systematic review. Furthermore, scoping reviews have been used to good effect in summarising the evidence base and identifying research gaps in other fields, such as misophonia (the hatred of sound; Potgieter et al., 2018), a condition that draws parallels with OCD. Due to the heterogeneous nature of the literature and with studies still emerging (Munn et al., 2018), a scoping review was deemed the most useful tool to meet the review objectives. This scoping review aims to summarise the ROCD research findings, identify gaps in the field, and make recommendations for future research (Arksey & O'Malley, 2005).

Method

This scoping review was guided by Arksey and O'Malley's (2005) methodological framework and Levac et al.'s (2010) recommendations to enhance the methodology. The framework used suggests a six-stage process for scoping reviews: (1) identifying the research question(s), (2) identifying relevant studies, (3) selecting the studies, (4) charting the data, (5) collating, summarising and reporting the results, and an optional sixth stage; (6) consultation with key stakeholders. Reporting of this scoping review followed Preferred Reporting Items

for Systematic Reviews and Meta-Analyses extension for Scoping Review guidelines (PRISMA-ScR; Tricco et al., 2018).

Protocol Registration

Before undertaking this review, an a priori scoping review protocol was pre-registered on the Open Science Framework (OSF) (https://doi.org/10.17605/OSF.IO/U965K).

Search Strategy

Exploratory literature searches were conducted on SCOPUS and Google Scholar throughout January 2023 to determine whether there was sufficient relevant literature on ROCD to warrant a scoping review. Initial searches, using frequently used words in ROCD paper titles and abstracts, found evidence of relevant studies to justify undertaking a scoping review. Preliminary searches involved searching the OSF and Prospero; no scoping or systematic reviews on ROCD were underway.

On 14 March 2023, a final comprehensive literature search was conducted on SCOPUS, PsycINFO, Medline, and CINAHL for all available years to the present date to identify articles using the terms ‘relationship obsessive-compulsive disorder’, ‘relationship OCD’, ‘ROCD’, ‘R-OCD, ‘relationship-centred obsessions, 'relationship-centred OC symptoms’, partner-focused obsessions’, and ‘partner-focused OC symptoms.’ Boolean operators supported the search. Forward and backward citation searches were conducted on eligible articles, and a limited search on Google Scholar (the first 10 pages) was conducted. The authors of relevant literature were contacted to identify additional references (Arksey & O’Malley, 2005).

Eligibility Criteria

Due to the iterative and reflexive nature of scoping reviews, the eligibility criteria were redefined as familiarity with the literature increased: beginning broadly and redefining to ensure a feasible and effective review (Arksey & O'Malley, 2005; Levac et al., 2010). To be eligible, studies were required to have empirical data focusing on ROCD of a romantic nature and be available in English. All study designs and sample sizes were eligible. The review was limited to published, peer-reviewed studies and studies currently submitted for publication. Studies that focused on non-romantic symptoms of ROCD (e.g., parent-child and scrupulosity) were excluded. Studies primarily focused on measurement (e.g., determining validity) were excluded.

Study Selection

All retrieved articles were exported into EndNote. After duplicates were removed, titles and abstracts were screened for relevance. Articles not meeting the eligibility criteria were excluded, and the remaining articles underwent a full-text review.

Data Charting

A data charting table was developed and used to extract the data from each study (Arksey & O'Malley, 2005; Levac et al., 2010). This was refined as familiarity with the study data increased, and a uniform approach to each study was taken (Levac et al., 2010). Data extracted included the country of origin, publication type, aim of the study, population and sample size, study design, intervention type, duration and comparator (if applicable), how ROCD and other outcomes were measured, and the key findings that relate to the review questions.

Critical Appraisal

A critical appraisal of the individual studies was not conducted in line with best practice guidance for scoping reviews (Arksey & O'Malley, 2005).

Synthesis

Following scoping review guidance (Arksey & O'Malley, 2005; Levac et al., 2010), study characteristics and key findings were tabulated, followed by a descriptive summary, and a narrative overview (where studies were clustered and summarised based on common themes).

Results

In total, 151 articles were identified through database searches, and 11 articles were identified through other sources (i.e., reference lists and contact with authors). After duplicates (N = 62) were removed, 100 articles were screened, and 32 articles met the criteria for a full-text review. In total, 25 articles met the eligibility criteria. As several articles reported multiple studies within one paper, each study is reported separately. See Figure 1 for the PRISMA-ScR (Tricco et al., 2018) flow diagram.

Figure 1

PRISMA-ScR Flow Diagram

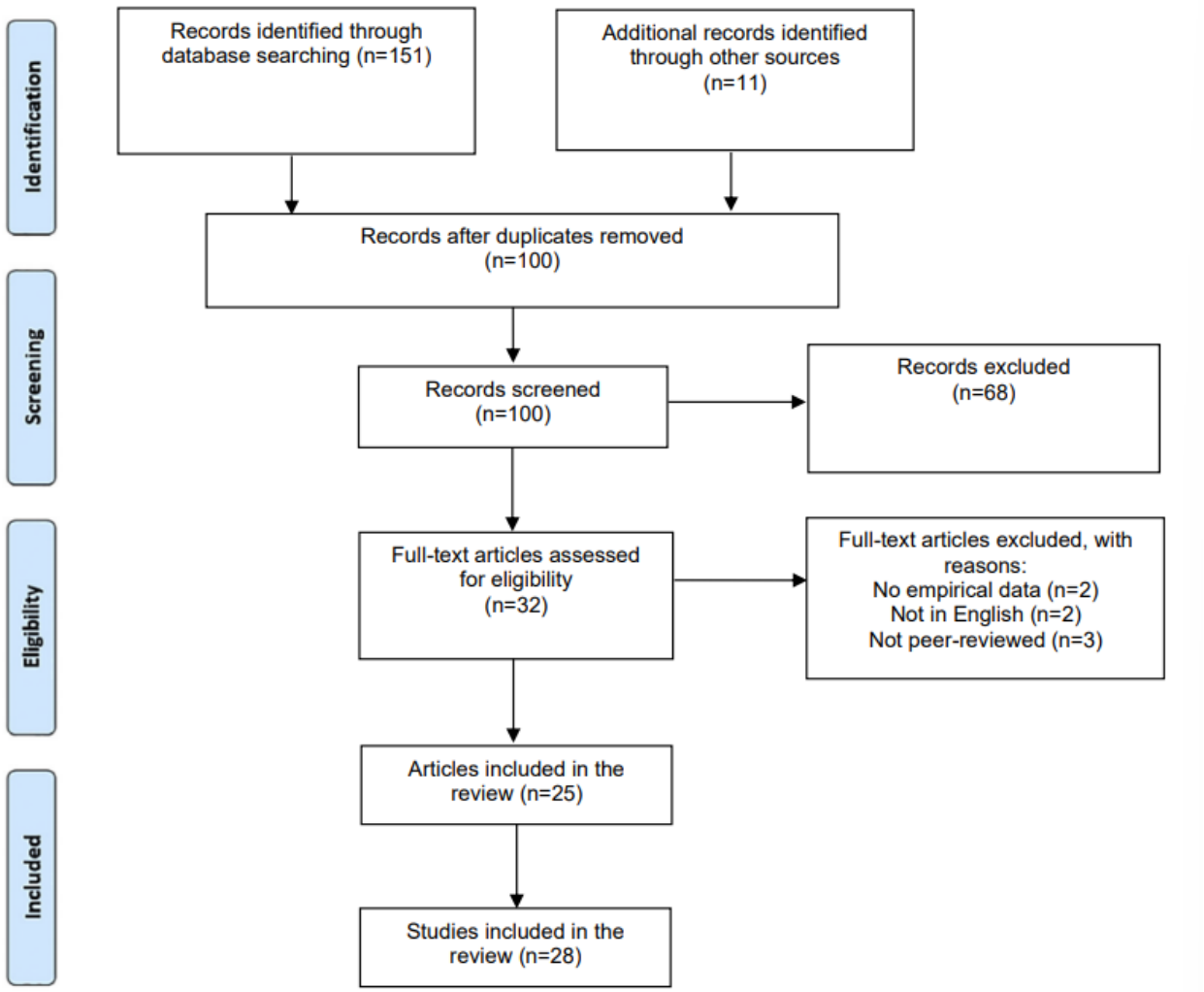

Table 1

Data Charting Table

No.	Author(s), Year, Country, Publication type, Journal	Aims/purpose of the study	Sample size and population	Study design	Intervention type, comparator, and duration (if applicable)	How ROCD symptoms were measured	How other outcomes were measured	Key findings that relate to the review question
1.	Bilge et al., 2022, Turkey Peer-reviewed journal (Trends in Psychology)	To examine the effects of ACEs and EMS on ROCD symptoms.	309 non-clinical participants (university students) (76.05% female; Age range: 18-38yrs, M = 21.40, SD = 3.28). Participants were not required to be in a romantic relationship at the time of the study (72.17% reported being single, and 30% reported never experiencing at least one romantic relationship).	Cross-sectional	N/A	ROCI; PROCSI	Socio-Demographic Form, VOCI, YSQ, ACEQ, BDI, BAI	Higher levels of ACEs were associated with greater RC and PF symptoms. However, this association was mediated by EMS, suggesting that ACEs have an indirect effect on ROCD symptoms via EMS.
2.	Brandes et al., 2020, Turkey Study 1/2 Peer-reviewed journal (Journal of	(a) To assess links between ROCD, general distress (depression, anxiety, and stress), self-esteem and common OCD symptoms.	132 non-clinical participants (students) (64.39% female; Age range: 18-39yrs, M & SD not provided). Participants were required to be in a romantic relationship	Cross-sectional	N/A	ODIS	OCI-R, DASS, SISE	Higher levels of ROCD were associated with higher levels of depression, anxiety, stress, and OCD symptoms, but not self-esteem. Depression and anxiety (but not stress) were predicted by higher ROCD, over and above demographic variables, OCD symptoms, and self-esteem.

	Obsessive-Compulsive and Related Disorders)	(b) to examine the unique contribution of ROCD for predicting general distress (depression, anxiety, and stress) beyond gender, age, common OCD symptoms and self-esteem.	during the study (Relationship duration M = 40 months, SD = 28).					
3.	Brandes et al., 2020, Turkey Study 2/2 Peer-reviewed journal (Journal of Obsessive-Compulsive and Related Disorders)	(a) To reassess links between ROCD, depression and common OCD symptoms. (b) to examine the unique contribution of ROCD for predicting depression beyond gender, age, common OCD symptoms and relationship factors. (c) to examine the unique contribution of obsessive distrust in predicting relationship violence beyond the contribution of mental health and relationship factors.	125 non-clinical (community) participants (69.60% female; Age range = 20-51yrs; M & SD not provided). Participants were required to be in a romantic relationship during the study (Relationship duration M = 50 months, SD = 34).	Cross-sectional	N/A	ROCI, PROCSI, ODIS	OCI-R, CTS-2, DASS, ECR, MJS, IMS	Higher levels of ROCD symptoms were associated with higher levels of depression and OCD symptoms generally. Higher levels of ROCD symptoms predicted depression over and above mental health and relationship measures. ROCD, over and above other mental health and relationship measures, was a significant predictor of (a) being a perpetrator of physical assault on a partner and (b) being a victim of sexual coercion by a partner. No predictive relationships were found between ROCD and psychological aggression, sexual coercion, and injury towards a partner; or between ROCD and physical assault, psychological aggression, and injury by a partner.

4.	Cerea et al., 2020, Italy Peer-reviewed journal (Journal of Affective Disorders)	To assess the efficacy of a short, daily cognitive intervention delivered via a mobile application in reducing sub-clinical ROCD symptoms and associated phenomena.	50 sub-clinical (university students) (76.00% female; Age range = 20-24yrs; M = 22, SD = 1.32) with sub-clinical levels of ROCD symptoms (>21.5 on ROCI, >17 on PROCSI). Participants with a clinical diagnosis of ROCD/OCD or a psychotic disorder were excluded. Participants were <u>not</u> required to be in a romantic relationship at the time of the study (50% were single) BUT were required to have experienced at least one romantic relationship.	Intervention study RCT with a crossover design	Cognitive app-based intervention (GGRO) Participants were randomised into two groups: immediate-use group (iApp group; *n* =25) and delayed-use group (dApp group; *n* = 25). The iApp group began using the GGRO app immediately (T0) for 15 consecutive days (until T1). The dApp group began using the GGRO app 15 days after the iApp group (T1) for the following 15 days (T2). Participants completed self-report questionnaires at three time points: baseline (T0), at the end of 15 days (T1), and again after 15 days (T2).	ROCI, PROCSI	Sociodemographic information schedule (at baseline only), OBQ, OCI-R, NJRE-Q-R, RSES, IUS-R, SIAS, DASS	GGRO was found to reduce ROCD symptoms, OCD beliefs and social anxiety and increase self-esteem. Analyses using the RCI indicated a reliable change in ROCD symptoms for 42-50% of the sample.

5.	Cerea, under review, Italy	To examine the associations between ROCD symptoms and relationship quality, social media addiction and maximisation style.	221 non-clinical community participants (71.1.% female; Age range = 19-67yrs, M = 30.4, SD = 11.54) Participants were required to be in a romantic relationship during the study (Relationship duration M = 90.56 months, SD = 120.79 months).	Cross-sectional	N/A	ROCI, PROCSI	Sociodemographic questionnaire; Romance Qualities Scale; Begen Social Media Addiction Scale; Maximisation Scale	Relationship quality, social media addiction, and maximisation style (i.e., the tendency to seek the 'best' possible choice when making a decision) were significantly associated with ROCD symptoms (RC and PF).
6.	Doron et al., 2012a, Israel Peer-reviewed journal (Journal of Obsessive-Compulsive and Related Disorders)	To examine the pathways linking RC and PF OC symptoms	229 non-clinical (community) participants (48.47% female; Age range = 18-65yrs; M & SD or Mdn not provided. Participants were required to be in a romantic relationship at the time of the study (Mdn relationship duration = 111.5 months)	Cross-sectional, longitudinal design (9 weeks)	N/A	ROCI, PROCSI	OCI-R, DASS, OBQ, ECR, DCQ	PF symptoms positively predicted later RC symptoms (accounting for all other variables at time 1). The reverse was also true (i.e., RC symptoms positively predicted later PF symptoms). The strength of the latter was the weaker effect of the two, suggesting that PF symptoms have a bigger temporal impact on RC symptoms than the reverse. Avoidant attachment style was associated with fewer RC symptoms. Higher levels of PF symptoms were associated with higher attachment anxiety and attachment avoidance.

								Dysmorphic concerns about oneself (i.e., obsessing about perceived flaws) were associated with greater PF symptoms.
7.	Doron et al., 2012b, Israel Peer-reviewed journal (Journal of Obsessive-Compulsive and Related Disorders)	(a) To examine associations between RC OC symptoms and measures of general distress, self-esteem and relationship measures (attachment and relationship ambivalence). (b) To examine the incremental contribution of the ROCI in predicting depression and relationship-related distress beyond the contribution of OCD symptoms, relationship factors, mood, and self-esteem. (c) To examine the incremental contribution of the ROCI in predicting OCD symptoms beyond the contribution of	179 non-clinical (community) participants (50.84% female; Age range = 18-65yrs, M & SD or Mdn not provided). Participants were <u>not</u> required to be in a romantic relationship at the time of the study (17.88% were single).	Cross-sectional	N/A	ROCI	OCI-R, OBQ, DASS, SISE, RAS, ECR, and the ambivalence subscale from the Personal Relationship Questionnaire	RC symptoms were associated with the following: a) higher levels of depression, anxiety, stress, OCD, attachment insecurity (anxiety and avoidance), and relationship ambivalence b) Lower levels of relationship satisfaction and self-esteem Depression, OCD symptoms and relationship dissatisfaction were predicted by RC symptoms over and above other mental health and relationship measures.

		mental health and relationship factors.						
8.	Doron et al., 2013, Israel Study 1/2 Peer-reviewed journal (Journal of Behaviour Therapy and Experimental Psychiatry)	To examine associations between attachment anxiety, relationship-contingent self-worth, and RC OC symptoms.	171 non-clinical (community) participants (45.03% female; Age range = 19-64yrs; Mdn = 37, M & SD not provided). Participants were required to be in a romantic relationship at the time of the study (Mdn relationship duration = 96 months).	Cross-sectional	N/A	ROCI	ECR and four items assessing relationship-contingent self-worth. Controls: OBQ, DASS, SISE, PSWQ	Attachment anxiety was associated with more severe RC symptoms. However, this effect was moderated by relationship-contingent self-worth, such that this association was stronger with increasing levels of self-worth depending on relationships. Effects remained when controlling for OCD-related beliefs, general worry, depression, and self-esteem. Relationship-contingent self-worth was associated with more severe RC symptoms, but this effect was moderated by attachment anxiety. Participants high in attachment anxiety showed this positive association, whereas those low in attachment anxiety showed the opposite pattern.
9.	Doron et al., 2013, Israel Study 2/2 Peer-reviewed journal (Journal of Behaviour Therapy and	To examine whether the threat to one's sense of relational competence would increase RC OC symptoms among participants with relationship-contingent self-worth and attachment anxiety.	80 non-clinical participants (undergraduate students) (57.50% female; Age range = 20-29yrs, M & SD not provided). Participants were required to be in a romantic relationship at the time of the	Experimental design Participants were randomly assigned either to an experimental condition (*n*=39), where they received mildly-negative automated	Not applicable	ROCI	ECR and four items assessing relationship-contingent self-worth.	Negative feedback (i.e., telling participants that their capacity for maintaining a long-term relationship was below average) only had a detrimental effect on relationship OC concerns (in response to hypothetical scenarios) for participants with high attachment anxiety and relationship-contingent self-worth.

Experimental Psychiatry)	study (Mdn relationship duration = 18 months).	feedback or a control condition (*n* = 41), where they received mildly positive automated feedback. Participants were either informed that their capacity for maintaining a long-term relationship was either “somewhat below average” (experimental condition) or “somewhat above average” (control condition). Participants were then asked to imagine 12 hypothetical scenarios relating to RC OC concerns and rate their distress, the urge to act on the concern, and the likelihood of acting on the concern on a scale from 1 (*not at all*) to 9 (*very much*).

10.	Doron, Mizrahi, et al., 2014, Israel Peer-reviewed journal (The Journal of Sexual Medicine)	To examine the association between ROCD symptoms and sexual satisfaction.	157 non-clinical (community) participants (45.22% female; Age range = 20-65yrs; Mdn = 44, M & SD not provided) Participants were required to be in a romantic relationship at the time of the study (Mdn relationship duration = 181 months).	Cross-sectional	N/A	ROCI, PROCSI	RAS, ISBI, Covariates: DASS, PSWQ, OCI-R, ECR	ROCD symptoms were associated with lower levels of sexual satisfaction over and above symptoms of depression, general worry, OCD, as well as attachment anxiety and avoidance. The association between ROCD symptoms and lower sexual satisfaction was mediated by reduced relationship satisfaction.
11.	Doron et al., 2016, Israel Peer-reviewed journal (Frontiers in Psychiatry)	(a) To compare levels of interference, OCD, and mood symptoms between clinical participants with ROCD, OCD, and community controls. (b) To examine group differences in maladaptive beliefs previously linked with OCD and ROCD.	22 clinical participants with ROCD (40.91% female; Age range = 21-40yrs, M = 29.89, SD = 4.76). 22 clinical participants with OCD (59.09% female; Age range = 18-49yrs, M = 29.43, SD = 8.33) 28 community control participants (60.71% female; Age range = 18-57yrs, M = 31.50, SD = 8.90). Participants were <u>not</u> required to be in a	Cross-sectional	N/A	ROCI, PROCSI, and MINI	Y-BOCS, OBQ, RECATS, DASS	The total OBQ score was positively correlated with all symptom measures, whereas the total RECATS score was positively correlated only with ROCD measures (ROCI and PROCSI). Compared to OCD and control participants, ROCD participants: a) reported more severe RC and PF symptoms, b) were more likely to attribute importance to thoughts and have an inflated sense of responsibility, c) Were more prone to overestimate the negative consequences of being in the wrong relationship.

			relationship at the time of the study (18% of ROCD participants, 56% of OCD participants, and 11% of community control participants were single).					Compared to control (but not OCD) participants, ROCD participants: a) had higher levels of depression, b) were more prone to threat overestimation and perfectionism, c) were more likely to overestimate the negative consequences of being alone. ROCD and OCD participants had equivalent levels of OCD severity, including interference in functioning, distress, resistance attempt, and degree of control related to their primary obsessions and compulsions.
12.	Doron & Szepsenwol, 2015, Israel Study 1/2 Peer-reviewed journal (Journal of Behaviour Therapy and Experimental Psychiatry)	To examine whether the effect of experimentally induced negative PF intrusions on self-esteem depends on the level of PF symptoms.	131 non-clinical (community) participants (45.80% female; Age range = 23-67yrs, Mdn = 46, M & SD not provided). Participants were required to be in a romantic relationship at the time of the study (Mdn relationship duration = 174 months).	Experimental design Participants were randomly assigned to one of three conditions: (1) Negative comparison to others condition (*n*=44), (2) Negative comparison to self condition (*n*=46), or (3) Neutral condition (*n*=41).	N/A	PROCSI	SISE	Across the sample, higher PF symptoms were associated with lower self-esteem. Negative comparison to others induced lower self-esteem compared to the control condition (and the self-comparison condition). This effect was moderated by levels of PF symptoms, such that the manipulation only lowered state self-esteem in participants high in these symptoms. There were no effects of the self-comparison manipulation.

(1) Negative comparison to others condition: Participants were asked to indicate the extent to which they felt 11 emotions (e.g., excited, depressed, guilty) when thinking their partner was not as beautiful, smart, moral, and successful as others of the same sex.

(2) Negative comparison to self condition: Participants were asked to indicate the extent to which they felt the same 11 emotions when thinking their partner was not as beautiful, smart, moral, and successful as them.

(3) Neutral condition: Participants were

				asked to indicate the extent to which they felt these 11 emotions when dealing with daily chores.					
13.	Doron & Szepsenwol, 2015, Israel Study 2/2 Peer-reviewed journal (Journal of Obsessive-Compulsive and Related Disorders)	(a) To replicate Study 1 results with a pre-post experimental design. (b) To examine whether positive PF intrusions would have a positive effect on self-esteem contingent on the level of PF symptoms.	179 non-clinical (community) participants (47.49% female; Age range = 19-65yrs; Mdn = 43; M & SD not provided). Participants were required to be in a romantic relationship at the time of the study (Mdn relationship duration = 137 months),	Experimental design Participants were randomly assigned into one of four conditions: (1) Negative comparison to others (*n*=41) (as described above), (2) Negative comparison to self condition (*n*=46) (as described above), (3) Positive comparison to others condition (*n*=48) where participants were asked to indicate the extent to which they felt 11 emotions when thinking their partner was more beautiful, smart, moral and successful than	N/A	PROCSI	SISE	Participants with high levels of PF symptoms, primed with negative unfavourable intrusions of their partner in comparison to other alternative partners, showed reduced state self-esteem (compared to the control condition). State self-esteem was not increased by positive partner intrusions (compared to other alternative partners).

				others of the same sex. , and (4) Positive comparison to self condition (*n*=44) where participants were asked to indicate the extent to which they felt 11 emotions when thinking their partner was more beautiful, smart, moral and successful than themselves.				
14.	Fernandez et al., 2021, Australia Peer-reviewed journal (Journal of Obsessive-Compulsive and Related Disorders)	To explore cognitive predictors of ROCD and Sexual orientation-OCD in a non-clinical sample.	264 non-clinical participants (51.1% female; Age range = 18-84yrs, M = 34.65, SD = 12.01). Participants were <u>not</u> required to be in a romantic relationship, BUT participants with ROCD were required to have experience in a romantic relationship (previously or currently)	Cross-sectional	N/A	ROCI, PROCSI	DOCS, OBQ, RECATS, SO-OCS, SO-OBS, FSQ, Depression scale of DASS	General OCD beliefs predicted the presentation of general OCD symptoms but not ROCD and SO-OCD symptoms. Relationship-related beliefs did not predict ROCD symptoms (when including other predictors). Instead, ROCD was most strongly predicted by feared self-beliefs and depression.
15.	Ghomian et al., 2020, Iran	To evaluate the efficacy of the combined protocol	6 clinical participants (university students) (100% female; Age	Intervention study	Participants were randomly assigned to 1 of 3	New PROCSI, New ROCI	None	All treatment groups showed decreases in ROCD symptoms with 4/6 participants showing

	Peer-reviewed journal (Journal of Fundamentals of Mental Health)	of ACT for ROCD and ACT affecting couples' interpersonal context on improving relationship obsession of female service users with ROCD.	range = 28-37yrs, Mdn, M & SD not provided). All participants were married at the time of the study (Marriage duration M = 4 years, SD not provided).	(Single-subject study with a multiple baseline design)	treatments: (1) ACT for OCD (*n* = 2); (2) ACT for couples (*n* = 2); (3) combined ACT for OCD and couples (*n* = 2). The latter two treatment conditions included the participants' spouses. Duration of intervention not provided.			stable changes in both ROCD measures. Those in the combined ACT for OCD and couples condition showed the highest remission rate and greatest improvement in ROCD symptoms.
16.	Ghomian et al., 2021, Iran Peer-reviewed journal (Journal of Fundamentals of Mental Health)	To examine symptoms, causes and consequences of ROCD in an Iranian population.	47 clinical participants (68.58% female; Age range = not provided; M = 27.08yrs, SD = not provided), All participants were married at the time of the study (Marriage duration M = 4 years and 18 months, SD not provided).	Qualitative design	N/A	ROCI, PROCSI, SCID-5-RD	None	ROCD was the result of three categories of repetitive thoughts about the relationship with spouse, characteristics of the spouse, and neutralising thoughts that involved repetitive behaviours about the spouse. In the category of repetitive thoughts about the spouse's characteristics, infidelity and emotional intelligence were the most prevalent. In the category of repetitive thoughts about the relationship, perfectionism in the relationship and fear of rejection were the most prevalent. In the category of neutralising, help of other thoughts (e.g., opposite thoughts) and help of behaviour (e.g., talking to spouse, distracting and checking) were most prevalent.

								The underlying factors affecting ROCD included obsessive beliefs, environmental conditions, and other disorders. Revealing factors affecting ROCD included environmental driver situations and thought or mental imagery. The consequences of ROCD included specific thinking, emotion, and behaviour (short-term), and the effect on one's spouse and symptoms of depression and aggression (long-term).
17.	Kabiri et al., 2017, Iran Peer-reviewed journal (Journal of Research & Health)	To examine the mediating role of ROCD in relation to marital quality and attachment styles in women.	195 non-clinical (community) participants (100% female; Age range =19-43yrs, M = 28.00yrs, SD = 4.97) All participants were married at the time of the study (Marriage duration M = 4.2 years, SD 4.97).	Cross-sectional	N/A	ROCI	GRIMS, AAQ	ROCD was associated with poorer marriage quality, higher anxious/ambivalent and avoidant attachment styles, and lower secure attachment. ROCD also mediated the relationship between attachment styles and marriage quality.
18.	Kılıç & Altinok, 2021, Turkey Peer-reviewed journal (Personality	To explore associations between ROCD symptoms and relationship satisfaction, and the mediation of this relationship by jealousy and	270 non-clinical participants (university students) (59.63% female; age range = 17-39 yrs; M = 21.6yrs; SD = 3.21).	Cross-sectional	N/A	ROCI	MJS, RTS, RAS	ROCD predicted more jealousy, a more ruminative thought style, and lower relationship satisfaction. The relationship between ROCD and relationship satisfaction was mediated by jealousy and ruminative style.

	and Individual Differences)	ruminative thought style.	Participants were required to be in a romantic relationship of at least 5 months at the time of the study (M or Mdn relationship duration not provided).					The relationship between ROCD and jealously was mediated by rumination; and jealousy mediated the link between ruminative style and relationship satisfaction.
19.	Littman et al., in press, Israel	(a) To assess whether being exposed to one's partner's elevated ROCD symptoms (i.e., viewing one's partner's alleged heightened responses on a measure of ROCD symptoms) would increase participants' own ROCD symptom levels. (b) To evaluate the effect of such unmediated exposure on participants' estimation of their own and their partner's susceptibility to infidelity.	100 non-clinical participants (50 university students and their partners; age range: 21-35years, M = 25.8, SD = 2.8). Participants were required to be in a romantic relationship of at least 4 months at the time of the study (M or Mdn relationship duration not provided).	Experimental design One randomly selected partner of each romantic dyad was randomly allocated to being exposed to information suggesting their partner has low (low exposure) or high (high exposure) levels of ROCD symptoms	N/A		ROCI, PROCSI, ROCI-scenerio questionnaire	OCI-R, DASS, RAS, Regret Scale of the Maximisation Scale, Susceptibility to Infidelity Measure	Those in the high, compared to low, exposure group (i.e., led to believe that their partner has elevated ROCD symptoms) displayed elevated ROCD symptoms (regardless of their initial ROCD symptom level). High exposure also led to heightened perceptions of self and partner infidelity, particularly in those with pre-existing ROCD.
20.	Melli et al., 2018, Italy	To examine the unique contribution of OCD-related	124 clinical participants (71.0% female; Age range =	Cross-sectional	N/A		ROCI, PROCSI	FMPS, OBQ, RECATS,	Hierarchical multiple regression analyses (controlling for

	Peer-reviewed journal (Journal of Obsessive-Compulsive and Related Disorders)	beliefs, multi-dimensional perfectionism, and relationship beliefs to RC and PF ROCD symptoms.	18-51yrs; M = 26.73; SD = 7.16) Participants were <u>not</u> required to be in a relationship at the time of the study (71% were single).				DASS, SMM (Distraction)	depression, anxiety, stress and obsessive beliefs) showed that: a) RC symptoms were significantly positively predicted by: Concern Over Mistakes and Doubts About Actions and Overestimation of the negative consequences of being alone (Perfectionism) and Overestimation of the negative consequences of being in the wrong relationship subscale (Relationship Catastrophisation). b) PF symptoms were significantly positively predicted only by overestimation of the negative consequences of being in the wrong relationship.
21.	Melli, under review, Italy	To explore associations between narcissism and ROCD and explore the mediational role of partner contingent self-worth.	310 clinical participants (75.8% female; Age range = 18-59yrs, M = 28.18, SD = 8.12) Participants were <u>not</u> required to be in a relationship at the time of the study (64.4% were single).	Cross-sectional	N/A	PROCSI	PVCSW, OBQ, RECATS, PNI	Narcissistic vulnerability, overestimation of negative consequences of being in the wrong relationship, and partner contingent self-worth were significant positive predictors of ROCD symptoms. The relationship between vulnerable narcissism and ROCD symptoms was mediated by partner contingent self-worth (controlling for overestimation of negative consequences of being in the wrong relationship).

22.	Meydani et al., 2022, Iran Peer-reviewed journal (Iranian Journal of Psychiatry and Clinical Psychology)	To explore associations between attachment styles and ROCD and the potential mediating role of emotion regulation difficulties and experiential avoidance.	531 non-clinical (community) participants (85.69% female; Age range, M & SD not provided) Whether participants were required to be in a romantic relationship at the time of the study was not reported.	Cross-sectional	N/A	ROCI	ECR, DERS, AAQ-II	ROCD symptoms were associated with difficulties in emotion regulation and higher experiential avoidance. Direct associations between ROCD and attachment were not formally tested (although the authors indicated evidence of mediation of the relationship between attachment style and ROCD via difficulties in emotion regulation and experiential avoidance).
23.	Roncero et al., 2018, Spain Peer-reviewed journal (Journal of Behaviour Therapy and Experimental Psychiatry)	To assess the effectiveness of a novel cognitive intervention delivered via an app designed to challenge OCD-related beliefs on ROCD and OCD symptoms.	36 non-clinical university students; 20 completers (44.44% female; Age range = 19-26 years; M & SD not provided) Participants were not required to be in a romantic relationship at the time of the study (55% of completers were single).	Intervention study	GGRO - Participants were instructed to complete 3-levels a day for 15 days at a pre-determined time.	ROCI-Short Form, PROCSI-Short Form	OCI-R, OBQ, DASS, SISE	Using the app for 3 mins a day resulted in a significant reduction in all OCD symptom measures and OCD-related beliefs. Changes in levels of OCD-related beliefs was associated with a reduction in OCD symptoms. There was no significant effect found for symptoms of depression.
24.	Roncero et al., 2019, Spain Peer-reviewed journal (JMIR	To assess the effectiveness of a cognitive intervention via an app (GGRO) designed to challenge OCD-related beliefs on	97 non-clinical participants (university students) (81.4% female; Age range = 18-65yrs; M = 21.56; SD = 7.07).	Intervention study RCT with a crossover design	The intervention was GGRO (the mobile-delivered cognitive training described above). Participants were randomised to an immediate use	ROCI-Short Form, PROCSI= Short Form	OCI-R, OBQ-20, DASS-21, SISE	The intervention group (compared to control) showed: fewer ROCD symptoms, fewer OCD-related beliefs and higher self-esteem. These effects were maintained at follow-up. The waitlist group also showed similar improvements. Partner-

	mHealth and uHealth)	ROCD and OCD symptoms.	Participants were not required to be in a romantic relationship at the time of the study (43.7% were single), BUT they were required to have experienced at least one stable romantic relationship.		group (iApp, *n*=51) or a delayed use group (waitlist crossover group) (dApp, *n*=46). Participants in the iApp group started using the app immediately (T1) for a period of consecutive 15 days (until T2). Participants in the dApp group were then requested to start using the app at T2 for 15 consecutive days (crossover) 15 days after the iApp group. Participants were requested to complete 3 levels a day (approx. 3 mins a day).			focused symptoms showed further improvements at follow-up suggesting this may be an especially useful intervention for ROCD (perhaps because GGRO targets relationship contingent self-worth).
25.	Szepsenwol et al., 2016, Israel Peer-reviewed journal (Journal of Obsessive-Compulsive	To examine the reciprocal relationship between PF and RC OC symptoms over time.	141 non-clinical (community) participants (44.68% female; Age range = 19-66yrs; M & SD not provided). Participants were required to be in a romantic relationship at the time of the	Cross-sectional, longitudinal design (1-year)	N/A	ROCI, PROCSI	None	ROCD symptoms were positively correlated over time (1-year difference). PF symptoms were more strongly correlated over time compared to RC symptoms suggesting that the former are more stable over time.

	and Related Disorders)		study (M relationship duration = 223.65 months, SD = 140.09)					Longer relationship duration was associated with lower levels of ROCD symptoms. PF symptoms significantly predicted later relationship-focused symptoms. The reverse was not found (i.e., that relationship symptoms predicted later partner symptoms). However, relationship symptoms did predict later partner symptoms for participants with longer relationships and with high initial partner-related symptoms.
26.	Tinella et al., 2023, Italy Peer-reviewed journal (Journal of Obsessive-Compulsive and Related Disorders)	To explore the relationships between ROCD and: fear of guilt, relationship duration, narcissism, and paranoia in a non-clinical sample.	164 non-clinical (community) participants (81.7% female; Age range = 19-60yrs, M = 32.6; SD = 6.78) Participants were required to be in a romantic relationship at the time of the study. M or Mdn relationship duration is not provided for the entire sample.	Cross-sectional	N/A	ROCI, PROCSI	NPI, FOGS, PADS	Correlational analyses showed that more severe RC and PF symptoms were associated with: fear of guilt, narcissism and paranoia. RC symptoms were negatively associated with relationship duration (the longer the relationship duration, the more severe the ROCD symptoms. In regression models, fear of guilt, paranoia and relationship duration predicted RC symptoms. Fear of guilt, narcissism and relationship duration predicted PF symptoms.
27.	Toroslu & Cem Çırako ğlu, 2022, Turkey	To examine the mediating role of perfectionism and intolerance of	224 non-clinical (community) participants (77.2%	Cross-sectional	N/A	ROCI, PROCSI	OCI-R, IUS-R, FMPS, YSQ	Correlational analyses showed that more severe RC and PF symptoms were associated with: shorter relationship duration,

	Peer-reviewed journal (Current Psychology)	uncertainty in associations between RC and PF ROCD symptoms. To examine which EMS domains predicted ROCD.	female; Age range, M & SD reported) Participants were required to be in a romantic relationship at the time of the study (Relationship duration M = 73.71 months, SD = 89.36).					OCD symptoms, schema domains, perfectionism, and intolerance to uncertainty. Mediation models showed positive relationships between schema domains (impaired autonomy, disconnection, unrelenting standards, other-directedness) and RC-OC symptoms, mediated by intolerance of uncertainty (but not perfectionism). Mediation models showed positive relationships between schema domains (impaired autonomy, disconnection, unrelenting standards) and PF symptoms, mediated by perfectionism (but not intolerance of uncertainty). Impaired limits and other-directedness domains affected PF symptoms only indirectly via perfectionism and intolerance of uncertainty.
28.	Trak & Inozu, 2019, Turkey Peer-reviewed journal (Journal of Obsessive-Compulsive	To examine how overprotective parental attitudes are associated with RC OC symptoms via attachment anxiety.	538 non-clinical (community) participants (62.5% female; Age range = not provided; M = 31.29yrs; SD = 10.06). Participants were required to be in a romantic relationship	Cross-sectional	N/S	ROCI	PBI, ECR, PVCSW	ROCD symptoms were associated with higher levels of: maternal overprotection, paternal overprotection, anxious attachment, and partner-contingent self-worth. Mediation analyses showed that the relationships between maternal and partner overprotection on ROCD

and Related Disorders)	at the time of the study (Relationship duration M = 71 months).	symptoms was mediated by attachment anxiety. Higher attachment anxiety accompanied by higher partner-contingent self-worth was associated with increased RC OCD symptoms.

Note. **Acronyms (in order of appearance)**
ACE - Adverse Childhood Experiences
EMS - Early Maladaptive Schemas
N/A – Not applicable
RC – Relationship-Centred
PF – Partner-Focused
RCT – Randomised Control Trial
GGRO - GG Relationship Doubts
RCI - Reliable Change Index
ACT – Acceptance and Commitment Therapy

Measures:
ROCI: Relationship Obsessive-Compulsive Inventory
PROCSI: Partner-Related Obsessive-Compulsive Symptom Inventory
VOCI: Vancouver Obsessive-Compulsive Inventory
YSQ: Young Schema Questionnaire
ACEQ: Adverse Childhood Experience Questionnaire
BDI: Beck Depression Inventory
BAI: Beck Anxiety Inventory
ODIS: Obsessive Distrust Scale
OCI-R: Obsessive-Compulsive Inventory-Revised
DASS: Depression, Anxiety and Stress Scale
SISE: Single-Item Self-Esteem Scale
CTS-2: The Revised Conflict Tactics Scale
ECR: Experience in Close Relationships Questionnaire
MJS: Multidimensional Jealousy Scale
IMS: Investment Model Scale
OBQ: Obsessive Beliefs Questionnaire
NJRE-Q-R: Not Just Right Experiences Questionnaire-Revised
RSES: Rosenberg Self-Esteem Scale
IUS-R: Intolerance of Uncertainty Scale-Revised
SIAS: Social Interaction Anxiety Scale
DCQ: Dysmorphic Concerns and Questionnaire
RAS: Relationship Assessment Scale
ISBI: Israeli Sexual Behaviour Inventory
PSWQ: Penn State Worry Questionnaire
MINI: Mini International Neuropsychiatric Interview
Y-BOCS: Yale-Brown Obsessive-Compulsive Scale
RECATS: Relationship Catastrophization Scale
DOCS: Dimensional Obsessive-Compulsive Scale
SO-OCS: Sexual-Orientation-Obsessive Compulsive Scale
SO-OBS: Sexual-Orientation Obsessive Beliefs Scale
FSQ: Fear of Self Questionnaire
SCID-5-RD: The Structured Clinical Intervention for DSM-V Research Version
GRIMS: Golombak-Rust Inventory of Marital State
AAQ: Adult Attachment Questionnaire
RTS: Ruminative Thought Style Questionnaire
FMPS: Frost Multidimensional Perfectionism Scale
SMM: Couple Meal Measure
PVCSW: Partner Value Contingent Self-Worth Scale
PNI: Pathological Narcissism Inventory
DERS: Difficulties in Emotion Regulation Scale
AAQ-II: Acceptance and Action Questionnaire-II
NPI: Narcissistic Personality Inventory
FOGS: Fear of Guilt Scale
PADS: Persecution and Deservedness Scale
PBI: Parental Bonding Instrument

Descriptive Summary

Publication Type & Study Setting. Of the 28 studies, 25 studies were published in peer-reviewed journals (between 2012 and 2023), and three were 'in press' or under review. Studies were conducted in six countries across three continents, most frequently conducted in Israel (*n* = 10), followed by Turkey (*n* = 6), Italy (*n* = 5), Iran (*n* = 4), Spain (n = 2), and Australia (*n* = 1).

Study Designs. Most employed a cross-sectional design (*n* = 17) with far fewer intervention (*n* = 4) and experimental (*n* = 4) studies. Only two studies employed a longitudinal design, and there was a single qualitative investigation.

Sample Characteristics. Twenty-two studies recruited non-clinical participants, and only six were conducted with clinical/sub-clinical ROCD participants. Although most studies required participants to be in a romantic relationship (*n* = 18), nine studies did not have this requirement, and one did not report whether this was a requirement (Meydani et al., 2022). Of the 18 studies that did require participants to be in a romantic relationship, three exclusively included married participants. Of the nine studies that did not have this requirement, three specified that participants must have had previous relationship experience.

Sample sizes varied substantially across studies, from six participants (i.e., a single-subject design; Ghomian et al., 2020) to 538 participants (i.e., cross-sectional design; Trak & Inozu, 2019). Nine studies recruited exclusively from student populations.

Measures of ROCD. Fifteen studies used a combination of the Relationship Obsessive-Compulsive Inventory (ROCI) (focused on measuring RC symptoms; Doron, Mizrahi, et al., 2014) and the Partner-Focused Obsessive-Compulsive Inventory (PROCSI) (focused on measuring PF symptoms; Doron, Mizrahi et al., 2014). Six studies used the ROCI only; three used the PROCSI only; two used the Obsessive Distrust Inventory (ODIS)

(focused on measuring the perceived reliability/unreliability of one's romantic partner; Brandes et al., 2020). One study used the ODIS in combination with the PROCSI and ROCI). One used the PROCSI and ROCI in addition to the Structured Clinical Interview for DSM-V Research Version (SCID-5-RD; Ghomian et al., 2021). Another used the PROCSI and ROCI in addition to the Mini International Neuropsychiatric Interview (MINI) (Doron et al., 2016).

Narrative Overview

Correlational Studies

Most studies (n = 17) were correlational and explored the association between ROCD and other variables. Three studies explored predisposing childhood factors associated with ROCD symptom development. Bilge et al. (2022) examined the effects of adverse childhood experiences (ACEs) and early maladaptive schemas (EMS) on the severity of ROCD symptoms. EMS refers to enduring, self-defeating patterns of memories, emotions, and physical sensations, originating in childhood and shaping one's self-beliefs or worldview (Bilge et al., 2022). They found higher ACEs were associated with more severe RC and PF symptoms in a non-clinical sample of 309 students. This association was mediated by EMS, suggesting that ACEs may have an indirect effect on ROCD symptoms via EMS.

Toroslu and Cem Çırakoğlu (2022) examined associations between EMS domains (impaired autonomy, disconnection, unrelenting standards, impaired limits, and other-directedness) and ROCD (RC and PF symptoms) and explored whether these associations were mediated by intolerance of uncertainty and perfectionism. This research was conducted in a non-clinical sample (N = 224). There were significant positive associations between impaired autonomy, disconnection, unrelenting standards, other-directedness schema domains and more severe RC symptoms. These associations were mediated by heightened intolerance of uncertainty (but not perfectionism). There were significant positive

associations between impaired autonomy, disconnection, and unrelenting standards schema domains and more severe PF symptoms. These associations were mediated by heightened perfectionism (but not intolerance of uncertainty). Impaired limits and other-directedness schema domains were significantly positively associated with PF but not RC symptoms and were mediated by both heightened perfectionism and intolerance of uncertainty. Furthermore, this research found that shorter relationship duration was associated with more severe RC and PF symptoms.

Finally, in relation to predisposing childhood factors, Trak and Inozu (2019) examined how overprotective parental attitudes are associated with RC symptoms via attachment anxiety. They recruited 538 non-clinical participants and found that higher levels of parental overprotection were associated with more severe RC symptoms. This association was mediated by heightened attachment anxiety. They also found that RC symptoms were associated with higher levels of attachment anxiety and partner-contingent self-worth and that higher attachment anxiety accompanied by higher partner-contingent self-worth was associated with increased RC symptoms.

Several other studies also examined associations between ROCD symptoms and attachment insecurity (Doron et al., 2012a; Doron et al., 2012b; Doron et al., 2013; Kabiri et al., 2017; Meydani et al., 2022), with five using a version of the Experiences in Close Relationships (ECR) questionnaire to measure anxious and avoidant attachment styles and one using the Adult Attachment Questionnaire (Kabiri et al., 2017). Kabiri et al. (2017) aimed to examine the mediating role of RC symptoms in relation to marital quality and attachment styles in women. They recruited 195 non-clinical participants. They found that RC symptoms was associated with poorer perceived marriage quality, higher anxious/ambivalent and avoidant attachment styles, and lower secure attachment. They also found that RC symptom severity mediated the association between secure attachment style

and higher marriage quality and between insecure attachment styles (anxious and avoidant) and lower marriage quality.

Doron et al. (2013) examine the associations between attachment anxiety, relationship-contingent self-worth, and RC symptoms in a non-clinical sample (n = 171). They found that higher levels of attachment anxiety were associated with more severe RC symptoms. Doron et al. (2013) found that this association was moderated by relationship-contingent self-worth, such that the link between attachment anxiety and more severe RC symptoms was stronger with increasing levels of self-worth dependent on relationships. Additionally, this study found a positive association between relationship-contingent self-worth and more severe RC symptoms, which were moderated by attachment anxiety. Specifically, they found that participants high in attachment anxiety showed a positive association between relationship symptoms and self-worth, whereas those low in attachment anxiety showed the opposite pattern.

Meydani et al. (2022) explored associations between attachment styles and RC symptoms and the potential mediating role of emotion regulation difficulties and experiential avoidance. From a sample of 531 non-clinical participants, they found that RC symptoms were associated with difficulties in emotion regulation and higher experiential avoidance. While direct associations between ROCD and attachment were not formally tested, the authors suggested that associations between attachment style and ROCD were mediated by difficulties in emotion regulation and heightened experiential avoidance.

Doron et al. (2012b) examined the association between RC symptoms and attachment insecurity, as well as relationship ambivalence and relationship satisfaction. They found that more severe RC symptoms were associated with higher levels of attachment insecurity (anxiety and avoidance) and relationship ambivalence and lower levels of relationship

satisfaction. They also examined the association between RC symptoms and general distress (depression, anxiety, and stress), OCD symptoms, and self-esteem. They found that RC symptoms were associated with higher levels of depression, anxiety, stress, and OCD symptoms and lower levels of self-esteem. Furthermore, they found that depression, OCD symptoms, and relationship dissatisfaction were predicted by RC symptoms over and above other mental health and relationship measures. This research was conducted in a non-clinical sample (N = 179).

Similarly, Brandes et al. (2020) published a paper outlining two studies. In the first study, Brandes et al. (2020) assessed the association between ROCD and general distress (depression, anxiety, and stress), self-esteem, and OCD symptoms. They recruited 132 non-clinical participants and found that higher levels of ROCD symptoms were associated with higher levels of depression, anxiety, stress, and OCD symptoms, but not self-esteem. They found that depression and anxiety (but not stress) were predicted by higher ROCD, over and above demographic variables, OCD symptoms, and self-esteem.

In their second study, Brandes et al. (2020) aimed to reassess the associations between ROCD, depression, and OCD symptoms, and examine the unique contribution of ROCD in predicting depression and relationship violence beyond the contribution of other factors. From a sample of 125 non-clinical participants, they found that higher levels of ROCD symptoms were associated with higher levels of depression and OCD symptoms generally and that higher levels of ROCD symptoms predicted depression over and above mental health and relationship measures. Furthermore, they found ROCD symptom severity, over and above mental health and relationship measures, predicted (a) being a perpetrator of physical assault on a partner and (b) being a victim of sexual coercion by a partner. However, ROCD did not predict perpetrating psychological aggression, sexual coercion, and injury towards a

partner or being a victim of physical assault, psychological aggression, and injury by a partner.

A number of studies assessed the association between ROCD symptoms and maladaptive beliefs. Melli et al. (2018) assessed the unique contribution of OCD-related beliefs, multi-dimensional perfectionism, and relationship-related beliefs in relation to both RC and PF symptoms in a sample of 124 clinical participants. They found that RC symptoms were significantly positively predicted by perfectionistic concerns about mistakes and doubts about actions, catastrophic beliefs regarding the negative consequences of being alone, and catastrophic beliefs regarding the negative consequences of being in the wrong relationship (relationship catastrophisation) over and above mood. Only catastrophic beliefs regarding the negative consequences of being in the wrong relationship (relationship catastrophisation) significantly predicted PF symptoms.

Doron et al. (2016) aimed to compare levels of interference, OCD, and mood symptoms between clinical participants with ROCD (*n* = 22), OCD (n = 22) and community controls (*n* = 28) and examine group differences in maladaptive belief linked with OCD and ROCD. They found that ROCD and OCD participants had equivalent levels of OCD severity, including interference in functioning, distress, resistance attempt, and degree of control related to their primary obsessions and compulsions. They also found that compared to controls (but not OCD participants), participants with ROCD had higher levels of depression. In relation to maladaptive beliefs, Doron et al. (2016) found that compared to OCD and control participants, ROCD participants were more likely to attribute importance to thoughts and have an inflated sense of responsibility. They found that compared to the control group (but not the OCD group), ROCD participants were more likely to overestimate the negative consequences of being alone and were more prone to perfectionism. ROCD participants were significantly more likely to have catastrophic beliefs about the negative consequences of

being in the wrong relationship (relationship catastrophisation) and that RC and PF symptom severity were significantly positively associated with these beliefs.

Fernandez et al. (20201) explored associations between ROCD symptoms and OCD-related maladaptive beliefs in a sample of 264 non-clinical participants. They found that while maladaptive OCD beliefs predicted the presentation of general OCD symptoms, it did not predict ROCD. Furthermore, relationship-related beliefs (i.e., relationship catastrophisation) did not predict ROCD symptoms (when including other predictors). Instead, ROCD was strongly predicted by feared self beliefs and depression.

Two studies explored the association between ROCD and narcissism. Melli (under review) explored the association between PF symptoms and narcissism and the mediating role of partner contingent self-worth in a sample of 310 clinical participants. They found that narcissistic vulnerability (characterised by self-esteem contingent on external appraisal), overestimation of the negative consequences of being in the wrong relationship (relationship catastrophisation), and partner contingent self-worth were significant predictors of more severe PF symptoms. They also found that the relationship between vulnerable narcissism and PF symptoms was mediated by partner contingent self-worth (controlling for relationship catastrophisation).

Tinella et al. (2013) explored associations between ROCD and narcissism, paranoia, fear of guilt, and relationship duration. They recruited 164 non-clinical participants and their analyses showed that more severe RC and PF symptoms were associated with narcissism, paranoia, and fear of guilt. They found that that fear of guilt, paranoia, and shorter relationship duration predicted more severe RC symptoms, whereas fear of guilt, narcissism, and shorter relationship duration predicted more severe PF symptoms.

Several studies explored the association between ROCD, and a range of factors associated with relationships. Kılıç & Altinok (2021) aimed to explore the association between ROCD symptoms and relationship satisfaction, and whether this was mediated by jealousy and ruminative thought style. They recruited 270 non-clinical university students and found that ROCD predicted more jealousy, a more ruminative thought style, and lower relationship satisfaction. Their analyses indicate that associations between ROCD symptoms and lower relationship satisfaction are mediated by jealousy and ruminative thought style; the relationship between ROCD and jealousy was mediated by rumination; and that jealousy mediated the linked between ruminative style and relationship satisfaction.

Doron, Mizrahi, et al. (2014) aimed to examine the association between ROCD symptoms and sexual satisfaction. They recruited 157 non-clinical participants and found that ROCD symptoms were associated with lower levels of sexual satisfaction over and above symptoms of depression, OCD, general worry, and attachment insecurity (anxiety and avoidance). They also found that the association between ROCD symptoms and lower sexual satisfaction was mediated by reduced relationship satisfaction.

Cerea (under review) aimed to examine the associations between ROCD symptoms and relationship quality, social media addiction, and maximisation style (i.e., the tendency to seek the 'best' possible choice when making a decision). They recruited 221 non-clinical participants and found that relationship quality, social media addiction, and maximisation style were significantly associated with more severe ROCD symptoms (both RC and PF).

Longitudinal Studies

Two longitudinal studies investigated ROCD symptom change over time. Doron et al. (2012a) examined associations between PF and RC symptoms over 9 weeks in a non-clinical sample of 229 participants. PF and RC symptoms were bidirectionally associated over time:

PF symptoms positively predicted later RC symptoms; RC symptoms positively predicted later PF symptoms. However, the association between partner-to-relationship symptoms was greater than between relationship-to-partner symptoms, suggesting that PF symptoms may have a greater impact on RC symptoms than the reverse. Their correlational analyses found that an avoidant attachment style was associated with fewer RC symptoms and higher levels of PF symptoms were associated with higher attachment anxiety and avoidance. Furthermore, dysmorphic concerns about oneself (i.e., obsessing about one's perceived flaws) were associated with greater PF symptoms. A similar study by Szepsenwol et al. (2016) examined associations between PF and RC symptoms over a longer time frame (1 year), again, in a non-clinical sample. Similarly, PF symptoms significantly predicted later RC symptoms. Although relationship symptoms did not predict later PF symptoms across the sample, this association *was* found for participants with longer relationship durations and with high initial partner-related symptoms. Szepsenwol et al. (2016) also aimed to explore the association between relationship duration and ROCD symptoms. They found that longer relationship duration was associated with lower levels of ROCD symptoms.

Experimental Studies

Four experimental studies have been conducted to understand possible causal links between ROCD and other variables (Doron et al., 2013; Doron & Szepsenwol, 2015;; Littman et al., in press). Doron et al. (2013) experimentally manipulated the threat to relational competence to examine whether doing so would increase RC symptoms. Eighty non-clinical university students were randomly assigned to an experimental (n = 39) or control (n = 41) condition. After an experimental task, false feedback was used to manipulate perceptions of relational competence: those in the experimental condition were told their capacity for maintaining a long-term relationship was "somewhat below average", whereas those in the control condition were told it was "somewhat above average". Participants then

imagined 12 hypothetical scenarios relating to RC-OC concerns, after which they rated their distress, the urge to act on their concern, and the likelihood of acting on the concern. Results showed that the experimental manipulation only had a detrimental effect on RC symptoms for participants with both high attachment anxiety and relationship-contingent self-worth.

Doron and Szepsenwol (2015) examined the effect of experimentally-induced negative PF intrusions on self-esteem and whether the effects depended on PF symptom severity. 131 non-clinical participants were randomly assigned to one of three conditions: (1) negative comparison to others (n = 44), (2) negative comparison to self (n = 46), or (3) neutral (n = 41). Participants in the negative comparison to others condition indicated the extent to which they felt 11 emotions (e.g., guilty) when thinking their partner was not as beautiful, smart, moral, and successful as other people of the same sex. Participants in the negative comparison to self condition indicated the extent to which they felt the same 11 emotions when thinking their partner was not as beautiful, smart, moral, and successful as themselves. Participants in the neutral condition indicated the extent to which they felt these 11 emotions when dealing with daily chores. All participants then rated their state levels of self-esteem. Across the sample, PF symptom severity was associated with lower self-esteem regardless of the experimental condition. However, the experimental manipulation did have a stronger impact on self-esteem, such that those in the negative comparison to others condition had lower levels of state self-esteem compared to the other two conditions. This effect was moderated by levels of PF symptoms which suggested that the experimental manipulation only lowered state self-esteem in participants high in these symptoms to start with.

Doron and Szepsenwol (2015) conducted a second study to replicate these results using a pre- and post-experimental design. They also explored whether positive PF intrusions might have a positive effect on self-esteem depending on PF symptom severity. 179 non-clinical participantswere randomly assigned to one of four conditions: (1) negative

comparison to others (*n* = 41), (2) negative comparison to self (*n* = 46), (3) positive comparison to others (*n* = 48), and (4) positive comparison to self (*n* = 4). The first two conditions were the same as described by Doron and Szepsenwol (2015). Participants in the positive comparison to others condition rated the extent to which they felt 11 emotions when thinking their partner was more beautiful, smart, moral and successful than others of the same sex. Participants in the positive comparison condition rated the extent to which they felt 11 emotions when thinking about these factors in relation to themselves. All participants then rated their state levels of self-esteem. Results for negative comparison to others were similar to study 1: participants with high levels of PF symptoms, primed with negative unfavourable intrusions of their partner in comparison to alternative partners, showed reduced state self-esteem (compared to the control condition). However, contrary to prediction, positive PF instructions did not have a positive effect on state self-esteem.

Littman et al. (in press) assessed the effect of exposure to one's partner's elevated ROCD symptoms (i.e., viewing one's partner's alleged heightened responses on a ROCD measure) on participants' own ROCD levels. They also evaluated the effect of such unmediated exposure on participants' estimation of their own and their partner's susceptibility to infidelity. 100 non-clinical university students and their partners were recruited, and one randomly selected partner of each dyad was randomly allocated to either (1) the low exposure condition, where they were given information suggesting their partner has low levels of ROCD symptoms or (2) the high exposure condition, where they were given information suggesting their partner has low levels of ROCD symptoms. Participants then rated their own ROCD symptoms. Results showed that participants in the high exposure condition had significantly elevated ROCD symptoms (regardless of their initial ROCD symptom level). High exposure also led to heightened perceptions of self and partner infidelity, particularly in those with pre-existing ROCD symptoms.

Intervention Studies

App-Based CBT. Three studies out of four assessed the effectiveness of novel app-based cognitive therapy called GG Relationship Doubts (GGRO; Cerea et al., 2020; Roncero et al., 2018; Roncero et al., 2019). The intervention is designed to challenge dysfunctional beliefs underlying ROCD symptoms through gamification, where participants reject maladaptive thoughts by throwing them away from themselves (swiping upwards on the app) and embrace supportive thoughts by pulling them towards themselves (swiping downwards on the app). Participants were instructed to complete 3 levels of GGRO a day (approximately 3 minutes).

Cerea et al. (2020) tested the app on 50 university students with sub-clinical ROCD employing a randomised control trial (RCT) with a cross-over design. The cognitive intervention, used for 15 consecutive days by participants, reduced ROCD symptoms, OCD beliefs, and social anxiety, and increased self-esteem. Analyses using the reliable change index indicated a reliable change of ROCD symptoms for 42-50% of the sample. Roncero et al. (2018) tested the same intervention on 20 non-clinical university students for the same duration (15 days). This study also showed that the app (used for 3 minutes per day) was associated with significant reductions in ROCD and OCD symptoms generally, thought to be explained by changes in OCD-related beliefs (the intended target of the intervention). Roncero et al. (2019) tested the app in a larger sample of 97 non-clinical university students, using an RCT with a cross-over design. The study found that the intervention group (compared to the control) showed fewer ROCD symptoms, fewer OCD-related beliefs, and higher self-esteem. These effects were maintained at follow-up.

The final intervention study evaluated the effectiveness of different protocols of Acceptance and Commitment Therapy (ACT) in clinical ROCD service users (Ghomian et

al., 2020). The study recruited six married female participants with ROCD who were randomly assigned to receive one of three treatments: either (1) ACT for OCD (*n* = 2), (2) ACT for couples (*n* = 2), or (3) combined ACT for OCD and couples (*n* = 2). The latter two treatment conditions include the participants' spouses. The duration was not provided. All treatment groups demonstrated a decrease in ROCD symptoms from baseline, with 4 out of 6 participants showing stable reductions in ROCD measures. Participants who received combined ACT for OCD and couples demonstrated the highest remission rate and greatest improvement in ROCD symptoms, suggesting that this combined approach may have been the most effective.

Qualitative Study

The single qualitative exploration of ROCD was conducted by Ghomian et al. (2021). They recruited 47 married, clinical participants and examined symptoms, causes and consequences of ROCD. They found that ROCD was the result of three categories of repetitive thoughts about the relationship with the spouse, characteristics of the spouse, and neutralising thoughts (involving repetitive behaviours relating to the spouse). In the category of repetitive thoughts about the spouse's characteristics, infidelity and emotional intelligence were the most prevalent. In the category of repetitive thoughts about the relationship, perfectionism in the relationship and fear of rejection were the most prevalent. In the category of neutralising, help of other thoughts (e.g., opposite thoughts) and help of behaviour (e.g., talking to spouse) were most prevalent. The underlying factors affecting ROCD included obsessive beliefs, environmental conditions, and other disorders. Revealing factors affecting ROCD included environmental driver situations and thought or mental imagery. Consequences of ROCD included specific thinking, emotion, and behaviour (short-term), and the effect on one's spouse and symptoms of depression and aggression (long-term).

Discussion

ROCD is an understudied form of OCD and has a detrimental impact on sufferers, as well as their partners (Doron, Mizrahi, et al., 2014; Littman et al., in press). This scoping review is the first of its kind to systematically examine and synthesise empirical research on ROCD. The aims were to highlight what is currently known about ROCD and identify key areas where future research would be beneficial to strengthen understanding. Altogether 28 studies (from 25 articles) were included, and the literature is composed of cross-sectional, longitudinal, experimental, qualitative, and intervention studies. The majority of studies have come from countries in the Middle East, with a large proportion of the research being conducted by one research group. Most of the studies have been conducted within non-clinical samples, and two measures (ROCI and PROCSI) are predominant for measuring ROCD in the literature. Most studies are descriptive, and there is a paucity of studies employing analytic designs.

Cross-Sectional Studies

Most studies employed a cross-sectional design. These studies examined the association between ROCD and other constructs (e.g., attachment insecurity), allowing researchers and clinicians to get a better understanding of ROCD. From the literature reviewed, there appears to be evidence to suggest that attachment insecurity is associated with ROCD, with consistent evidence linking attachment anxiety with more severe RC symptoms (Doron et al., 2012b; Doron et al., 2013; Kabiri et al., 2017; Trak & Inozu, 2019) and mixed evidence regarding the link between avoidant attachment styles and ROCD symptoms (RC and PF) (Doron et al., 2012a; Doron et al., 2012b; Kabiri et al., 2017). This is in line with wider OCD research regarding association between OCD and attachment insecurity. For instance, a recent meta-analysis conducted by Leeuwan et al. (2020) showed

robust effect sizes of both attachment anxiety and attachment avoidance in relation to OCD symptomatology more generally.

Previous research has drawn on attachment theory to explain why certain individuals may be more susceptible to developing ROCD, and how attachment style may maintain symptoms. Attachment theory suggests that individuals develop distinct attachment styles (secure, anxious, or avoidant) in response to early interactions with primary caregivers, something later in life is translated to romantic partners who replace parents as attachment figures (Bowlby, 1973, 1982; Mikulincer & Shaver, 2010). When an individual receives inadequate or inconsistent care from an attachment figure, this is thought to lead to the development of negative internal representations of self and others, resulting in insecure attachment styles (attachment anxiety or attachment avoidance). Attachment anxiety is characterised by preoccupation regarding an attachment figure's availability or responsiveness in times of need. Attachment avoidance is characterised by distrust and a need to maintain autonomy and emotional distance to suppress attachment needs (Brennan et al., 1998). To cope, individuals adopt dysfunctional strategies aimed at regulating distress. For an anxiously attached individual, this can manifest as attempts to obtain care, support, and love whereas for an avoidantly attached individual, this can manifest as denial of attachment needs and suppression of attachment-related thoughts and emotions. Such strategies are considered maladaptive to the extent that they exacerbate anxiety and reinforce negative cognitive biases in relationships. It is suggested that such experiences can leave individuals vulnerable to developing ROCD (e.g., an individual with an anxious attachment experiencing RC obsessions or an avoidant attachment style experiencing compulsions related to distancing themselves from their partner) in maladaptive attempts to protect oneself. Negative feedback loops can develop when attachment styles influence how individuals with ROCD cope with negative relationship events and intrusive thoughts associated with them. These loops can

lead to counterproductive efforts to manage distress which may further intensify and maintain symptoms over time (Doron et al., 2009).

Several studies explored the association between ROCD and other factors relating to general mental health (e.g., general distress, general OCD symptoms, and maladaptive beliefs). A number of studies consistently found that higher levels of ROCD symptoms were associated with more severe depression, anxiety, and stress (Brandes et al., 2020Doron et al., 2012b; Doron et al., 2016), general OCD symptoms (Brandes et al., 2020; Doron et al., 2012b; Toroslu & Cem Çırakoğlu, 2022), and maladaptive beliefs (Doron et al., 2016; Melli et al., 2018; Melli, under review; Doron et al., 2016; Melli et al., 2018; Toroslu & Cem Çırakoğlu, 2022). These studies suggest consistent associations between ROCD and poorer mental health in general, perhaps reflective of co-morbidities or underlying transdiagnostic processes. This is in line with previous research that has found a strong association between OCD and affective disorders (El-Mallakh & Hollifield, 2008) and evidence that service users with OCD exhibit obsessions and compulsions from different subtypes (Starcevic & Brakoulias, 2008). Several correlational studies explored other variables in relation to ROCD (e.g., ACES, paranoia). However, with only one or two studies exploring each of these associations, it is difficult to draw conclusions.

The number of correlational studies and the consistency of associations found over several studies help to shed light on ROCD in terms of its potentially concurrent experiences or co-morbidities, which is useful to help build a greater understanding of this subtype of OCD. However, correlational research is limited because they do not allow meaningful conclusions to be drawn about the direction or causality of the relationships found between different variables. For example, although attachment insecurity might be a pre-cursor to developing ROCD, it may also be a consequence of it (e.g., having ROCD results in a more insecure attachment style) or both may be underlined by some other third variable driving the

apparent association. Despite the widespread use of the cross-sectional design, this method cannot provide us with an understanding of the mechanisms underlying ROCD, and it is not clear whether there are temporal or causal connections between ROCD and the other constructs and/or whether they are co-morbid traits with no reciprocal influence. This highlights the need for greater use of research designs that enable inferences about causality and potential underlying mechanisms to be drawn, such as longitudinal designs, experience-sampling methods, and experimental work. Such methods will provide a clearer understanding of the direction of the associations found, which may facilitate the development of more targeted, effective treatments for ROCD.

Intervention Studies

Four studies examined the effectiveness of psychological treatment in reducing ROCD. Three assessed the efficacy of an app-based CBT intervention designed to challenge dysfunctional beliefs underlying ROCD. All these studies (Cerea et al., 2020; Roncero et al., 2018; Roncero et al., 2019) found that using the app for 3 minutes a day for 15 days showed promising results for reducing ROCD symptoms and OCD-related beliefs. Two studies examined the impact on self-esteem (Cerea et al., 2020; Roncero et al., 2019) and found that there was a positive impact on improving self-esteem. However, all these studies were not based on clinical samples, with two of the studies recruiting non-clinical samples and one testing the intervention efficacy on a sub-clinical sample. Although these results are, therefore, promising, it is not clear whether similar beneficial effects would be found in service users with clinical levels of ROCD. This is especially important because there is a lack of evidence on how sub-clinical and clinical ROCD symptoms are different and/or similar. As a result, it is not possible to extrapolate what interventions are effective in sub-clinical to clinical samples. For example, would 3 minutes daily for 15 days be sufficient to meaningfully reduce clinical symptom levels? Additionally, could there be potential

drawbacks to using technology-mediated treatment which involves a focus on relationship cognitions? These are questions that research has yet to explore and is therefore recommended. One intervention study conducted by Ghomian et al. (2020) showed promising results that ACT could be used to treat clinical ROCD and that a combined approach with service users and their partners was the most effective. However, due to the small sample size, it is unclear how generalisable these findings are. Future research exploring the efficacy of ACT and involving a relational aspect to treatment, using larger sample sizes, would be beneficial.

Experimental Studies

The four experimental studies examined the effects of manipulating various aspects of ROCD-type cognitions and emotions (e.g., beliefs about the capacity to maintain a long-term relationship) on state outcomes, such as their own OCD symptoms and other aspects (e.g., self-esteem). Overall, it is difficult to draw conclusions about the effects of these manipulates on participants' psychological states because of the low number of studies for each manipulation. However, in general, there seemed to be a relatively complex interplay between the impact of experimental manipulations on symptoms depending on other variables. For instance, Doron et al. (2013) showed that negative feedback regarding one's capacity to maintain a long-term relationship only had a detrimental effect on RC symptoms for participants with both high attachment anxiety and relationship-contingent self-worth. Similarly, negative comparison to others as a manipulation only lowered self-esteem in participants who had high levels of PF symptoms. These studies highlight the complexity of understanding the underlying processes that may contribute to the worsening of ROCD symptoms, and they may depend on complex person-situation interactions.

An experimental manipulation that did not depend on other features of the individual but was found to elicit higher levels of reported ROCD symptoms was providing an individual with information that their partner has high levels of ROCD symptoms (Littman et al., in press). Leading participants to believe that their partner had ROCD symptoms led to heightened ROCD symptoms, regardless of their initial ROCD symptom level. This finding emphasises a potentially important role in considering the relational aspects of ROCD, especially how perceptions and/or behaviour of one's partner contribute in a dynamic way to the worsening or improvement of symptoms over time.

Overall, although there were only a handful of experimental studies, their carefully controlled design is useful for providing greater insight into the causal mechanisms underlying ROCD, something that, ultimately, may help researchers and clinicians develop more targeted interventions to treat ROCD. However, it should be noted that these studies were all conducted in non-clinical samples, making it difficult to generalise to clinical ROCD, making it important to conduct similar research with sub-clinical or clinical samples.

Qualitative Research

There was only one qualitative study within the ROCD research. The aims of this study were to examine symptoms, causes and consequences of ROCD and provide useful insight into the condition. Many of the findings of the qualitative study corroborated or reflected findings of quantitative research (e.g., links to perfectionism) whilst adding granular detail on the lived experience of ROCD. This demonstrates the value of mixed methods approaches for strengthening understanding of mental health conditions in complementary ways.

Critique, Knowledge Gaps, & Recommendations for Future Research

Most studies were conducted with non-clinical samples, meaning that most assumed knowledge of ROCD is generated from non-clinical populations. Whilst the use of non-

clinical participants is common practice within ROCD research (Abramowitz et al., 2014), making inferences about clinical symptomology from non-clinical samples is questionable. It is likely that individuals with ROCD will differ from non-clinical participants in the type and severity of symptoms and level of symptom-related impairment (Doron et al., 2012b). Future research comparing clinical, sub-clinical, and non-clinical samples and attempting to replicate findings from non-clinical samples with clinical groups is therefore a high priority. Future research would benefit from measuring both RC and PF symptoms in their investigations into ROCD to examine both types of ROCD symptoms.

Another important limitation is the selection requirements of participants in ROCD research. A surprising proportion of studies (32.1%) recruited participants who were not in a romantic relationship, with some reporting having never experienced a romantic relationship. It is argued that recruiting participants who are not currently in romantic relationships is beneficial as people with ROCD may avoid romantic relationships (Doron, Derby, et al., 2014). However, it is important that participants have had at least some relationship experience. Future research would benefit from these excluding participants or, at the least, collecting data on relationship status and controlling for its potential influence statistically. Future studies would benefit from better use of diagnostic interviewing and collecting outcomes from partners over the short and long term.

The aim of this review was to provide a useful summary of what is known about ROCD from research; however, it also has served to highlight substantial gaps in understanding. Three important but unresolved questions have been identified and suggestions for how they might be answered by future research:

1) *What are micro-level mechanisms that might shed insight into the course of ROCD in suffers?*

It is notable that all but one of the studies used retrospective questionnaires for exploring ROCD symptoms. None of the studies have examined the variability or day-to-day fluctuations of ROCD symptoms and processes or their causes or consequences for both sufferers and partners. Therefore, the use of experience-sampling and daily diary methods could hold promise in providing a more in-depth understanding of the lived experiences of those suffering from ROCD as well as, crucially, a more granular understanding of causes, consequences, and exacerbating factors of ROCD symptoms.

2) When and why does ROCD develop?

Although some studies examined early childhood factors in ROCD symptoms, there is research required to understand the risk factors contributing to the development of ROCD and chart the development of ROCD (e.g., age of onset). An advanced epidemiological understanding of ROCD would better identify at-risk individuals and enable targeted early intervention. Given that many mental health disorders have a developmental origin in early adolescence (Paus et al., 2008), it may be especially useful to explore the emergence of ROCD in youth and whether it emerges before or after other common mental health co-morbidities (e.g., anxiety, depression, OCD). Another central issue for the ROCD evidence base is understanding how it interacts with other subtypes of OCD over time. Why is it, for example, that some individuals develop ROCD rather than other subtypes? Or is ROCD an extension or transference of other OCD subtypes (e.g., checking)? Therefore, the use of detailed longitudinal studies is indicated.

3) What are the most effective treatment options for those with ROCD?

A large gap identified is the small number of intervention studies and particularly the relative absence of RCTs. The difficulties with recruiting to suitably powered trials would suggest that pilot and feasibility trials would be valuable areas of development. The interventions tested thus far have been cognitive, and therefore evaluating other types of

approaches is indicated. It is recommended that this be completed for both in-person and app-based delivery.

Limitations

While an effort was made to ensure this scoping review was comprehensive, searching a wide range of databases, consulting with authors of relevant literature, and including all study designs, the findings should be considered in light of a number of limitations. Firstly, the exclusion of foreign language materials and grey and "file drawer" literature may have resulted in important findings not being reviewed. From the studies included, it is evident that the research on this phenomenon is taking place across the globe, predominantly in countries where English is not the first language, and therefore it is possible that excluded studies may have answered some of the knowledge gaps identified. Secondly, the synthesis and interpretation of the current findings being completed by a single reviewer may have led to subjective interpretations despite the best efforts to minimise bias. Future reviews can minimise the risk of this bias by ensuring more than one reviewer is involved. Finally, the utility of scoping reviews are limited due to the lack of quality appraisal (Tricco et al., 2018), and the findings should be interpreted with caution. While an overall critique of the literature was provided, a future systematic review critically appraising each of the studies could strengthen the findings.

Conclusion

The ROCD literature is composed of cross-sectional, longitudinal, experimental, qualitative, and intervention studies. The majority of studies explored associations between ROCD and a range of variables, with several studies finding consistent associations between ROCD and attachment insecurity, general distress, general OCD symptoms, and maladaptive beliefs. There was evidence to suggest that an app-based cognitive intervention was effective

in reducing ROCD symptoms in non-clinical samples. The small number of experimental and qualitative studies made conclusions difficult to draw. The main criticisms are the over-reliance on cross-sectional methods, the lack of qualitative studies, the lack of clinical samples, poor diagnostic processes, and the small number of intervention studies. It is recommended that research recruits clinical samples and uses more robust research methods such as longitudinal designs, experience-sampling methods, and experimental work when investigating ROCD.

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Section Two: Empirical Research Report

Attachment, Obsessive-Compulsive Symptoms, and Mind-Wandering in Limerence: A Combined Correlational and Experience-Sampling Study

Abstract

Objectives: Limerence refers to an obsessional state concerning another person (termed a limerent object; LO). The key objectives were to (a) to explore the association between limerence, attachment styles, and limerence-specific obsessive-compulsive disorder (OCD) symptoms, and (b) to explore the frequency and characteristics of mind-wandering and how this relates to mood over time.

Methods: *N*= 235 participants completed online surveys assessing limerence severity, attachment styles, and limerence-specific OCD symptoms and associations were tested using correlations. *N* = 62 of these participants completed a 7-day experience sampling study where they were signalled 8 times daily for 7-days to report on thoughts and feelings (*N* = 2,073 individual responses collected). Data were analysed using multi-level modelling.

Results: Limerence severity was positively associated with attachment anxiety to a LO but not romantic partners, and there was a strong positive association between limerence severity and limerence-specific OCD symptoms. Nearly half the time when signalled, participants were mind-wandering about a LO and LO mind-wandering was associated with less happiness, calmness and boredom, and more sadness and anxiety.

Conclusions: The findings suggest that although limerent individuals appear to have anxious attachment styles towards their LOs, they can form secure attachments in romantic relationships. Limerent individuals spend a large proportion of time mind-wandering about their LO which has a negative impact on mood. Potential treatment options are discussed.

Attachment, Obsessive-Compulsive Symptoms, and Mind-Wandering in Limerence: A Combined Correlational and Experience-Sampling Study

Limerence was coined by Dr. Dorothy Tennov and detailed in her book *Love and Limerence: The Experience of Being in Love* (Tennov, 1979) and concerns a set of similar experiences not universally experienced, identifying a unique cognitive state of romantic infatuation termed 'limerence'. Limerence is an obsessive focus on another person with whom there is romantic interest (termed a limerent object; 'LO') and is associated with a heightened emotional state that drives compulsive behaviours. LOs are typically unaware of their 'status', so feelings are usually unrequited (Tennov, 1979; Wyant, 2021).

There has been limited research into limerence despite consistent journalistic interest and novels describing the phenomenon (e.g., Murdoch, 2020). Limerence remains largely unstudied and often unrecognised in clinical settings (Willmott & Bentley, 2015). Wakin and Vo (2008) suggest that the lack of research was likely due to the mistaken assumption that limerence is similar to infatuation or conventional romantic love. Whilst limerence has the appearance and veneer of falling in love, it has unique components distinguishing it from romantic love and love pathologies. The key differential components of limerence are (1) intrusive and repetitive thoughts about the LO that dominate all other interests and responsibilities, (2) an intense longing for reciprocation that involves compulsively searching for signs of interest and fanciful thinking, (3) intense fear of rejection and emotional instability linked to the perception of reciprocation, (4) biased focus on the LO's positive attributes, and (5) varying degrees of self-consciousness when in the company of the LO (Tennov, 1979).

Research has challenged Tennov's original assertion that limerence is a normal condition rather than a pathological state. Wakin and Vo (2008) conceptualised limerence as

inherently pathological and detrimental to functioning. Others have suggested that limerence lies on a continuum of intensity and functional impairment (Beaudoin et al., 2020). People living with limerence (termed 'limerents'; Tennov, 1979) find the experience extremely debilitating, causing significant ongoing disruption (Willmott & Bentley, 2015).

Limerents can find themselves 'stuck' in the involuntary state for months or even years with the same LO (Tennov, 1979; Wyant, 2021) or find themselves in repetitive, cyclical limerent patterns with different LOs (Tennov, 1979; Wyant, 2021). Limerence impairs functioning at work, in education and existing relationships, with previous research suggesting that it co-occurs with serious mental health consequences and various negative outcomes (Tennov, 1979; Willmott & Bentley, 2015). The advent of the internet has enabled growing online mutually supportive communities of individuals who self-identify as experiencing limerence (Willmott & Bentley, 2015). Understanding limerence is a goal shared by researchers, clinicians and individuals with lived experience (Tennov, 1979; Willmott & Bentley, 2015; Wyant, 2021).

Research into limerence is still in its infancy, with only a handful of correlational reports and one in-depth qualitative study. The small evidence base that does does exist has linked limerence to attachment insecurity (Feeney & Noller, 1990; Wolf, 2017), low self-esteem (Feeney & Noller, 1990; Wolf, 2017), perfectionism (Flett et al., 2001), excessive mind-wandering (Wolf, 2017), maladaptive fantasy (Willmott & Bentley, 2005), and psychiatric conditions such as depression, anxiety, and obsessive-compulsive disorder (OCD) (Willmott & Bentley, 2015; Wyant, 2021). Since the existing empirical research into limerence has been correlational (Flett et al., 2001; Wolf, 2017) and qualitative (Tennov, 1979), the direction of causality between limerence and associated mental health difficulties, or other potential explanations, is currently unknown.

The present novel study examines limerence using a combination of questionnaires and experience-sampling methodology to build upon and extend previous research. In the following sections, the previous research on limerence and (1) attachment, (2) OCD, and (3) mind-wandering are reviewed, which serves as the basis for the current study and the proposed hypotheses.

Limerence and Attachment

The notion that limerence is associated with an anxious attachment was first proposed by Hazan and Shaver (1987). In their work extending Bowlby's (1969, 1973, 1980) and Ainsworth et al.'s (1978) theories of attachment patterns in infancy, Hazan and Shaver (1987) developed a three-category measure (avoidant, secure, and anxious-ambivalent) to identify attachment patterns in adult romantic relationships. They proposed that Tennov's participants likely had an 'anxious-ambivalent' attachment style. Two subsequent studies have found that limerence is associated with an anxious attachment style (Feeney & Noller, 1990; Wolf, 2017).

Feeney and Noller (1990) examined the association between adult attachment style and a questionnaire measure of individual differences in limerence. Here, limerence was conceptualised, in line with Tennov's original hypothesis, as a state of normal rather than pathological functioning, and the scale created comprised four dimensions of limerent experience (obsessive preoccupation, self-conscious anxiety, emotional dependence, and idealisation of partner). In a non-clinical sample of undergraduates, Feeney and Noller (1990) found that those with anxious-ambivalent attachment styles were more likely than avoidants to score higher on three out of four limerence dimensions, reflecting a tendency for anxious-ambivalent individuals to idealise their romantic interest, be emotionally dependent on them, and be mentally preoccupied with thoughts of them. Wolf (2017) later replicated Feeney and

Noller's (1990) work using a different and newly developed measure of limerence (Wolf & Lemay, 2015), as well as a different measure of attachment style (Experiences in Close Relationships-Revised Questionnaire; Brennan et al., 1998). Again, with an undergraduate sample and characterisation of limerence as reflecting feelings towards someone participants were romantically attracted to, Wolf (2017) found that higher levels of limerence were positively associated with attachment anxiety. As both studies were conducted in student, non-clinical populations, with a broad non-clinical conceptualisation of limerence, they are limited in their clinical utility (Peterson & Merunka, 2014).

The current study, therefore, aims to build on this previous work to develop an understanding of the association between limerence and attachment insecurity, but in a global and more demographically diverse sample of participants that self-identify as suffering from limerence at the outset. The current study also sought to extend previous research by clearly distinguishing between attachment styles within different relationships, including with LOs and non-limerent relationships. It is proposed that limerence may be associated with different attachment styles depending on the relationship being assessed, for example, attachment to a LO may be more anxious than attachment to a real-life romantic relationship. Indeed, anecdotally, there are reports of limerents having a concurrent romantic and limerent relationship, but the structure of attachment style has yet to be compared.

Limerence and OCD

Previous literature suggests that limerence shares similarities and may co-occur with OCD (Wakin & Vo, 2008; Willmott & Bentley, 2015; Wyant, 2021), but this has yet to be established empirically. Several features of limerence, such as persistent, intrusive, obsessive thinking about the LO and overt and covert compulsions performed to alleviate distress (e.g., fantasying), have parallels with the diagnostic criteria for OCD (International Classification

of Diseases (ICD-11); World Health Organisation, 2019). Engaging with the compulsions is time-consuming and interferes with everyday functioning (e.g., compulsively checking their LO's social media; Wyant, 2021). Investigating the association between obsessions and compulsions in limerence has the potential to provide useful insight into limerence by linking it to more well-established models of OCD. This could allow for assessment tools and treatments to be developed. In the current study, exploring whether limerence could be conceptualised and measured using tools common in the OCD literature was a key interest, focusing on limerent-specific obsessions and compulsions and their impact on individuals.

Limerence and Mind-Wandering

Mind-wandering is an umbrella term to describe any form of self-generated thinking unrelated to a person's current task or the external environment (Smallwood & Schooler, 2015). During mind-wandering, attention is intentionally or unintentionally decoupled from perception (Seli et al., 2016). Previous research suggests that mind-wandering may play a role in limerence. Wolf (2017) assessed the association between limerence and mind-wandering (using the Mind-Wandering Questionnaire; Mrazek et al., 2013), finding that limerence severity was associated with an increased propensity to mind-wandering. The interpretation of this association was that trait mind-wandering reflects diminished cognitive control, a general trait that may also underlie the cognitive intrusions characteristic of limerence. However, this research only examined trait perceptions of mind-wandering, rather than actual mind-wandering events, and crucially, there was no attempt to determine whether mind-wandering is generally excessive in limerence or whether it is mind-wandering about a LO specifically that underlies this association. Furthermore, previous research has established that mind-wandering impacts mood, well-being, and spirals of maladaptive perseverative cognitions (Killingsworth & Gilbert, 2010; Marchetti et al., 2016; Poerio et al., 2013). Therefore, the current study aimed to explore mind-wandering and limerence with greater

granularity and reliability by exploring its frequency, content, and associations with mood in daily life using experience-sampling.

The Current Research

The current research has two parts, the first uses an online survey for robust screening purposes in a self-identified limerent sample. This survey was used to contextualise the sample in terms of limerence, attachment insecurity (to the LO and more generally), and limerence-specific obsessions and compulsions. This was followed by experience sampling exploring the frequency and characteristics of mind-wandering and how it relates to mood over time (Hormuth, 1986). Experience sampling is the repeated, context-sensitive measurement of thoughts, feelings, judgements, and behaviours over a given period (Conner et al., 2009). It offers insights into how people think, feel, and behave in their natural environment (Hofmann & Patel, 2015). It has been used to good effect in previous studies exploring mind-wandering in different populations (Poerio et al., 2013; Poerio et al., 2017). The use of experience-sampling methodology in the limerence literature is entirely novel.

Aims of the Research

1. To understand the relationships between limerence severity, attachment style, and limerence-specific OCD symptoms in a limerent sample.
2. To use experience-sampling methodology to better capture the dynamic and moment-to-moment experience of limerent thoughts and feelings.
3. To assess the role of mind-wandering about a LO in a limerent population.

Hypothesises

1. Limerence severity will be positively associated with higher levels of attachment anxiety (in both limerent and non-limerent relationships).

2. Limerence severity will be positively associated with higher levels of obsessive thinking and compulsive behaviour in the context of the LO.
3. Limerent thoughts in daily life will be positively associated with higher levels of state negative affect.

Methods

Public Participation and Ethics

This study was designed in consultation with people with lived experience of limerence. Members of two Facebook limerence support groups were invited to an online focus group (see Appendix A), and two women attended. The proposed research was presented (see Appendix B), and feedback on feasibility and acceptability was sought. The focus group lasted 90 minutes and was transcribed verbatim. All suggestions and decisions were recorded (see Appendix C).

Attendees expressed satisfaction with the study's aims and methodology. They collaborated on decision-making relating to the eligibility criteria, survey questions and response choices, and study documentation (e.g., participant information sheet). For example, the eligibility criteria were altered to allow people not sexually attracted to their LO to participate rather than an explicit focus on romantic limerence, which has dominated thus far. Additional survey questions were included, and the wording of questions was altered to be clearer or more inclusive. Attendees highlighted the need to consider that some participants may never have been in a romantic relationship, making the attachment questionnaires difficult to complete. As a response, participants were asked about their experience of romantic relationships, and those who had not been in a previous romantic relationship were invited to complete an alternative attachment questionnaire.

The study was piloted by the researcher and one of the women. A non-structured interview was conducted, and her feedback was incorporated into the experience sampling training. For example, participants were encouraged to consider how they would explain their participation to people unaware of their limerence (e.g., spouses). In addition, prospective participants were offered training via email if they wished due to the difficult experiences associated with limerence (e.g., shame). Following the public consultation, ethical approval was obtained from The University of Sheffield's ethics committee (reference: 046754; see Appendix D).

Participants

Sample Size Justification

The sample size target was based on power analysis for the level-2 analyses (survey and aggregated experience-sampling data), which suggested that a minimum sample size of 64 was required to detect a medium effect (r = .30) at an alpha level of .05 and power set at 80% (one-tailed). Power in multi-level designs arises from a complex combination of factors (Mathieu et al., 2012) because sample size reflects both the number of level-2 units (i.e., participants) and the number of level-1 units (i.e., time points). As a result of this complexity, sample size recommendations often represent a trade-off between the two (Hox, 2010; Scherbaum & Ferreter, 2009), comprising the number of participants and the number of time points sampled. For this study, a conservative decision was to base a priori power analyses on level-2 analyses rather than those on level-1 (because there would naturally be more time points than participants).

Recruitment and Eligibility Criteria

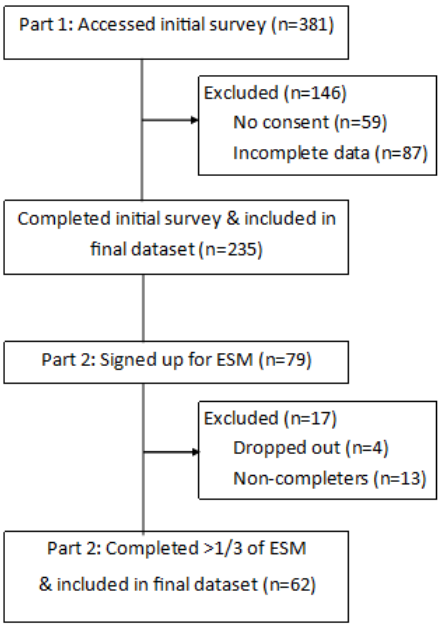
Participants were recruited via Internet advertisements and snowball sampling (Goodman, 1961). This approach enables the recruitment of a large, diverse sample in a cost-

effective and timely manner (Gosling & Mason, 2015) and can recruit participants from hard-to-reach populations (Johnson, 2014). The researcher contacted administrators of limerence-related websites (e.g., forums, blogs, and social media pages) and sought permission to share the study advertisement (see Appendix E). Several participants shared the study with other 'limerents.'

To be eligible, participants needed to be over 18, self-define as having experienced limerence (using a definition within the participant information sheet; see Appendix F), have a smartphone with internet connection and be proficient in English. Participants did not need to be currently limerent. Participants from India and Vietnam were excluded from the experience sampling study due to issues with receiving text messages from the mobile research platform SurveySignal (Hofmann & Patel, 2015). Participants provided informed consent and were informed that they were free to withdraw at any time. There were no participation incentives offered. See Figure 1 for a flowchart of participant exclusion.

Figure 1

Flowchart of Participant Exclusion



Initial Survey

Three hundred and eighty-one people accessed the initial online survey. *N*=235 participants (178 women, 50 men, 6 non-binary, 2 other/prefer not to say; M_{age} = 33.9 years) completed all the screening measures and were included in the final data set. Participants were from 34 countries, with the majority being from the United States of America (USA; 50%), followed by the United Kingdom (UK; 15%), Canada (6%), and India (4%).

Experience-Sampling Study

Seventy-nine participants signed up for the 7-day experience-sampling study; four withdrew during the study. Per standard guidelines (Delespaul, 1995), 13 participants who responded to fewer than one-third of the signals (19) were considered non-completers and excluded from analyses. The final sample was 62 (44 women, 15 men, 3 non-binary; M_{age} = 35.2 years) from 19 countries, with the majority being from the USA (41%), followed by the UK (23%) and Mexico (5%).

Procedure

Prospective participants accessed the study via a hyperlink or by scanning a Quick Report (QR) code that directed them to the online survey platform Qualtrics. Participants were presented with a participant information sheet and a consent form (see Appendix G). Participants who consented to participate were asked an eligibility question: “Have you experienced limerence in your life? (“Yes”; “No”). Those who indicated “No” were redirected to an end-of-survey message. Participants who answered affirmatively then completed the following measures: (1) demographics, (2) experience of limerence, (3) a revised version of Wolf & Lemay’s (2015) limerence measure, (4) two versions of the Relationship Structures (ECR-RS) questionnaire (Fraley et al., 2011), and (5) a modified limerence-specific version of the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS;

Goodman et al., 1989) (see Appendix H). Participants opting to participate in the experience-sampling measures (ESM) were contacted by the researcher (see Experience-Sampling Protocol). Participants were sent a debrief (see Appendix I), and individuals who engaged in the ESM were sent a feedback form (see Appendix J).

Measures

Initial Survey

Demographics. The following demographic information was collected: age, gender, country of residence, ethnicity, employment status, sexual orientation, relationship status, relationship type (e.g., monogamous, polyamorous), whether they have been diagnosed with any mental health or neurodevelopmental disorders (yes/no), whether they had received treatment for limerence (e.g., medication, counselling, therapy) (yes – currently; yes – in the past; no – never), and whether they had been in a previous romantic relationship (non-limerent) (yes/no).

Limerence-Related Questions. Participants were asked whether they were currently in a limerent episode (yes/no) and whether they were sexually attracted to their current or most recent LO (yes/no). Participants were asked the following questions: (1) How many limerent episodes have you had in your life? (2) What is the shortest amount of time a limerent episode has lasted? (3) What is the longest amount of time a limerent episode has lasted for? (4) At what age did you start experiencing limerence? and (5) What is your relationship with your current or most recent LO? Participants typed their answers in free-text boxes.

Limerence Severity. Limerence severity was measured using a revised version of Wolf and Lemay's (2015) 30-item limerence measure. The revised measure is a 24-item version with comparable internal reliability to the original measure ($\alpha = .89$). The original

measure was revised to reduce participant burden (proposed by the consultation group). The scale assesses core features of limerence outlined by Tennov (1979), and participants rated their agreement to each item concerning their current or most recent LO using a 7-point scale from 1 *(strongly disagree)* to 7 (*strongly agree).* Eight subscales measured the following components of limerence: (1) Exclusivity (3 items; α = .77) measuring the inability to be limerent towards more than one person, (2) Intrusive Thinking (3 items; α = .81) measuring intrusive thinking about the LO, (3) Uncertainty (3 items; α = .74) measuring uncertainty of the LO's true feelings, (4) Idealisation (3 items; α = .80) measuring idealisation of the LO, (5) Ache in Chest (3 items; α = .93) measuring aching in the chest, (6) Elation (3 items; α = .85) measuring elation when reciprocation seems evident, (7) Apprehension (3 items; α = .82) measuring apprehension when in the LO's presence, and (8) Inability to Become Non-Limerent (3 items; α = .83) measuring inability to become non-limerent towards the LO. Item order was randomised. Items were averaged to provide scores for each subscale and an overall score where higher scores indicate higher levels of limerence (α = .89).

Attachment Style. Attachment style was measured using Fraley et al.'s (2011) 9-item ECR-RS questionnaire, which has two subscales (Avoidance: 6 items; Anxiety: 3 items). Item order was randomised. Participants completed the questionnaire twice, first concerning their current or most recent LO and then concerning a romantic or close other. Participants who had previously been in a non-limerent romantic relationship (*n* = 178) answered concerning their current or most recent romantic partner. Fifty-seven individuals who reported never having been in a romantic relationship answered concerning the person with whom they had the closest non-limerent relationship (e.g., best friend). For each item (e.g., "It helps to turn to this person in times of need"), participants rated their agreement using a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree).* Two scores, one for attachment-related avoidance and one for attachment-related anxiety, were computed for each

relationship type. The avoidance score was computed by averaging items 1-6 while reverse scoring items 1, 2, 3, and 4. Higher scores indicated greater attachment avoidance (current or most recent LO; α = .82; romantic partner; α = .89; close other; α = .90). The anxiety score was computed by averaging items 7-9, with higher scores indicating greater attachment anxiety (LO; α = .80; romantic partner; α = .89; close other; α = .95).

Obsessive Thinking and Compulsive Behaviour. Limerence-specific OCD symptoms were measured using a modified version of the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman et al., 1989). Previous adaptions of this scale, such as the Pathological Gambling-Yale-Brown Obsessive-Compulsive Scale (PG-YBOCS; Pallanti et al., 2005), have provided reliable and valid measures of symptom severity in other obsessive-compulsive and impulse control disorders. The Limerence-Yale-Brown Obsessive-Compulsive Scale (L-YBOCS) newly developed for this research comprised two subscales, each with 5 items (Obsessive Thinking: α = .68; Compulsive Behaviour Subscale: α =.85). For each item (e.g., "How much distress do your obsessive thoughts related to your LO cause you?"), participants rated their experience using a 5-point scale (0 = *none* to 4 = *near constant and disabling distress).* Items were summed to provide a total score where higher scores indicated greater severity of OCD-type symptoms relating to the LO (α = .85).

Experience Sampling Protocol

After completing the initial survey, participants were invited to a 30-minute training session. Participants signed up for a time slot listed and attended a small online group session. Alternatively, participants were invited to contact the researcher to arrange to meet individually or receive the information via email. The session included a demonstration of the ESM, a verbal explanation of survey questions and items, and an opportunity to ask questions. Participants then nominated a day to begin and were signed up for SurveySignal

(Hofmann & Patel, 2015), which delivered experience-sampling prompts to participants' smartphones. Participants were signalled via text message 8 times daily for 7 consecutive days to answer short surveys (Csikszentmihalyi & Larson, 2014). Signals were scheduled to be delivered randomly between 09.00 and 22.00, with at least 1 hour between consecutive signals. This time frame was chosen as it is during typical waking hours for most people (Csikszentmihalyi & Larson, 2014) and has been used to explore mind-wandering using ESM in previous studies (Turnbull et al., 2021). The text messages contained a hyperlink to a Qualtrics survey that was accessible for 30 minutes, after which the survey became inactive (i.e., a missed response).

Experience Samling Measures

When signalled, participants were asked to complete a series of questions concerning their thoughts and feelings immediately before being signalled (see Appendix L).

Mind-Wandering about LO. Mind-wandering about a LO was measured with two items: (1) "Were you thinking about a LO?" (Response options: "yes" / "no") and (2) "How much has this LO occupied your thoughts over the last 30 minutes?". Responses were made on a 5-point scale from 1 *(not at all) to* 5 *(completely).* The first question was intended to capture in the moment mind-wandering about a LO, whereas the latter was intended to provide a rough estimate of mind-wandering about a LO over a relatively longer time frame.

Content of LO Mind-Wandering. When participants were mind-wandering about a LO, they rated the extent to which the following statements described the content of that thought: (1) "I was thinking about a past interaction with this LO", (2) "I was thinking about a future interaction with this LO", (3) "I was imagining reciprocated desire from this LO", (4) "I was searching for signs of interest from this LO", and (5) "I was thinking about this LO for

pleasure." Responses were made on a 5-point scale from 1 *(not at all) to* 5 *(extremely).* These questions were intended to capture and characterise the content of limerent mind-wandering.

LO Beliefs. Regardless of whether the participant was mind-wandering about an LO, they rated their agreement with two statements: 1) "I believe that my LO wants a relationship with me" and 2) "I am uncertain about my LO's true feelings about me" from 1 (*strongly disagree)* to 6 (*strongly agree).* These questions were intended to capture potential moment-to-moment variation in held beliefs about the LO.

Mood. Participants rated the extent to which they were currently feeling: (1) happiness, (2) sadness, (3) anxiety, (4) calmness, (5) excitement, and (6) boredom from 1 *(not at all)* to 5 (*extremely).* These measures of affect were chosen as they reflect the pleasure (valence) and arousal (activation) dimensions of core affect (Remington et al., 2000) and have been used in previous studies exploring mind-wandering and mood (Poerio et al., 2013).

Participant Feedback

ESM participants were sent a feedback form (see Appendix J) and were asked the following questions: (1) How was your overall experience of the study? (2) Is there anything you particularly liked about the study? (3) Is there anything you would change about the study? and (4) Would you recommend the study to other people you know have limerence? This feedback was to assist in identifying strengths and limitations from participants' perspectives, determine if there were any beneficial or adverse experiences associated with ESM relating to limerence, and improve future research. This was agreed upon during the public consultation as ESM had not been used with this population before. Feedback was reviewed and common or consistent feedback was identified.

Analysis Strategy

Prior to analysis, data were cleaned and screened. Duplicate responses were removed, and data of non-completers were excluded from analyses (Delespaul, 1995). Histograms and boxplots were conducted to explore whether the variables were normally distributed, check for potential outliers and determine whether parametric or non-parametric statistical tests were most appropriate (Mishra et al., 2019). All the variables were normally distributed, so parametric statistical tests were used (Mishra et al., 2019). Correlations were used to analyse the relationship between limerence severity, attachment style, and limerence-specific OCD symptoms. Experience-sampling data were analysed with multi-level modelling (MLM) (Hox, 2010) using SPSSMIXED. Level-1 independent variables were frequency and characteristics of mind-wandering (e.g., the content of thoughts and beliefs), with mood items as the dependent variables. Level-1 experience-sampling data was also aggregated to level-2 to explore associations between mind-wandering and trait-level variables (e.g., attachment). As an additional check of potential differences between the initial survey and ESM samples, a series of parametric independent samples t-tests were conducted to determine whether there were any significant differences in key variables (e.g., age, limerence severity). There were no significant differences between samples on age, limerence severity, limerence-specific OCD symptoms, number/length of limerent episodes, or attachment style. The ESM sample did have a slightly lower average age of limerent onset (15 years compared to 18 years) compared to survey responders, but this difference would be statistically non-significant if correcting for multiple comparisons. Table 2 shows the full results of these analyses.

Presentation of Results

The results from the entire sample (*N*= 235) completing the initial survey are first presented. These analyses describe key features of limerence reported by the sample and examine associations between limerence severity and other individual difference measures (e.g., attachment insecurity, limerent-specific OCD symptoms). Next, the results from smaller

experience-sampling data (N = 62) will be presented. First, aggregated data (level-1 responses aggregated to level 2) will be presented to describe the key characteristics of mind-wandering and its associations to level-2 individual difference variables (e.g., limerence severity and attachment insecurity). Second, results from MLM analyses will be presented, in which the effects of limerent mind-wandering, content of thoughts, and beliefs on mood states were examined.

Results

Demographics and the descriptives of the two samples are presented in Table 1 and Table 3. Differences between the samples are presented in Table 2. Means, standard deviations and correlations between key level-2 variables are displayed in Table 4.

Initial Survey Results

Descriptives

Experiences of limerence varied considerably. The frequency of limerent episodes ranged from 1 to 100 episodes (M = 7.33), and the age of onset ranged from 4-62 years (M = 17 years). Participants' shortest limerent episodes ranged from 5 minutes to 30 years, with the average shortest length reported as over 1 year (M = 15.1 months). Participants' longest limerent episodes ranged from 95 minutes to 40 years, with the average longest length being over 5 years (M = 61.0 months). N= 205 participants provided information on LO status. A friend was the most cited (26.8%), followed by a co-worker (20.0%), an acquaintance (13.2%), a stranger (11.2%) and an ex-partner (9.8%).

Limerence Severity and Attachment Styles

To the LO. Limerence severity was significantly negatively correlated with LO attachment avoidance ($r(233) = -.16$, $p = .016$) but significantly positively correlated with LO

attachment anxiety ($r(233) = .29$, $p < .001$). This suggests that individuals with higher limerence severity are likely to have an attachment style to their LO that is higher in anxiety and lower in avoidance.

To a Romantic Partner. There was no significant association between limerence severity and either attachment avoidance ($r(176) = -.02$, $p = .822$) or attachment anxiety ($r(176) = -.11$, $p = .148$) in the context of romantic partners. This suggests that limerence severity, although related to LO attachment style, is not significantly associated with attachment in non-limerent romantic relationships. If anything, the pattern of results suggests a negative association between limerence severity and attachment anxiety.

To a Close Person. For those who had never been in a romantic relationship, limerence severity was significantly positively correlated with attachment anxiety in close relationships ($r(53) = .29$, $p = .034$). However, there was no significant association with attachment avoidance ($r(54) = .11$, $p = .434$). This suggests that limerence severity is significantly associated with attachment anxiety in close relationships for individuals who have not had a previous romantic relationship.

Relationships Between Limerence Severity and OCD-Type Symptoms

Limerence severity and limerence-specific OCD symptoms were strongly positively correlated ($r(233) = .51$, $p < .001$), providing tentative support that limerence may be characterised using an OCD framework.

ESM; Level-2 and Aggregated Level-1 Data (N = 62)

Mind-Wandering About LO.

Participants were mind-wandering about a LO 45% ($SD = 26$) of the time when signalled (see Table 3). However, there was considerable individual variation (range 0.00 to

100.00%). Furthermore, the average amount of time spent mind-wandering about a LO was negatively correlated with LO attachment avoidance ($r(60) = -.25$, $p < .01$) but positively correlated with romantic partner attachment avoidance ($r(60) = .30$, $p < .01$). This suggests that participants who mind-wandered more about a LO tended to be low in avoidant attachment to their LO but high in avoidant attachment to their romantic partner.

Level-1 Data (*N* = 2073 Observations From 62 Participants)

Response Rate & Descriptives

The mean signal response rate was 60% (*SD* = 17%), representing 2,073 individual responses collected from 62 participants. Of these 62 participants, 82% reported being currently limerent. For this subsample, the average age of limerence onset was 15 years. Over half (66%) reported having a mental health or neurodevelopmental disorder, and 36% reported current or previous treatment for limerence. Fifty-six participants provided information on LO status. A co-worker was the most cited (20.0%), followed by a friend (26.8%), an acquaintance (11.2%), and a stranger (10.7%).

Content of Limerent Thoughts

When mind-wandering about a LO, participants were questioned on the content of their limerent thoughts. Participants reported that they were most often thinking about a past interaction with their LO (*M* = 3.98, *SD* = 1.04), followed by searching for signs of interest (*M* = 2.69, SD = .83); followed by thinking about a future interaction with their LO (*M* = 2.54, *SD* = 1.10); followed by thinking about their LO for pleasure (*M* = *2.41*, *SD* = 0.89); and finally, imagining reciprocated desire from their LO (*M* = 2.18, *SD* = 0.68).

Table 1

Demographics and Descriptives of the Two Samples Collected at Baseline

Demographic Category	Initial Survey *N*=235 (%)	ESM *N*=62 (%)
Gender		
Female	178 (75.7%)	44 (71.0%)
Male	50 (21.3%)	15 (24.2%)
Non-Binary	5 (2.1%)	3 (4.8%)
Other/Prefer Not to Say	2 (0.9%)	
Country of Residence		
Australia	7 (3.0%)	2 (3.2%)
Brazil	3 (1.3%)	1 (1.6%)
Cambodia	1 (0.4%)	1 (1.6%)
Canada	13 (5.5%)	2 (3.2%)
Colombia	3 (1.3%)	1 (1.6%)
Croatia	2 (0.9%)	
Cyprus	1 (0.4%)	1 (1.6%)
Czech Republic	1 (0.4%)	
Ecuador	1 (0.4%)	
Finland	1 (0.4%)	1 (1.6%)
France	5 (2.1%)	1 (1.6%)
Germany	5 (2.1%)	1 (1.6%)
Greece	1 (0.4%)	
India	10 (4.3%)	
Ireland	1 (0.4%)	
Italy	3 (1.3%)	1 (1.6%)
Mexico	3 (1.3%)	3 (4.9%)
The Netherlands	1 (0.4%)	1 (1.6%)
New Zealand	2 (0.9%)	2 (3.2%)
Pakistan	1 (0.4%)	
Portugal	1 (0.4%)	1 (1.6%)
Romania	1 (0.4%)	1 (1.6%)
Russia	1 (0.4%)	
Singapore	2 (0.9%)	
Slovakia	2 (0.9%)	1 (1.6%)
South Africa	2 (0.9%)	
Spain	1 (0.4%)	
Sweden	3 (1.3%)	1 (1.6%)
Turkey	2 (0.9%)	
United Arab Emirates	1 (0.4%)	
United Kingdom	34 (14.5%)	14 (22.7%)
United States	115 (48.9%)	25 (40.4%)
Vietnam	1 (0.4%)	
Zambia	1 (0.4%)	
Prefer Not to Say	3 (1.3%)	1 (1.6%)
Ethnicity		
Asian	24 (10.2%)	2 (3.2%)
Black	10 (4.3%)	3 (4.8%)
White	144 (61.2%)	37 (59.8%)
Mixed	34 (14.5%)	10 (16.1%)
Other	17 (7.2%)	7 (11.3%)
Prefer Not to Say	6 (2.6%)	3 (4.8%)

Employment Status		
Full-Time	146 (62.1%)	41 (66.1%)
Part-Time	46 (19.5%)	13 (21.0%)
Unemployed	34 (14.5%)	8 (12.9%)
Retired	6 (2.6%)	
Disability/Sick Leave	3 (1.3%)	
Sexual Orientation		
Asexual	3 (1.2%)	2 (3.2%)
Bisexual	36 (15.3%)	9 (14.5%)
Gay/Lesbian	23 (9.8%)	6 (9.7%)
Heterosexual	147 (62.6%)	36 (58.1%)
Pansexual	12 (5.1%)	5 (8.1%)
Other	7 (3.0%)	2 (3.2%)
Prefer Not to Say	7 (3.0%)	2 (3.2%)
Relationship Status		
Single	109 (46.4%)	30 (48.4%)
In a relationship	52 (22.1%)	12 (19.4%)
Married	67 (28.5%)	17 (27.4%)
Separated/Divorced	7 (3.0%)	3 (4.8%)
Relationship Type		
Monogamous	192 (81.7%)	44 (71.0%)
Polyamorous	19 (8.1%)	9 (14.5%)
Neither/Other	24 (10.2%)	9 (14.5%)
Mental Health or Neurodevelopmental Disorder		
Yes	156 (66.4%)	41 (66.1%)
No	79 (33.6%)	21 (33.9%)
Received Treatment for Limerence		
Yes – Currently	45 (19.1%)	16 (25.8%)
Yes – Past	39 (16.6%)	13 (21.0%)
No – Never	151 (64.3%)	33 (53.2%)
Previous Romantic Relationship		
Yes	178 (75.7%)	50 (19.4%)
No	57 (24.3%)	12 (80.6%)
Current Limerent Episode		
Yes	197 (83.8%)	51 (82.3%)
No	38 (16.2%)	11 (17.7%)
Sexual Attraction to LO		
Yes	223 (94.9%)	57 (91.9%)
No	12 (5.1%)	5 (8.1%)
LO	**Initial Survey *N=205***	**ESM *N=56***
Friend	55 (26.8%)	13 (23.2%)
Co-worker	41 (20.0%)	15 (26.8%)
Stranger	23 (11.2%)	6 (10.7%)
Ex-partner	20 (9.8%)	3 (5.4%)
Sexual partner (current/former)	16 (7.7%)	1 (1.8%)
Boss	7 (3.4%)	1 (1.8%)
Online friend/acquaintance	5 (2.4%)	3 (5.4%)
Teacher/professor (current/former)	4 (2.0%)	2 (3.5%)
Student (current/former)	3 (1.5%)	0 (0.0%)
Community leader	2 (1.0%)	2 (3.5%)
Therapist	1 (0.5%)	0 (0.0%)
Client	1 (0.5%)	0 (0.0%)

Table 2

Differences between initial survey sample (n = 235) and ESM sample (n = 62)

Variable	Initial Sample		ESM Sample		Independent-samples t-test				
	Mean	SD	Mean	SD	*t*	*df*	*p*	*d*	95% CI
Age	33.43	11.54	35.15	10.01	-1.04	233	.299	-.15	[-4.97, 1.54]
Limerence Severity	5.27	0.93	5.36	0.62	-.70	233	.484	-.10	[-.34, .16]
No. of Limerent Episodes	6.56	13.70	9.47	17.77	-1.32	233	.188	-.20	[-7.24, 1.43]
Shortest LE (in months)	15.92	33.58	12.67	23.25	.69	225	.490	.10	[-6.01, 12.50]
Longest LE (in months)	57.97	55.95	69.71	87.39	-1.18	225	.238	-.18	[-31.28, 7.80]
Age of Onset	18.17	8.74	15.10	5.71	2.58	233	.011	.38	[.72, 5.42]
Attachment Avoidance (Romantic Partner)	2.99	1.63	2.70	1.49	1.11	176	.269	.19	[-.23, .82]
Attachment Anxiety (Romantic Partner)	3.32	2.00	3.30	1.96	.07	176	.945	.01	[-.63, .68]
Attachment Avoidance (to LO)	3.91	1.41	3.76	1.56	.69	233	.493	.10	[-.28, .57]

Attachment Anxiety (to LO)	5.75	1.34	5.73	1.22	.08	233	.940	.01	[-.37, .40]
Attachment Avoidance (to close person)	2.95	1,54	2.79	1.49	.33	54	.745	.11	[-.84, 1.16]
Attachment Anxiety (to a close person)	3.41	2.19	3.08	1.56	.48	53	.631	.16	[-1.03, 1.69]
OCD-type Symptoms Severity	18.29	6.92	18.44	6.34	-.14	233	.889	-.02	[-2.12, 1.84]

Note. SD = standard deviation, ESM = experience sampling measures, LO = limerent object, LE = limerent episode, *t* = t-statistic, *df* = degrees of freedom, *p* = p-value, *d* = Cohen's d, 95% CI is the 95% confidence interval for the mean difference, OCD = obsessive-compulsive disorder.

Table 3

Descriptives of the Two Samples Collected at Baseline

	N=235						N=62					
Characteristics of Limerence	M	SD	Min.	Max.	Mdn	Mode	M	SD	Min.	Max.	Mdn	Mode
No. of episodes	7.33	14.90	1.00	100.00	4.00	2.00	9.47	17.77	1.00	100.00	5.00	3.00
Age of onset	17 yrs	8.15	4 yrs	62 yrs	15 yrs	14 yrs	15 yrs	5.51	7yrs	33yrs	14 yrs	14 yrs
Shortest episode	15.1 mths	31.12	5 mins	30 yrs	6 mths	12 mths	10.28 mths	15.64	1 hr	8 yrs	4 mths	12 mths
Longest episode	61.0 mths	65.57	95 mins	40 yrs	4 yrs	2 yrs	67.65 mths	86.98	8 hrs	40 yrs	3 yrs	3 yrs

Note. M = mean; SD = standard deviation; Min. = minimum; Max. = maximum; Mdn = median; mins = minutes; yrs = years; mths = months; mins = minutes.

Table 4

*Means, Standard Deviations and Correlations Between Key Study Variables (*N = *235)*

Variable	**M**	**SD**	**(1)**	**(2.1)**	**(2.2)**	**(3.1)**	**(3.2)**	**(4.1)**	**(4.2)**	**(5)**
(1) Limerence Severity	5.29	0.86	--	-.16*	.29**	-.02	-.11	.11	.29*	.51**
(2.1) Attachment Avoidance: LO	3.87	1.45		--	-.06	-0.2	.09	-.13	-.02	-.20**
(2.2) Attachment Anxiety: LO	5.74	1.30			--	.06	.14	.18	.31*	.23**
(3.1) Attachment Avoidance: Romantic Partner	2.91	1.59				--	.29**	--	--	-.04
(3.2) Attachment Anxiety: Romantic Partner	3.31	1.99					--	--	--	-.10
(4.1) Attachment Avoidance: Close Person	2.92	1.52						--	.19	.16
(4.2) Attachment Anxiety: Close Person	3.34	2.06			.				--	.31*
(5) OCD-type Symptoms	11.25	3.10								--

Note. **p<.001, *p<.01

The Impact of LO Mind-Wandering on Mood

Fixed effects of mind-wandering (yes vs no) about a LO were significant for happiness (β = .22, SE = .04, t(1939) = 5.25, p < .001, 95%CI[0.14, 0.30]), sadness (β = -.52, SE = .04, t(1896) = -12.01, p < .001, 95%CI[-0.60, -0.43]), anxiety (β = -.14, SE = .05, t(1969) = -3.09, p = .002, 95%CI[-0.24, -0.05]), calmness (β = -.24, SE = .04, t(1999) = 5.39, p < .001, 95%CI[.15, .33]), and boredom (β = -.08, SE = .04, t(1955) = 2.22, p = .026, 95%CI[.01, .16]). LO mind-wandering did not significantly predict excitement (β = -.04, SE = .05, t(2010) = -0.96, p = .336, 95%CI[-.13, -0.45]). Estimated marginal means show that (1) happiness was significantly lower when mind-wandering about a LO (M = 2.28, SE = .08), compared to when not (M = 2.50, SE = .08), (2) sadness was significantly higher when mind-wandering about a LO (M = 2.47, SE = .08) compared to when not (M = 1.95, SE = .09), (3) anxiety was significantly higher when mind-wandering about a LO (M = 2.45, SE = .09) compared to when not (M = 2.30, SE = .08]), (4) calmness was significantly lower when mind-wandering about a LO (M = 2.43, SE = .08), compared to when not (M = 2.67, SE = .08) and (5) boredom was significantly lower when mind-wandering about a LO (M = 1.61, SE = .08) compared to when not (M = 1.69, SE = .07). These results suggest that mind-wandering about an LO was associated with higher concurrent levels of anxiety and sadness and lower levels of happiness, calmness, and boredom.

Time Spent Mind-Wandering About LO in the Past 30 Minutes and Mood

The extent to which participants were mind-wandering about their LO during the 30 minutes prior to answering the ESM was a significant negative predictor of happiness (β = -.09, SE = .02, t(2052) = -4.47, p < .001, 95%CI[-0.12, -.05]) and calmness (β = -.13, SE = .02, t(2071) = -6.47, p < .001, 95%CI[-.17, -.09]) and a significant positive predictor of sadness (β = .27, SE = .02, t(2039) = 13.52, p < .001, 95%CI[0.23, 0.31]), anxiety (β = .12,

SE = .02, $t(2062) = 5.50$, $p < .001$, 95%CI[0.75, 0.16]), and excitement ($\beta = .05$, SE = .02, $t(2056) = 2.43$, $p = .015$, 95%CI[0.01, 0.09]). This suggests that the more time participants had spent mind-wandering about a LO within the last 30 minutes, the less happy and calm they felt and the more sad, anxious, and excited they felt. The extent to which participants were mind-wandering about a LO within the last half an hour did not significantly predict boredom ($\beta = -.01$, SE = .02, $t(2059) = -.79$, $p = .430$, 95%CI[-.05, 0.02]).

The Impact of Beliefs About LO Wanting a Relationship and Mood

Participants belief that the LO wanted a relationship with them was a significant negative predictor of sadness ($\beta = -.10$, SE = .04, $t(717) = -2.37$, $p = .018$, 95%CI[-0.18, -.02]) and a significant positive predictor of excitement ($\beta = .13$, SE = .04, $t(393) = 3.34$, $p < .001$, 95%CI[0.05, 0.20]). This suggests that the more participants believed their LO wanted a relationship with them, the less sadness and the more excitement they experienced. The extent to which participants believed their LO wanted a relationship with them did not significantly predict levels of happiness ($\beta = .06$, SE = .04, $t(639) = 1.63$, $p = .103$, 95%CI[-0.01, -.14]), anxiety ($\beta = -.07$, SE = .04, $t(603) = -1.58$, $p = .116$, 95%CI[-0.15, 0.02), calmness ($\beta = .02$, SE = .04, $t(595) = .45$, $p = .652$, 95%CI[-0.06, 0.10]) or boredom ($\beta = -.01$, SE = .03, $t(761) = -.15$, $p = .882$, 95%CI[-0.07, -.06]).

The Impact of Uncertainty of LO's True Feelings and Mood

Participants' uncertainty about their LO's true feelings about them did not significantly predictor any mood state: happiness ($\beta = -.03$, SE = .03, $t(1157) = -.85$, $p = .396$, 95%CI[-.08, .033]), sadness ($\beta = .002$, SE = .03, $t(1274) = .06$, $p = .955$, 95%CI[-0.06, .06]), anxiety ($\beta = .02$, SE = .03, $t(1084) = .515$, $p = .607$, 95%CI[-0.05, -.08]), calmness ($\beta = -.05$, SE = .03, $t(1064) = -1.55$, $p = .121$, 95%CI[-.11, -.01]), excitement ($\beta = -.04$, SE = .03, $t(844)$

= -1.35, p = .176, 95%CI[-0.10, .02]), and boredom (β = .05, SE = .03, t(1291) = 1.96, p = .051, 95%CI[-.0001, .103]).

Discussion

Limerence is poorly understood but appears to be characterised by obsessive thinking about an LO, emotional instability, and compulsive behaviours aimed at alleviating distress. Limerence research is sparse, and clinicians remain largely unaware regarding assessment and treatment. This leaves individuals suffering from limerence without adequate treatment, The current study contributed to the evidence base by providing two well-conducted studies researching limerence in self-identifying sufferers rather than in a general or student population sample. By doing so, it has been possible to test previous research findings linking limerence to attachment anxiety and test hypotheses regarding limerence and OCD. The use of an ESM is entirely novel and enabled an understanding of how mind-wandering in limerence presents and is associated with mood at a granular and everyday level.

The current study highlights that although limerent experiences appear heterogeneous, there are noteworthy commonalities. First, limerence typically emerges at age 14, suggesting an adolescent onset (Tennov, 1979), in keeping with the onset of OCD evidence base (Brakoulias et al., 2017). Second, limerence is mostly romantic (95% reported attraction towards their LO). Not having romantic feelings or being sexually attracted to a LO remains a contentious issue, and future research (e.g., a qualitative study) would be helpful in exploring individuals with lived experience of limerence that is non-romantic. Furthermore, the findings suggest that participants' LOs tend to be people they likely have regular contact with, such as friends or co-workers (47%). However, a proportion of people reported that their LO was a stranger (11.2%), and it is unclear how much contact the individual has with them. Therefore, future research identifying the amount of contact the 'limerent' individual

has with their LO is indicated, as evidence suggests that more frequent contact would result in higher levels of mind-wandering (Poerio et al., 2015). Third, average limerent episodes can be remarkably long; the average shortest episode was over 1 year, and the average longest episode was over 5 years. This suggests that those living with limerence have sustained obsessions centred on a single individual, typically over years rather than months or weeks. Duration of limerent episodes may be a potential diagnostic feature that distinguishes clinical limerence from the thoughts and feelings that can emerge during the initial stages of sexual attraction.

Limerence and Attachment Insecurity

The current study hypothesised that attachment anxiety would be positively associated with limerence severity, in line with previous research in student samples (Feeney & Noller, 1990; Wolf, 2017). However, instead of measuring attachment style generally, the current study examined attachment across relational contexts, including attachment to a LO as well as within 'real-life' relationships. Interestingly, the current study found that limerence severity was related to anxious attachment to a LO but not romantic partners. Indeed, the pattern of results suggests a negative association between limerence severity and romantic-partner attachment anxiety, so it is not even in the expected direction. This contradicts previous findings suggesting an anxious attachment style may explain why certain people are more likely to develop limerence (Feeney & Noller, 1990; Wolf, 2017). It is possible that because the previous studies did not explore whether participants had been in a previous romantic relationship and only administered one attachment measure in the context of a romantic partner, participants' responses may have been skewed by their limerent experiences. These findings are important as they suggest that people who suffer from limerence can form secure attachments in romantic relationships. This affirms the importance

of consulting with people with lived experience to ensure important context is not overlooked and impacting research findings.

However, an important consideration is the LO status and assessing attachment insecurity within this context. Several people indicated that their LO was a stranger (11%) or someone they may not have contact with (e.g., an ex-partner; 10%). Therefore, certain questions on the attachment measure (e.g., "I usually discuss my problems and concerns with this person") may have been difficult to answer. Therefore, the ECR-RS (Fraley et al., 2011) may not be a valid measure to use in a limerent sample. Future research should consider using a more general measure of attachment, such as the Adult Attachment Questionnaire (Simpson et al., 1996).

This study did find, however, a slightly significant positive association between limerence severity and heightened attachment anxiety to a close person for participants who had not been in a romantic relationship. This may suggest that 'limerents' with an anxious attachment to close others are less likely to pursue romantic relationships and more likely to develop attachments towards 'imaginary' relationships (e.g., an LO). However, this is a somewhat unusual finding in the context of attachment theory. According to Mikulincer and Shaver (2010), individuals who avoid closeness and interdependence in relationships would more likely present with an avoidant attachment style instead of an anxious one. Future research should attempt to replicate these findings and further explore differences and similarities between real-world and imagined (or limerent) relationships, where insights may be drawn from work on parasocial relationships (Hoffner & Bond, 2022).

Limerence, OCD and R-OCD

The current study hypothesised that limerence severity would be positively associated with higher levels of limerence-specific OCD symptoms. This was based on parallels drawn

in theoretical work characterising limerence as a form of OCD (Wakin & Vo, 2008; Wyant, 2020). This idea was empirically tested in the current study for the first time, finding a strong positive correlation between limerence severity and OCD-type symptoms in the context of limerence (as measured by a modified limerence-specific version of the YBOCS). One implication of this finding is that limerence could be viewed as a specific sub-type of OCD and may be related to relationship-OCD (Doron et al., 2014) or sexual orientation OCD (Williams & Farris, 2011). The crossover between limerence and R-OCD is the obsessional core of each of these problems being based in and focal to relationships – the relationship is imagined in limerence and its actual in R-OCD. Nevertheless, both limerence and R-OCD share the common process whereby the sufferer spends more time thinking about the state of mind of their partner (R-OCD) or their LO (limerence) than their own state of mind. The focus of attention is compulsively on 'other' and not 'self' (or this focus is inflexible and unbalanced) in both limerence and R-OCD.

It is recommended that future research further examine whether limerence is associated with common OCD subtypes by administering a general OCD measure such as the Obsessive-Compulsive Inventory (OCI) (Foa et al., 2002) that is composed of seven subscales based on symptom categories that are commonly found in OCD (e.g., checking). It would be useful to determine whether limerence is associated with some symptoms more than others, as doing so might help to identify common underlying mechanisms and courses of treatment. Currently, there are no formal diagnostic criteria or treatment options for limerence, leaving clinicians providing treatment without an evidence base to follow. Wyant (2021) outlined the treatment of limerence using exposure and response prevention and reported encouraging outcomes.

Limerence and Mind-Wandering

The current study found that participants were mind-wandering about a LO 45% of the time. So, nearly half the time when signalled, the participants were thinking about their LO. Mind-wandering literature suggests that people spend 30-50% of their waking lives mind-wandering (Kane et al., 2007; Killingsworth & Gilbert, 2010; Seli et al., 2018). The current research points to the focal nature of limerent mind-wandering. This finding suggests that for a limerent sample, much of this time is spent thinking about their LO and this mind wandering is also more frequent than in the general population. It is unclear, however, if limerent individuals spend more time mind-wandering about other topics and if, therefore, their mind-wandering frequency is greater overall compared to other clinical populations.

One intriguing finding was that mind-wandering about a LO in daily life was associated with attachment styles to both the LO and romantic partner. Participants who mind-wandered more about their LO had lower levels of attachment avoidance to their LO but *higher* attachment avoidance to their romantic partner. A possible interpretation is that limerents with avoidant attachment styles in romantic relationships may seek to meet their attachment needs via a 'fantasy' person (i.e., their LO). This idea is consistent with fantasy/daydreaming literature, which characterises fantasy as an avoidant coping strategy (Cuper & Lynch, 2009). An individual's fantasy world can compensate for needs that are not met in real-life (Brenner et al., 2022). Previous research on daydreaming in non-clinical samples suggests that imagining other people during daydreaming activity may be a useful compensatory mechanism to regulate feelings of loneliness and social disconnection (Poerio et al., 2015; Poerio et al., 2016), something that may be disrupted or maladaptive in limerence.

Although these speculations are useful for developing theoretical accounts of maladaptive fantasy, the correlational analyses mean that causal inferences cannot be established. It would, therefore, be beneficial for future research to explore how cognitive traits and pre-dispositions interact with everyday cognition, such as mind-wandering, to affect the development or maintenance of limerence. Moreover, the adolescent onset of limerence suggests that such research might be most profitably conducted in the transitional stages from childhood to adulthood. Investigating mind-wandering in a clinical sample of ROCD sufferers using ESM would also be useful to help advance the cross-sectional research on ROCD by adding granular detail on the lived experience of ROCD.

Content of Limerent Thoughts

Interestingly, when participants were asked about the content of their limerent thoughts, participants most reported thinking about a past interaction with their LO. This is an interesting finding given that the mind-wandering literature suggests that there tends to be a strong prospective bias in mind-wandering, in which people tend to more frequently mind-wander about the future rather than the past or current situation (Kvavilashvili & Rummel, 2020). However, there appears to be more of a retrospective bias in this limerent sample. Previous research has found that retrospective bias during mind-wandering is associated with low mood (Ruby et al., 2013; Poerio et al., 2013).

Impact of LO Mind-Wandering on Mood

Although LO mind-wandering was associated with less boredom, participants felt significantly less happy and calm and significantly sadder and more anxious. Similar findings were found when exploring the amount of time mind-wandering about a LO in the past 30 minutes and its impact on mood. Qualitative feedback from participants suggested that responding to random signals disrupted their thoughts and helped them subjectively feel

better. Future research investigating whether experience-sampling (Bartels, 2022) or interventions used in mind-wandering (Hutt et al., 2021) could alleviate symptoms of limerence would be beneficial. Regarding the impact of participants' beliefs about whether their LO wanted a relationship with them and the impact on mood, the results found that heightened belief in the LO wanting a relationship was associated with greater excitement and lower levels of sadness. This appears to show the influence of both positive (excited) and negative reinforcement (less sadness) contingencies maintaining limerence.

Participant Feedback

Seventeen participants returned a feedback form regarding their experience of the ESM. All but one participant suggested that they would recommend the study to other sufferers. The one participant who did not cited concerns that ESM could worsen limerence symptoms. Conversely, several participants stated that ESM prompts were therapeutic, and participation facilitated insight. Some participants expressed disappointment that the signals did not 'catch' their limerent thoughts often enough to capture the frequency fully. Therefore, it may be beneficial for a future study to use a daily diary method or event-contingent method to capture limerent thoughts over longer time frames with more sampling per day. Other participants reported that the randomised delivery of the signals and the time-limited nature of responding to the questionnaires benefited them (e.g., reduced overthinking and procrastination). Three participants recommended including additional emotions (e.g., anger, frustration) to fully capture the breadth of emotional experiences. As most participants did not return a feedback form, a comprehensive understanding of participants' experiences of ESM is not known.

Strengths and Limitations

This study has three key strengths. First, the involvement of people with lived experience of limerence in co-designing the study. Second, the large and diverse sample demonstrates the presence of limerence amongst a range of people (spanning ages, genders, ethnicities, sexualities, etc.), allowing for greater generalisability of findings. Third, the experience sampling methodology used has high ecological validity (Hektner et al., 2007; Csikszentmihalyi & Larson, 2014) and is an invaluable method for investigating real-world thoughts, emotions, and behaviours as they unfold in daily life (Bolger et al., 2003).

The primary limitation is the lack of diagnostic certainty that clinical interview screening would have facilitated, such as the use of the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). Another limitation is the ESM final sample size of 62, which is under the target sample size of 64, and therefore slightly under-powered. Furthermore, online recruitment and the use of smartphones may have resulted in a selectivity bias due to expense (Gosling & Mason, 2015). Also, due to different schedules and waking hours between participants, the time-sampling approach may not have fully captured limerent experiences. In the participant feedback returned, some shared that they missed signals due to their sleep pattern or work schedules. It is recommended that future ESM research should allow participants to choose their schedule for receiving signals, especially if limerent thoughts might occur more often during specific moments (e.g., after waking up or before going to sleep).

Conclusions

The findings suggest, contradictory to previous research, that although people with limerence appear to have anxious attachment styles towards their LOs, they can form secure attachments in romantic relationships. Furthermore, it is proposed that limerence could be

viewed as a specific sub-type of OCD and potentially assessed and treated through an OCD framework. Lastly, people with limerence appear to spend a large proportion of their time mind-wandering about their LO, with an overall negative impact on their mood, suggesting that LO mind-wandering could be a beneficial target of intervention.

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Appendices

Appendix A: Invite to Consultation Focus Group

Appendix B: Consultation Focus Group Presentation

Appendix C: Consultation Suggestions and Actions

Appendix D: Ethical Approval Confirmation Letter

Appendix E: Study Advertisement

Appendix F: Participant Information Form

Appendix G: Consent Form

Appendix H: Baseline Surveys

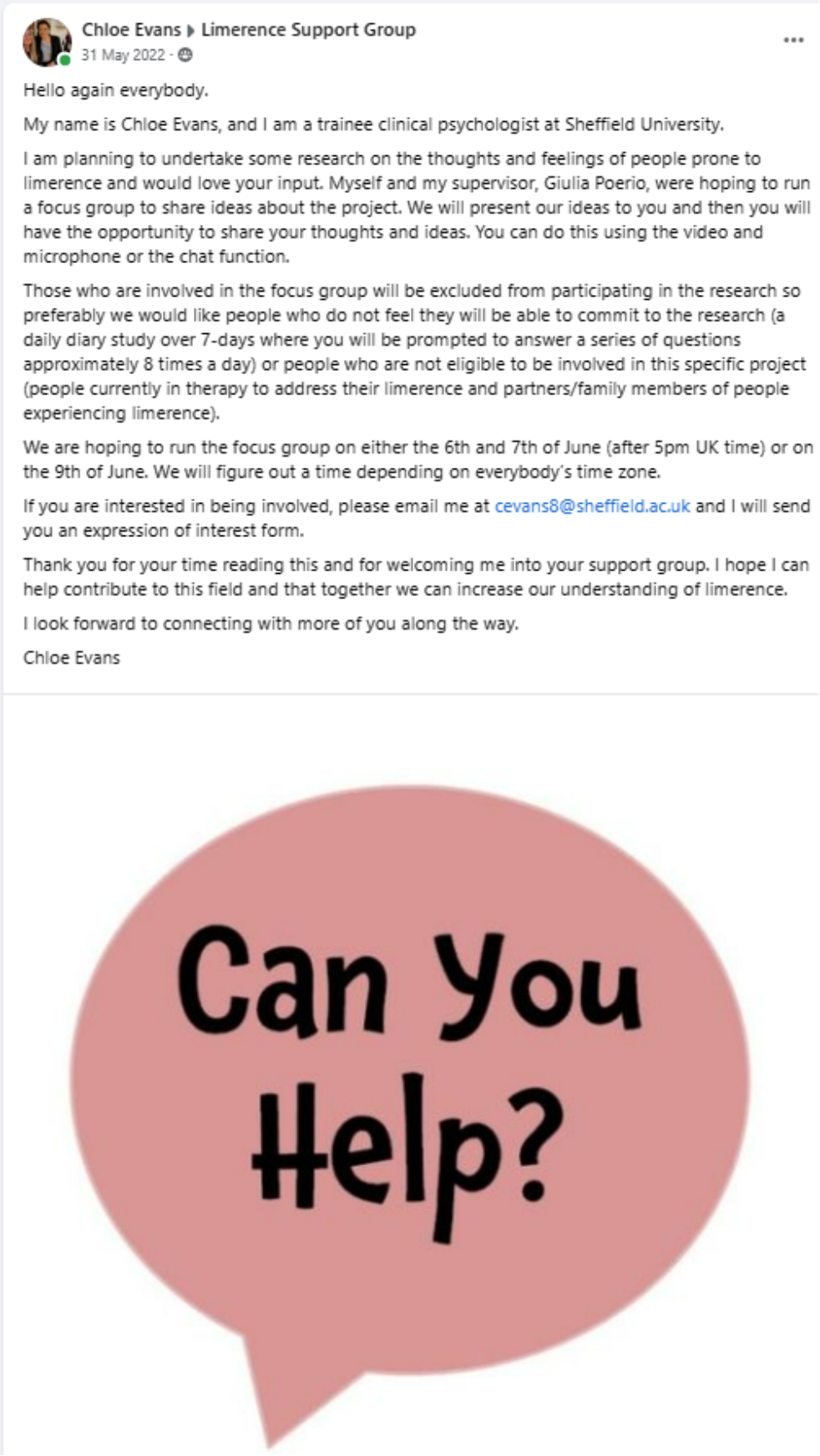
Appendix I: Debrief Form

Appendix J: Experience-Sampling Feedback Form

Appendix K: Experience-Sampling Training Presentation

Appendix L: Experience-Sampling Surveys

Appendix A: Invite to Consultation Focus Group



Chloe Evans ▸ Limerence Support Group
31 May 2022 ·

Hello again everybody.

My name is Chloe Evans, and I am a trainee clinical psychologist at Sheffield University.

I am planning to undertake some research on the thoughts and feelings of people prone to limerence and would love your input. Myself and my supervisor, Giulia Poerio, were hoping to run a focus group to share ideas about the project. We will present our ideas to you and then you will have the opportunity to share your thoughts and ideas. You can do this using the video and microphone or the chat function.

Those who are involved in the focus group will be excluded from participating in the research so preferably we would like people who do not feel they will be able to commit to the research (a daily diary study over 7-days where you will be prompted to answer a series of questions approximately 8 times a day) or people who are not eligible to be involved in this specific project (people currently in therapy to address their limerence and partners/family members of people experiencing limerence).

We are hoping to run the focus group on either the 6th and 7th of June (after 5pm UK time) or on the 9th of June. We will figure out a time depending on everybody's time zone.

If you are interested in being involved, please email me at cevans8@sheffield.ac.uk and I will send you an expression of interest form.

Thank you for your time reading this and for welcoming me into your support group. I hope I can help contribute to this field and that together we can increase our understanding of limerence.

I look forward to connecting with more of you along the way.

Chloe Evans

Appendix B: Consultation Focus Group Presentation

A study exploring the thoughts & feelings of people prone to limerence

A project by Chloe Evans
(Trainee Clinical Psychologist),
Dr. Giulia Poerio (Researcher), and
Dr. Stephen Kellett (Clinical Psychologist)

Aims of Today

SHARE OUR IDEAS & MATERIALS

THOUGHTS, FEEDBACK, & IDEAS

QUESTIONS & DISCUSSION

Project Aims

- To explore the association between limerence and obsessive-compulsive disorder (OCD)
- To explore the association between limerence and attachment
- To gain insight into the everyday thoughts and feelings of people prone to limerence (mind-wandering/daydreaming)
- Examine patterns and trends in a limerent population
- Compare data of people in and out of 'limerent episodes'

Sample

- **Inclusion criteria:** People over the age of 18 years old; who self-identify as having experienced limerence; have a good comprehension of the English language; any country
- **Sample size:** Approximately 65-100 participants

Data Collection

- Data to be collected using online surveys (a baseline questionnaire and daily measures)
- Baseline questionnaire – completed once at the beginning – demographic information, limerence measure, OCD measure, attachment measure, questions about experiences of limerence
- Daily measures – approximately 8 times a day over 7-days (via smartphone) – related to content and characteristics of thoughts and impact of & on emotions

SURVEYS

MATERIALS

DISCUSSION

Appendix C: Consultation Suggestion and Actions

Limerence Study Focus Group - Suggestions & Actions

	Key Point/Suggestion	Action
1.	No. of limerent object and limerent episode were considered the same thing.	Question about the limerent object has been removed (question 3).
2.	Estimating the number of limerent episodes may be difficult - suggested a range.	A range has been added (question 1 – how many limerent objects have you had?). **To be discussed further.**
3.	Limerent episodes can have different durations. Suggested a range.	Questions changed to "What is the shortest?" and "What is the longest?"
4.	No contact was considered blurry. To define what contact means. Suggestion of in contact (have interactions), contact (see them, look at their social media but don't interact), and no contact (at all)	Changed the question to "What type of contact do you have" and had multiple choice of contact, in contact, no contact with definitions
5.	Wolf & Lemay's limerence measure – discussion about the questions being very repetitive.	Validity checked and the same when reduced. Decision to reduce items.
6.	Wolf & Lemay's limerence measure question "I couldn't have a romantic relationship like this one" – one participant said it was difficult to answer as polyamorous, the other participant suggested sliding scale worked for this (i.e., disagree) and also suggested that most of the questions also applied to non-romantic limerence.	Keep the same
7.	Wolf & Lemay's limerence measure - Discussed the question saying "I could not have romantic feelings for somebody else" not applying to all participants	Changed to "such strong feelings" instead
8.	Wolf & Lemay's limerence measure – Question about being jittery nervous – participant explained that sometimes they are and sometimes they are not depending on the circumstances	Changed the wording slightly to say, "I can become jittery/nervous"
9.	Discussion about sexual attraction	A question was added to measure this
10.	Attachment measure – discussion about not everybody has had a romantic relationship	A question was added to ask, "Have you been in a romantic relationship?" and if no, there is now an option to answer the questionnaire relating to a non-romantic relationship
11.	Attachment measure – proposed that the instructions should clarify "non-limerent romantic relationship"	This has been changed.
12.	OCD measure – participant did not understand what 'saved up' meant due to English being second language	Item changed to say collected.
13.	Demographics – polyamory was not covered	Added a separate question about monogamy and polyamory
14.	Discussed exclusion of people in therapy for limerence. Rationale explained participants said this could feel punitive to people interested in participating who had sought support.	Discussed with supervisors and agreed that this exclusion could be removed.

Appendix D: Ethical Approval Confirmation Letter

The University Of Sheffield.

Downloaded: 04/08/2022
Approved: 04/08/2022

Chloe Evans
Registration number: 200183747
Psychology
Programme: DClinPsy

Dear Chloe

PROJECT TITLE: Exploring mind-wandering, and its characteristics, in people prone to experiencing limerence – an experience sampling study
APPLICATION: Reference Number 046754

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 04/08/2022 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 046754 (form submission date: 11/07/2022); (expected project end date: 31/05/2023).
- Participant information sheet 1106136 version 3 (28/07/2022).
- Participant consent form 1106137 version 3 (28/07/2022).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Department Of Psychology Research Ethics Committee
Ethics Administrator
Psychology

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy: https://www.sheffield.ac.uk/rs/ethicsandintegrity/ethicspolicy/approval-procedure
- The project must abide by the University's Good Research & Innovation Practices Policy: https://www.sheffield.ac.uk/polopoly_fs/1.671066!/file/GRIPPolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

Appendix E: Study Advertisement

DClinPsy

The University Of Sheffield.

PARTICIPANTS NEEDED
A study exploring the thoughts and feelings of people prone to limerence

Approved by the University of Sheffield Ethics Committee (Ref: 046754)

We are conducting a study **exploring the thoughts and feelings of people who have experienced limerence.** We also aim to **explore participants' experiences in relationships** more generally and **explore the relationship between limerence and obsessive thinking.**

Participants will be asked to complete **initial questionnaires** relating to their **demographics, limerence, experience in relationships, and obsessive thinking.** Participants will then take part in a **7-day study** where they will receive text message prompts **8 times a day** to answer questions relating to their **thoughts and feelings.**

If you are **over 18 years old,** have **experienced limerence,** and would like to take part in this study, please scan the QR code or click the link above. If you know other people who have experienced limerence, please feel free to share this study.

If you have any questions, please contact the researcher (Chloe Evans) via email (cevans8@sheffield.ac.uk)

Appendix F: Participant Information Sheet

The University Of Sheffield.

Chloe Evans
Trainee Clinical Psychologist
University of Sheffield
Department of Psychology
Floor F, Cathedral Court
1 Vicar Lane
Sheffield S1 2LT, UK

Email: cevans8@sheffield.ac.uk

EXPLORING THE THOUGHTS AND FEELINGS IN PEOPLE PRONE TO EXPERIENCING LIMERENCE

PARTICIPANT INFORMATION SHEET

Invitation to our study

We would like to invite you to participate in this research project. You should only participate if you want to, and it is okay if you choose not to. Before you decide whether you want to take part, it is important for you to read the following information carefully and discuss it with others if you wish. Please email (cevans8@sheffield.ac.uk) if there is anything that is not clear or if you would like more information.

Background of the project

You have been invited to take part in this research because we are interested in exploring the thoughts and feelings of people prone to experiencing limerence. Limerence is a unique emotional state characterised by an obsessive desire to form, or maintain, a relationship with a specific other (termed a limerent object). The current study is also seeking to explore participants' experiences of relationships and the association between limerence and experiences that could be related to obsessive thinking/compulsive behaviour.

If you are over age 18 and have experienced/are experiencing limerence, your participation in this study would be greatly valued.

What will happen if I take part?

If you decide you would like to take part in the study, you will be asked to complete questionnaires relating to your demographics, limerence, experiences in relationships, and experiences associated with obsessive thinking.

You will then be asked to complete a number of questions about your thoughts and feelings in the moment, approximately 8 times a day, over a 7-day period. You will receive a prompt via text message or email and the questions will be the same each time. Questions will include yes/no answers, rating on a Likert scale (i.e., between 1-10), and optional written responses. This is expected to take between 2-2.5 hours of your time over the week.

Once the data is collected, you will be provided with an individual report of your personal responses should you wish to receive one.

Potential risks

The researcher(s) anticipate the probability and severity of harm occurring as a result of participating in this study as minimal. Although unlikely, asking you to reflect on your thoughts and feelings may inadvertently make you more aware of negative feelings and experiences in your life and this could be distressing. If you do experience any distress, we advise that you seek support from your GP or support services (listed below).

- Samaritans - 116 123 (lines are open 24hrs)
- SANEline - 0300 304 7000 (lines are open from 6pm-11pm)
- Shout crisis text line - text SHOUT to 85258 (open 24/7).

Informed consent

Should you agree to take part in this study, you will be asked to complete a consent form before starting this survey.

Withdrawal

Your participation is always voluntary, and you will be free to withdraw from the project at any time without giving any reason. If you wish to withdraw, you simply need to notify the researcher and provide them with your unique ID number. If any data have already been collected, upon withdrawal, your data will be destroyed, if possible, unless you inform the researcher you are happy for the data to be used for the scientific purposes of the project. It will not be possible to destroy any data two weeks after the study finishes as data analysis is likely to already have begun. It will also not be possible to destroy any data that have already been shared anonymously on data sharing repositories.

Will I receive any reimbursement or expenses for taking part in this research?

There is no financial reimbursement offered for taking part in this research.

Data gathered

- We will collect the following data from each participant: name, email address, mobile number (to contact you to complete the daily diary measures), demographic information, and responses to questionnaires.
- We are using your data to improve our understanding of the thoughts and feelings of people prone to limerence, their experience in relationships, and associated experiences relating to obsessive thinking.
- Your data will be gathered by the researcher and may also be accessed by their supervisors (listed below)
- Personal identifying data will be stored in password-protected files and computers only accessible to the researcher and her supervisors.
- Your data may be anonymised (so that you cannot be identified from them) and published in scientific journal articles, and shared in permanent, publicly accessible archives accessible from any country.
- Your personally identifying data will be destroyed following the publication of the findings.

What will happen to the results of the study?

The results will be submitted as part of the researcher's doctoral thesis in May 2023, then prepared for publication. You can let the researcher know at the start of the study if you would like a copy of this and this can be sent to you.

The University of Sheffield is organising and funding this research. This project has been ethically approved via the University of Sheffield Clinical Psychology department, using the University of Sheffield's Ethics Review Procedure.

Concerns and complaints

In the first instance you can contact the lead researcher, Chloe Evans (cevans8@sheffield.ac.uk) to discuss any concerns. Alternatively, you can contact the research supervisors involved in the project; Dr Stephen Kellett (s.kellett@sheffield.ac.uk) or Dr Giulia Poerio (g.poerio@essex.ac.uk).

If you feel that your complaint has not been handled to your satisfaction following this, you can contact Professor Elizabeth Milne (Head of Department) (e.milne@sheffield.ac.uk)

Contact Information

This research is being conducted by Chloe Evans (Trainee Clinical Psychologist). This research will be used to write a thesis which fulfils part of their doctoral training. If you have any questions about the research, you can leave a telephone message with the Research Support Officer on: 0114 222 6650 and they will ask Chloe Evans to contact you.

Additional Information about your data

New data protection legislation came into effect across the EU, including the UK on 25 May 2018; this means that we need to provide you with some further information relating to how your personal information will be used and managed within this research project.

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it appropriately. To collect and use your personal information as part of this research project, we must have a basis in law to do so. The basis that we are using is that the research is 'a task in the public interest'.

As we will be collecting some data that is defined in the legislation as more sensitive, we also need to let you know that we are applying an additional condition in law: that the use of your data is 'necessary for scientific or historical research purposes'. Further information, including details about how and why the University processes your personal information, how we keep your information secure, and your legal rights (including how to complain if you feel that your personal information has not been handled correctly), can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

Appendix G: Consent Form

The University Of Sheffield.

Exploring Mind-Wandering, and its Characteristics, in People prone to Limerence

Consent Form

Chloe Evans
Trainee Clinical Psychologist
University of Sheffield
Department of Psychology
Floor F, Cathedral Court
1 Vicar Lane
Sheffield S1 2LT
UK

Email: cevans8@sheffield.ac.uk

Please tick the appropriate boxes	Yes	No
I agree to participate in the research project "Exploring mind-wandering, and its characteristics, in people prone to limerence" being carried out by the researcher.	☐	☐
This agreement has been given voluntarily and without coercion. I understand that I can withdraw from the project at any time and do not need to give a reason for this	☐	☐
I have been given full information about the study and contact details of the researcher(s).	☐	☐
I have read and understood the information provided above.	☐	☐
I understand my personal details, such as name, phone number, address and email address etc., will not be revealed to people outside the project.	☐	☐
I agree to be contacted by the researchers to complete the questionnaires and daily diary measures.	☐	☐
I agree to have my anonymised data shared on publicly accessible repositories. I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐

I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs unless I specifically request this.	□	□
I agree for the data collected from me to be stored anonymously and potentially used in future search	□	□
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	□	□

Name of Participant: _____ **Signature:** _____

Date: _____

Name of Researcher: _____ **Signature:** _____

Date: _____

Contact details for further information about the project:

Lead Researcher: Chloe Evans **Email:** cevans8@sheffield.ac.uk
Project Supervisor: Dr Stephen Kellett **Email:** s.kellett@sheffield.ac.uk
Project Supervisor: Dr Giulia Poerio **Email:** g.poerio@essex.ac.uk

If you have any concerns or wish to make a complaint regarding this project, please contact the researcher or their supervisor. If preferred, you can contact Professor Elizabeth Milne (Head of Department) at e.milne@sheffield.ac.uk

Appendix H: Baseline Surveys

ID_NO
This is your unique ID number ${e://Field/ID}

You will need to provide this if you decide to withdraw from the study and would like your data erased. You will also be asked to provide this ID number at the end of this survey to schedule a training session for guidance completing the 7-day study.

Page Break

LIM_SELF Have you experienced limerence in your life?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Block If Have you experienced limerence in your life? = No

TREATMENT Are you receiving treatment for limerence (including medication, counselling, and therapy)?

- ○ Yes - currently (6)
- ○ No - never (7)
- ○ No - but I have in the past (8)

Display This Question:

If Are you receiving treatment for limerence (including medication, counselling, and therapy)? = Yes - currently

Or Are you receiving treatment for limerence (including medication, counselling, and therapy)? = No - but I have in the past

TREATMENT_DESCRIBE If you want to, please describe what type of treatment?

_____

End of Block: INTRO

Start of Block: ELIGIBILITY

NON_ELIGIBLE Sorry - we are not looking for people who have not experienced limerence. Thank you for your time in accessing this study.

End of Block: ELIGIBILITY

Start of Block: DEMOGRPAHICS

DEMOGRAPHICS_TEXT The next set of questions will collect information about your demographics.

COUNTRY In which country do you currently reside?

▼ United Kingdom of Great Britain and Northern Ireland (16) ... Zimbabwe (241)

AGE What is your age? (Please type in numbers)

_____

GENDER What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary (3)
- ○ Prefer not to say (5)
- ○ Other (7)

SEXUALITY What is your sexuality?

- ○ Heterosexual (1)
- ○ Gay/Lesbian (2)
- ○ Bisexual (3)
- ○ Pansexual (4)
- ○ Asexual (5)
- ○ Prefer not to say (6)
- ○ Other (7)

RELATIONSHIP_STATUS What is your relationship status?

- ○ Single (1)
- ○ In a relationship (2)
- ○ Married (3)
- ○ Separated/Divorced (4)
- ○ Widowed (5)

RELATIONSHIP_TYPE Do you identify as being...

- ○ Monogamous (1)
- ○ Polyamorous (2)
- ○ Neither/other (3)

EMPLOYMENT What is your employment status?

- ○ Full time (1)
- ○ Part time (2)
- ○ Unemployed (3)
- ○ Retired (4)
- ○ Disability/Sick Leave (5)

ETHNICITY What is your ethnicity?

- ○ English/Welsh/Scottish (1)
- ○ Irish (2)
- ○ Gypsy or Traveller (3)
- ○ Indian (4)
- ○ Pakistani (5)
- ○ Bangladeshi (6)
- ○ Chinese (7)
- ○ African (8)
- ○ Caribbean (9)
- ○ Arab (10)
- ○ Any other ethnic group (11) _____
- ○ Any mixed/multiple ethnic backgrounds (12) _____

MENTAL_HEALTH Have you ever received a diagnosis of any mental health disorders (i.e., anxiety, depression, personality disorder) or developmental disorders (i.e., autism, ADHD, intellectual disabilities)?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Have you ever received a diagnosis of any mental health disorders (i.e., anxiety, depression, per... = Yes

DIAGNOSES What are your diagnoses? [if you have more than one, please type each separated by a comma]

_____

_____

_____

_____

_____

End of Block: DEMOGRPAHICS

Start of Block: LIMERENCE

LIMERENCE_TEXT Thank you for answering the demographic questions. The next set of questions will be relating to your experience of limerence.

LIMERENT_EPISODES How **many limerent episodes** have you had in your life? Please type in a number.

_____

LE_SHORTEST What is the **shortest** amount of time a limerent episode has lasted for?

_____

LE_LONGEST What is the **longest** amount of time a limerent episode has lasted for?

_____

LIM_AGE What **age** did you start experiencing limerence? Please type in a number.

_____

LIM_WHY Why do **you** think you experience limerence?

_____

_____

_____

_____

_____

Page Break

LE_CURRENT Are you currently in a limerent episode?

- ○ Yes (1)
- ○ No (2)

Page Break

Start of Block: LIMERENCE MEASURE

LIM_MEASURE When answering the following questions, please bring your **current** or **last** limerent object to mind. Please respond to each statement by indicating how much you agree or disagree with it.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
It is hard to imagine feeling such strong feelings towards anybody else but this person. (1)	○	○	○	○	○	○	○
Nobody else but this person could make me feel the way I do. (2)	○	○	○	○	○	○	○
Matters concerning this person are more important to me than any other concern that I have in my life. (3)	○	○	○	○	○	○	○
I cannot control when or how often I think of this person. (4)	○	○	○	○	○	○	○
I cannot seem to get this person out of my mind. (5)	○	○	○	○	○	○	○

Most of my thoughts concerning this person come about suddenly and without effort. (6)	○	○	○	○	○	○	○
I never seem to be 100% sure of how this person feels about me. (7)	○	○	○	○	○	○	○
I am unsure of how this person feels about me. (8)	○	○	○	○	○	○	○
It is possible that this person could feel differently towards me than what I have been led to believe. (9)	○	○	○	○	○	○	○
I do not pay any attention to this person's negative attributes. (10)	○	○	○	○	○	○	○
To me, this person's negative attributes are charming. (11)	○	○	○	○	○	○	○

This person's shortcomings do not bother me. (12)	○	○	○	○	○	○
When I think about this person, I develop an ache in the centre of my chest. (13)	○	○	○	○	○	○
The way I feel about this person leaves an aching sensation in the centre of my chest. (14)	○	○	○	○	○	○
I experience the longing to be with this person as an aching sensation in the centre of my chest. (15)	○	○	○	○	○	○
I am extremely happy when I believe this person feels strongly towards me. (16)	○	○	○	○	○	○
If this person felt the same way about me as I do for him/her I would be extremely happy. (17)	○	○	○	○	○	○

I become overjoyed when I believe this person feels the same way about me as I do for him/her. (18)	○	○	○	○	○	○
I have a hard time speaking and cannot think clearly around this person. (19)	○	○	○	○	○	○
I can become extremely jittery and nervous around this person. (20)	○	○	○	○	○	○
When I am around this person, I become uneasy. (21)	○	○	○	○	○	○
I know that, even if I wanted to, I could not change the way I feel about this person. (22)	○	○	○	○	○	○
The feelings I have for this person are impossible to change. (23)	○	○	○	○	○	○
I feel like I am powerless to change the way that I feel towards this person (24)	○	○	○	○	○	○

Page Break

ROMANCE_YESNO Have you been in a non-limerent romantic relationship?

- ○ Yes (1)
- ○ No (2)

Page Break

LO_ATTACHMENT **Please bring to mind your current or most recent limerent object.**
Read each of the following statements and rate the extent to which you believe each statement best describes your feelings about this limerent object.

	Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Neither Agree nor Disagree (4)	Slightly Agree (5)	Agree (6)	Strongly Agree (7)
It helps to turn to this person in times of need. (1)	○	○	○	○	○	○	○
I usually discuss my problems and concerns with this person. (10)	○	○	○	○	○	○	○
I talk things over with this person. (11)	○	○	○	○	○	○	○
I find it easy to depend on this person. (12)	○	○	○	○	○	○	○
I don't feel comfortable opening up to this person. (13)	○	○	○	○	○	○	○
I prefer not to show this person how I feel deep down. (14)	○	○	○	○	○	○	○
I often worry that this person doesn't really care for me. (15)	○	○	○	○	○	○	○
I'm afraid that this person may abandon me. (16)	○	○	○	○	○	○	○

I worry that this person won't care about me as much as I care about them. (17)	○	○	○	○	○	○	○

Page Break

Display This Question:

If Have you been in a non-limerent romantic relationship? = Yes

ATTACHMENT_ROMANCE **Please bring to mind your current or most recent romantic partner (non-limerent). If you are not currently in a romantic relationship with someone, answer these questions with respect to your most recent former partner.**

Read each of the following statements and rate the extent to which you believe each statement best describes your feelings about this person.

	Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Neither Agree nor Disagree (4)	Slightly Agree (5)	Agree (6)	Strongly Agree (7)
It helps to turn to this person in times of need. (1)	(	(	(	(	(	(	(
I usually discuss my problems and concerns with this person. (10)	(	(	(	(	(	(	(
I talk things over with this person. (11)	(	(	(	(	(	(	(
I find it easy to depend on this person. (12)	(	(	(	(	(	(	(
I don't feel comfortable opening up to this person. (13)	(	(	(	(	(	(	(
I prefer not to show this person how I feel deep down. (14)	(	(	(	(	(	(	(
I often worry that this person doesn't really care for me. (15)	(	(	(	(	(	(	(
I'm afraid that this person may abandon me. (16)	(	(	(	(	(	(	(

I worry that this person won't care about me as much as I care about them (17)	

Page Break

Display This Question:

If Have you been in a non-limerent romantic relationship? = No

ATTACHMENT_CLOSE **Please bring to mind the person you feel you have the closest non-limerent relationship with (e.g., best friend, parent, sibling.**

Read each of the following statements and rate the extent to which you believe each statement best describes your feelings about this person.

	Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Neither Agree nor Disagree (4)	Slightly Agree (5)	Agree (6)	Strongly Agree (7)
It helps to turn to this person in times of need. (1)	(	(	(	(	(	(	(
I usually discuss my problems and concerns with this person. (10)	(	(	(	(	(	(	(
I talk things over with this person. (11)	(	(	(	(	(	(	(
I find it easy to depend on this person. (12)	(	(	(	(	(	(	(
I don't feel comfortable opening up to this person. (13)	(	(	(	(	(	(	(
I prefer not to show this person how I feel deep down. (14)	(	(	(	(	(	(	(
I often worry that this person doesn't really care for me. (15)	(	(	(	(	(	(	(
I'm afraid that this person may abandon me. (16)	(	(	(	(	(	(	(

I worry that this person won't care about me as much as I care about them (17)	

Page Break

End of Block: LIMERENCE MEASURE

Start of Block: Limerence Specific _ YBOCS

OT_DESCRIPTION The next set of questions relate to OBSESSIVE THOUGHTS, ideas or impulses related to you LIMERENT OBJECT, that repeatedly enter your mind – they may seem to occur against your will.

TIME_OCCUPIED TIME OCCUPIED BY OBSESSIVE THOUGHTS
How much of your time is occupied by obsessive thoughts related to your limerent object?

- ○ 0 = None (1)
- ○ 1 = Less than 1 hr/day or occasional occurrence (2)
- ○ 2 = 1 to 3 hrs/day or frequent (3)
- ○ 3 = Greater than 3 and up to 8 hrs/day or very frequent occurrence (4)
- ○ 4 = Greater than 8 hrs/day or nearly constant occurrence (5)

OT_INTERFERENCE INTERFERENCE DUE TO OBSESSIVE THOUGHTS
How much do your obsessive thoughts related to your limerent object interfere with your work, social, or other important role functioning? Is there anything that you don't do because of them?

- ○ 0 = No interference (1)
- ○ 1 = Slight interference with social or other activities, but overall performance not impaired (2)
- ○ 2 = Definite interference with social or occupational performance, but still manageable (3)
- ○ 3 = Causes substantial impairment in social or occupational performance (4)
- ○ 4 = Incapacitating (5)

OT_DISTRESS DISTRESS ASSOCIATED WITH OBSESSIVE THOUGHTS
How much distress do your obsessive thoughts related to your limerent object cause you?

- ○ 0 = None (1)
- ○ 1 = Not too disturbing (2)
- ○ 2 = Disturbing, but still manageable (3)
- ○ 3 = Very disturbing (4)
- ○ 4 = Near constant and disabling distress (5)

OT_RESISTANCE RESISTANCE AGAINST OBSESSIONS
How much of an effort do you make to resist obsessive thoughts related to your limerent object? How often do you try to disregard or turn your attention away from these thoughts as they enter your mind?

- ○ 0 = Try to resist all the time (1)
- ○ 1 = Try to resist most of the time (2)
- ○ 2 = Make some effort to resist (3)
- ○ 3 = Yield to all obsessive thoughts related to limerent object without attempting to control them, but with some reluctance (4)
- ○ 4 = Completely and willingly yield to all obsessive thoughts related to limerent object (5)

OT_CONTROL DEGREE OF CONTROL OVER OBSESSIVE THOUGHTS
How much control do you have over the obsessive thoughts about your limerent object? How successful are you in stopping or diverting your obsessive thinking? Can you dismiss them?

- ○ 0 = Complete control (1)
- ○ 1 = Usually able to stop or divert obsessive thoughts about limerent object with some effort and concentration (2)
- ○ 2 = Sometimes able to stop or divert obsessive thoughts about limerent object (3)
- ○ 3 = Rarely successful in stopping or dismissing obsessive thoughts about limerent object, can only divert attention with difficulty (4)
- ○ 4 = Obsessive thoughts about limerent object are completely involuntary, rarely able to even momentarily alter obsessive thinking. (5)

OT_DESCRIPTION If you feel able to, please feel free to describe common obsessive thoughts related to your limerent object in the box below.

_____

Page Break

LO_COMPULSIONS The next set of questions are about COMPULSIVE BEHAVIOURS related to your LIMERENT OBJECT.
Compulsions are urges to do something and often take the form of repetitive, purposeful, intentional behaviours called rituals. The behaviour itself may seem appropriate but it becomes a ritual when done to excess. Checking, repeating and many other behaviours can be rituals. Some rituals are mental. For example, thinking or saying things over and over under your breath.

COMPULSIONS_TIME TIME SPENT PERFORMING COMPULSIVE BEHAVIORS
How much time do you spend performing compulsive behaviors related to your limerent object? How much longer than most people does it take to complete routine activities because of your rituals? How frequently do you do rituals?

- ○ 0 = No time / no rituals (1)
- ○ 1 = Less than 1 hr/day or occasional performance of compulsive behaviors/rituals related to limerent object (2)
- ○ 2 = From 1 to 3 hrs/day, or frequent performance of compulsive behaviors/rituals related to limerent object (3)
- ○ 3 = More than 3 and up to 8 hrs/day, or very frequent performance of compulsive behaviors/rituals related to limerent object (4)
- ○ 4 = More than 8 hrs/day, or near constant performance of compulsive behaviors/rituals related to limerent object (too numerous to count) (5)

COMPULSIONS_INTERFER INTERFERENCE DUE TO COMPULSIVE BEHAVIORS
How much do your compulsive behaviors related to your limerent object interfere with your work,

social, or other important role functioning? Is there anything that you don't do because of the compulsions/rituals?

- ○ 0 = No interference (1)
- ○ 1 = Slight interference with social or other activities, but overall performance not impaired (2)
- ○ 2 = Definite interference with social or occupational performance, but still manageable (3)
- ○ 3 = Causes substantial impairment in social or occupational performance (4)
- ○ 4 = Incapacitating (5)

COMPULSION_DISTRESS DISTRESS ASSOCIATED WITH COMPULSIVE BEHAVIOR
How would you feel if prevented from performing the compulsion(s)/ritual(s) related to your limerent object? How anxious would you become?

- ○ 0 = Not at all (1)
- ○ 1 = Only slightly anxious if compulsions/rituals related to limerent object prevented (2)
- ○ 2 = Anxiety would mount but remain manageable if compulsions/rituals related to limerent object prevented (3)
- ○ 3 = Prominent and very disturbing increase in anxiety if compulsions/rituals related to limerent object interrupted (4)
- ○ 4 = Incapacitating anxiety from any intervention aimed at modifying compulsions/rituals related to limerent object (5)

COMPULSION_RESISTANC RESISTANCE AGAINST COMPULSIONS
How much of an effort do you make to resist the compulsions/rituals related to your limerent object?

- ○ 0 = Always try to resist (1)
- ○ 1 = Try to resist most of the time (2)
- ○ 2 = Make some effort to resist (3)
- ○ 3 = Yield to almost all compulsions/rituals related to limerent object without attempting to control them, but with some reluctance (4)
- ○ 4 = Completely and willingly yield to all compulsions/rituals related to limerent object (5)

COMPULSIONS_CONTROL DEGREE OF CONTROL OVER COMPULSIONS
How strong is the drive to perform the compulsive behavior(s)/ritual(s) related to your limerent object? How much control do you have over them?

- ○ 0 = Complete control (1)
- ○ 1 = Pressure to perform behaviors/rituals related to limerent object but usually able to exercise voluntary control over them (2)
- ○ 2 = Strong pressure to perform behaviors/rituals related to limerent object, can control it only with difficulty (3)
- ○ 3 = Very strong drive to perform behaviors/rituals related to limerent object, must be carried to completion, can only delay with difficulty (4)
- ○ 4 = Drive to perform behaviors/rituals related to limerent object experienced as completely involuntary and over-powering, rarely able to even momentarily delay activity. (5)

COMPULSION_DESCRIBE If you feel able to, please feel free to describe common compulsive behaviors/rituals related to your limerent object in the box below.

_____

End of Block: Limerence Specific _ YBOCS

Start of Block: Block 6

TRAINING_BOOKING **Thank you for completing the initial surveys!**
The next part of the study is a short training session with the researcher for guidance in completing the 7-day study.

Please follow the instructions below carefully...

1) Click this link to sign up for a date/time for part 2 (or copy and paste the link into a new window: https://sx.sona-systems.com/exp_view_slots.aspx?experiment_id=1868 *note that you will need to sign in to your SONA account*

2) Please select a date and time to attend the next session from the options provided. Please save this information so you know when to attend (it will be a zoom meeting)

3) Once you have signed up for Part 2, please fill out all of the information below and select the submit button. We need all of this information before we meet so that we can set you up with the next phase of the study!

*if for any reason you can't sign up for a date and time for part 2 then please email me (cevans8@sheffield.ac.uk) and we can arrange something separately!

- Your Name (4) _____
- Email (5) _____
- Phone number (6) _____
- What time zone are you in? (7)
_____
- ID (see top left of screen) (8)
_____
- Date you have signed up for part 2 (online session) dd/mm/yyyy (9)
_____
- Time you have signed up for part 2 (online session) e.g., 09:00 (10)
_____

End of Block: Block 6

Appendix I: Debrief Form

Limerence Study Debrief Form

Thank you for participating in the study. Your time completing the questionnaires and daily measures relating to your thoughts and feelings, limerence, experiences in relationships, and obsessive thinking/compulsive thinking have been greatly appreciated. We appreciate the commitment to the study and your data will be valuable to increasing the understanding of limerence.

If you are interested, we can provide you with a report of your personal data relating to the measures you have completed. This data provided is not for the purpose of diagnosis, if you have any concerns about your emotions or behaviours, please consult a GP or a therapeutic practitioner for support or advice.

We understand that limerence can be a distressing experience and that this study could have brought up some difficult feelings.

- If participating in this study has caused any distress, support is available from the Samaritans on 116 123 (free 24-hour helpline), the 'Shout' crisis text line (text SHOUT to 85258, open 24/7), SANEline 0300 304 7000 (lines are open from 6pm-11pm).
- If you feel you need extra support, please contact your GP to discuss referral to appropriate mental health support services.

If you wish to withdraw your data, please email the lead researcher listed below and provide the unique ID number that you provided when signing up to the study. You can withdraw your data up to two weeks after completing the study and no explanation is required.

All your data will be stored in a secure password protected file that only the researcher and supervisor will have access to. No identifiable details will be included in the write up of the research.

Contact details of research team:

Chloe Evans – Lead Researcher (cevans8@sheffield.ac.uk)

Dr Stephen Kellett – Researcher Supervisor (s.kellett@sheffield.ac.uk)

Dr Giulia Poerio – Research Supervisor (g.poerio@essex.ac.uk)

Amrit Sinha – Research Support Officer (a.sinha@sheffield.ac.uk)

Appendix J: Experience Sampling Feedback Form

Limerence Study Feedback Form

Thank you for taking part in the study: *"Exploring the thoughts and feelings of people prone to limerence."* We really appreciate the data you have provided to help us improve the knowledge and understanding of limerence. We hope the study was a positive experience for you.

If you would like to provide feedback on your experience, please email this form back to the lead researcher (Chloe Evans; cevans8@sheffield.ac.uk).

How was your overall experience of the study?

Is there anything you particularly liked about the study?

Is there anything you would change about the study?

Would you recommend the study to other people you know who have limerence?

Appendix K: Experience-Sampling Training Presentation

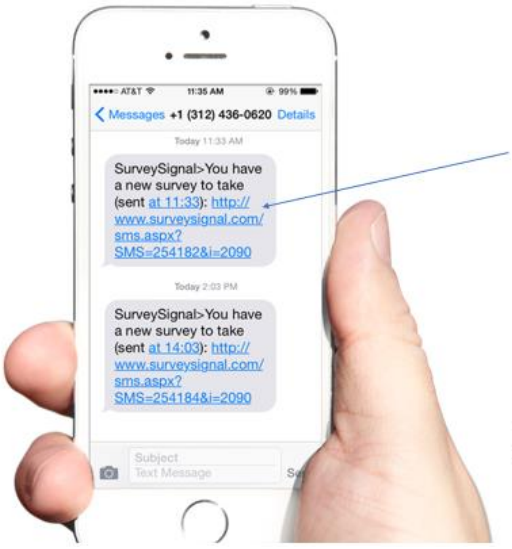
GENERAL INFORMATION

- The study will begin tomorrow.
- You will receive 8 text messages a day between 9 am and 10 pm for 7 days. You won't get them at the same time, they'll be random, that is so we can get your experience across a wide range of times.
- The text message will contain a link to an online survey – **click the link** to answer the survey (this will open in a web browser)
- You will have 30 minutes to answer the survey before the link expires (if you try to answer after this it will say "This link is not active anymore").
- We do not expect you to answer every single survey – please just answer as many as you can – we appreciate every response you can provide us.
- They should take around 5 mins to answer so please answer when you know you have the time.
- It may help to have your notifications for text messages turned on and your phone off silent.

What will you be asked about?

- Each text message survey will ask you questions relating to your thoughts, feelings, and activities **immediately before** you became aware that you needed to answer the survey.
- There are no "right" or "wrong" answers – please just answer as honestly as you can and don't spend too long thinking about your responses.

We'll now go through an example of the survey in detail...



Please click the link – it will take you to an online survey to complete.

You will have **half an hour** from the time it was sent to open the link and complete the online survey. Please make sure you have an internet connection to click on the link and open the online survey.

****Note: some of the questions may display better on your smartphone if you turn it to a LANDSCAPE orientation****

Your attention JUST BEFORE you were signalled...

We are interested in the focus of your attention, your thought and feelings, and the activities you have been engaging in.

When you open the survey, you will receive this message.

Click the blue button to access the questions.

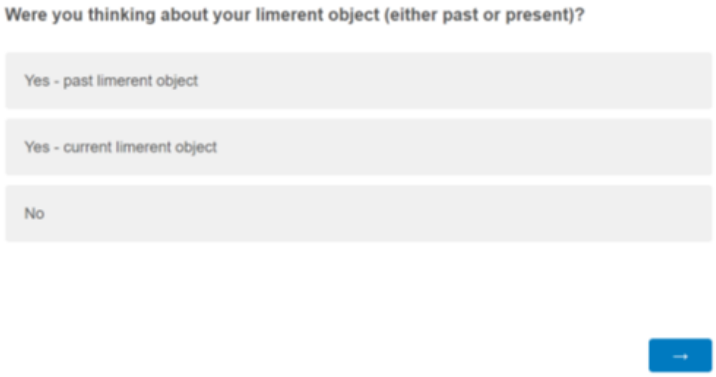
> Please complete this series of questions with reference to your thoughts, feelings, and activities **immediately before being signaled** (i.e., right before you were aware of the text message)

→

THE FOCUS OF YOUR ATTENTION

You will first be asked if the focus of your attention was on your limerent object (past or present) or not.

The questions you will receive following this question will depend on your answer.

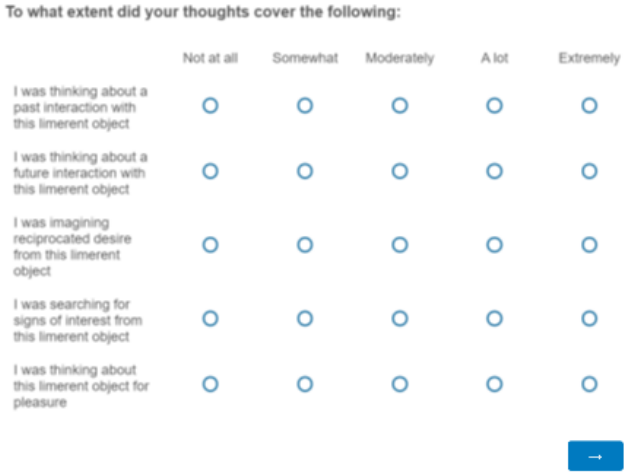


CONTENT OF YOUR THOUGHTS (ABOUT THE LIMERENT OBJECT)

If you **were** thinking about your limerent object (either past or present), you will be asked to indicate the content of your thoughts on a 5-point continuum (from not at all to extremely).

It can be hard to reflect on your thoughts so you are encouraged to use your initial reaction.

After providing a rating to all of the statements, click the blue arrow to continue to the next question.



RATING YOUR BELIEFS

You will then be asked to rate your beliefs about the limerent object's feelings towards you. You will answer two questions on a 5-point continuum from strongly agree to strongly disagree.

You will receive this question regardless of the focus of your attention prior to receiving the signal (i.e., if you were thinking about the limerent object or not).

EXTENT LIMERENT OBJECT OCCUPIED YOUR THOUGHTS - PAST HALF AN HOUR

You will then be asked to indicate how much the limerent object (current or past) occupied your thoughts over the last half an hour. This will be selected from a 5-point continuum from not at all to completely.

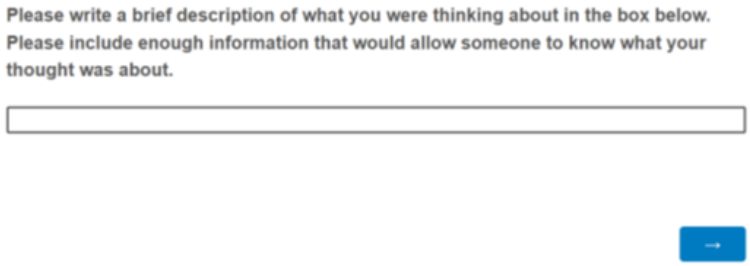
You will receive this question regardless of the focus of your attention prior to receiving the signal.

Select one answer and click the blue arrow to access the next question.

DESCRIPTION OF YOUR THOUGHTS

Next, you'll be offered the opportunity to provide a brief description of what you were thinking about **immediately before** you were aware of the text message.

Type your thoughts into the text box and click the blue bottom to proceed to the next question.



FEELINGS

Next, you will be asked to **indicate how you have been feeling over the past few minutes** from not at all to completely.

You may have to orient your mobile device to a landscape orientation in order to see all the presented options on this question.

END OF SURVEY

When you have answered all of the questions, you will receive a message thanking you for completing the survey.

Appendix L: Experience Sampling Surveys

Start of Block: Default Question Block

INTRO Please complete this series of questions with reference to your thoughts, feelings, and activities **immediately before being signaled** (i.e., right before you were aware of the text message)

Page Break

LO_NOW **Were you thinking about your limerent object (either past or present)?**

- ○ Yes - past limerent object (1)
- ○ Yes - current limerent object (2)
- ○ No (3)

Page Break

Display This Question:

If Were you thinking about your limerent object (either past or present)? = Yes - past limerent object

Or Were you thinking about your limerent object (either past or present)? = Yes - current limerent object

LO_CONTENT **To what extent did your thoughts cover the following:**

	Not at all (1)	Somewhat (2)	Moderately (3)	A lot (4)	Extremely (5)
I was thinking about a **past interaction** with this limerent object (1)	○	○	○	○	○
I was thinking about a **future interaction** with this limerent object (2)	○	○	○	○	○
I was **imagining reciprocated desire** from this limerent object (3)	○	○	○	○	○
I was **searching for signs of interest** from this limerent object (4)	○	○	○	○	○
I was thinking about this limerent object **for pleasure** (5)	○	○	○	○	○

Page Break

LO_BELIEF **Please rate how much you agree with the following statement right now?**

	Strongly agree (1)	Agree (2)	Neither agree nor disagree (4)	Disagree (5)	Strongly disagree (6)
I believe that my limerent object wants a relationship with me (1)	○	○	○	○	○
I am uncertain about my limerent object's true feelings about me (4)	○	○	○	○	○

Page Break

LO_30MINS **How much has your current or past limerent object occupied your thoughts over the last half an hour?**

- ○ Not at all (1)
- ○ Slightly (2)
- ○ Moderately (3)
- ○ Very (4)
- ○ Completely (5)

Page Break

CURRENT_FEELINGS **Current feelings.** Please rate the extent to which you feel…

	Not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
Happy (3)	○	○	○	○	○
Sad (4)	○	○	○	○	○
Anxious (5)	○	○	○	○	○
Calm (6)	○	○	○	○	○
Excited (7)	○	○	○	○	○
Bored (8)	○	○	○	○	○
Lonely (12)	○	○	○	○	○

Page Break

End of Block: Default Question Block