

The effect of adult attachment on intrusive imagery

Lawrence Yong

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:

Name: Lawrence Yong

Date: 17/06/2016

Overview

This thesis is concerned with intrusive imagery within psychological disorders, and the study of this in relation to attachment theory. Part one is a narrative literature review of direct imagery interventions, such as imaginal exposure and imagery rescripting, for psychological disorders that are not post-traumatic stress disorder or acute stress disorder. This review serves as a reference guide for clinicians to help them navigate the literature on imagery interventions. Part two is an experimental study using a paired-associate methodology to investigate the association between attachment orientation and the experience of intrusive and involuntary imagery. This study elicits involuntary imagery within a laboratory context with members of the general population. Part three is a critical appraisal of the thesis process that reflects upon research processes with reference to the broader context of clinical psychology in general.

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Part 1: Literature Review

A literature review of direct imagery interventions for psychological disorders excluding posttraumatic stress and acute stress disorders

Abstract

Aims

To systematically review direct imagery interventions for psychological disorders that are not post-traumatic stress disorder or acute stress disorder.

Method

PsycINFO, MEDLINE, Web of Science and the Cochrane Library (including the Cochrane Central Register of Controlled Trials; CENTRAL) were searched for relevant studies. Studies were included if a standardised, validated quantitative outcome measure was used to evaluate a direct imagery-based psychological intervention for the treatment of a psychological disorder as classified by a recognised diagnostic classification system. Studies were excluded if they evaluated therapies comprising multiple components.

Results

Seventeen studies were reviewed, which evaluated four available interventions: imaginal exposure, imagery rescripting, emotive imagery and guided imagery, across a range of depressive, anxiety and psychotic disorders. Direct imagery interventions were shown to be effective in treating a range of disorders via several proposed mechanisms.

Conclusions

The literature demonstrating the effectiveness of direct imagery interventions are in their infancy. Studies have shown promising results across disorders and often on a single session basis. Further research is warranted to replicate some evaluations using larger sample sizes, longer follow-up periods and between-participants designs consisting of control groups. Use of such designs and specific outcome measures should be used to elucidate treatment mechanisms.

Introduction

The relationship between mental imagery, emotion and psychological disorders

Mental imagery occurs when perceptual information is experienced from memory, unlike perception where such information is registered directly from the senses (Kosslyn, Ganis, & Thompson, 2001). Mental images can take a more veridical form, consisting of accurately recalled past events and can also be made up of combined extracts or edited versions of stored perceptual information, much in the same way that Bartlett's (1932) classic theory of reconstructive memory suggests. Research into the neural bases of mental imagery provides support for the concept of mental imagery as the re-experiencing of perceptual information. In a meta-analysis of 57 neuroimaging studies, the majority reported activation of the early visual cortex in visual mental imagery studies (Thompson & Kosslyn, 2000). Motor imagery in the form of mental transformations has been shown to be correlated with activation of the motor cortices (Parsons et al., 1995). The ability of imagery to engage much of the same neural apparatus and processes involved in perception and movement may provide some explanation for the powerful effect of imagery on the body and mind and may affect individuals in a similar way to direct perceptual experience and action itself.

The potent link between mental imagery and direct experience has been acknowledged and helpfully utilised across a variety of fields such as sports science (Feltz & Landers, 1983), medical surgery (Cocks, Moulton, Luu, & Cil, 2014) and physical therapy and rehabilitation (Dickstein et al., 2013). This has most often been in the form of voluntary mental imagery where images are brought to mind for a specific purpose, most often to practice in lieu of physical action/input to enhance performance, skills acquisition and perhaps also to maintain and heighten motivation.

It has been suggested that mental imagery plays a prominent role in the representation of emotionally charged memory content (Kosslyn, 1994) and that

imagery and emotion have a “special relationship” (Holmes & Matthews, 2005). Mental imagery that occurs involuntarily is a transdiagnostic phenomenon that can be associated with negative emotional content, subjective distress and maintenance of psychological disorders. Involuntary mental imagery has predominantly been associated with post-traumatic stress disorder (PTSD; Holmes, Grey, & Young, 2005) and acute stress disorder (ASD). Indeed experiencing involuntary, intrusive images, nightmares and/or flashbacks are key diagnostic symptoms in both PTSD and ASD (American Psychiatric Association, 2013). These two disorders can afflict those who have experienced a traumatic event, who subsequently experience involuntary images of these events. The symptoms of ASD and PTSD are similar, and are primarily differentiated based on the duration that sufferers experience symptoms rather than the symptoms themselves (Bryant, Matthew, Spiegel, Ursano, & Strain, 2010). There is also evidence to suggest there is a high level of diagnostic overlap between the two disorders (Brewin, Andrews, & Rose, 2003) and that ASD predicts the development of PTSD after trauma (Brewin, Andrews, Rose, & Kirk, 1999). While not regarded as a diagnostic criterion, the experience of negative involuntary mental imagery has been shown to be common to other disorders too (Brewin, Gregory, Lipton, & Burgess, 2010) such as social anxiety (Hackmann, Clark, & McManus, 2005), depression (Patel et al., 2007) and schizophrenia (D’Argembeau, Raffard, & Van der Linden, 2008).

Mental imagery interventions in clinical practice

There is an ever broadening literature on how current knowledge of mental imagery can be utilised to inform treatment interventions for a variety of psychological disorders. Given the close association between intrusive mental imagery and ASD and PTSD, the existing research on psychological treatment interventions aimed at tackling negative imagery has tended to focus on studying post-traumatic symptoms, developing models to explain them (e.g. Brewin, Dalgleish, & Joseph, 1996; Ehlers &

Clark, 2000) and subsequently testing treatments. These intervention techniques predominantly centre around re-experiencing negative imagery about past events, for example imaginal exposure (Keane, Fairbank, Caddell, & Zimmering, 1989) and may also involve manipulating these memories in some way “to provide corrective information” to alleviate distress as in imagery rescripting (Arntz, Kindt, & Tiesema, 2007, p. 347).

Holmes, Arntz, and Smucker (2007) make a heuristic distinction between “direct” and “indirect” imagery techniques within cognitive therapy, which aids navigation of the research literature. “Direct” techniques are concerned with the content of the image-based memory, in other words they are “imagery-interactive” techniques. The authors use a painting metaphor to explain this: “if the image was a painting, we would be working directly on the interacting with the image itself in some way – such as, examining the picture, re-painting parts of it, and so on (Holmes et al., 2007, p. 301).

“Indirect” imagery techniques do not involve interacting with the image itself but are more concerned with “imagery-properties” so that “rather than painting directly on the canvas itself, we might choose to view the canvas (or the notion of painting!) in a different way” (Holmes et al., 2007, p.302). Mindfulness-based cognitive therapy (Segal, Teasdale, & Williams, 2002) or meta-cognitive approaches (Wells, 2000) encourage the distancing of oneself from the metaphorical canvas or mental image and would be classed as “indirect” techniques.

More recently there has been a development in techniques promoting the generation of images associated with *positive* content and emotions, for example the use of compassionate mind techniques (Gilbert & Irons, 2004; Lee, 2005). Compassionate mind techniques draw upon Buddhist healing practices (Salzberg, 1995) and are focused on directing compassion towards the self, partly through generating images of places of safeness and images that represent compassionate

attributes such as warmth and sympathy. Techniques that address negative imagery as well as promote positive imagery may be classed as either direct or indirect within Holmes et al.'s (2007) framework.

The role of mental imagery in the debilitating symptoms of several psychological disorders has been documented. There is extant literature investigating psychological interventions for ASD and PTSD, for example Ponniah and Hollon's (2009) review, but the literature available on the effectiveness of using imagery-based intervention techniques, outside of the trauma-based ASD and PTSD literature, traditionally lags behind (Holmes et al., 2007).

The relative paucity of studies published that demonstrate effectiveness of non-trauma imagery intervention techniques may contribute to Bell, Mackie, and Bennett-Levy's (2015) reporting of cognitive-behavioural therapists' apprehension and avoidance of using such techniques. Using interpretive phenomenological analysis (IPA), clinicians in their study noted that the "varied application" and "broad and fluid conception" of imagery were relevant factors which affected their use of imagery interventions. One therapist commented:

Mainly I don't know what I'm doing, that's what causes the anxiety! Maybe not quite knowing whether I understand it fully as well, I suppose. When we talk about imagery, what's meant by that? It's just kind of I don't know what I'm doing, I don't know what it is! (Bell et al., 2015, p. 598)

The therapists participating in this study nevertheless reported the importance of imagery for their clients and clinical practice and generally held a belief in the efficacy of image-focused interventions.

Present review

This literature review aims to provide an overview of evaluation studies for “direct” imagery-based interventions for psychological disorders, apart from the well-covered PTSD and trauma literature. The questions guiding this review are:

- Which direct imagery interventions have been used for disorders other than PTSD/ASD?
- Are these interventions effective and for which disorders?
- What are the proposed mechanisms behind these interventions?
- What are the limitations of these studies and future directions for research into direct imagery interventions?

One aim of this review is to provide an accessible source of current effective techniques, indexed by presenting problem, to aid clinicians who wish to utilise imagery-based techniques, but may feel unsure of which techniques are available. Indeed by providing a broad overview across disorders and interventions, emergent transdiagnostic themes will be highlighted. Brief descriptions of the imagery interventions identified will be given, in light of newly qualified therapists’ reporting of the varied application of imagery, apprehension about imagery work and the limited relevant core training they had received (Bell et al., 2015). With these aims in mind, an inclusive approach to study design would be relevant, such that single case studies and case series as well as larger between-subjects trials will be included in the current review.

“Indirect” imagery techniques are beyond the scope of this review. This review will also focus on particular imagery-focused therapeutic interventions rather than whole “therapies”. A review of efficacy studies of whole therapies would not allow delineation of the individual contributions to effectiveness of specific imagery-based techniques.

Examples of multi-component therapies that include imagery-specific techniques within it, and thus would not be included in this review, are a range of cognitive-behavioural therapy (CBT) protocols and Eye Movement Desensitisation and Reprocessing (EMDR) which consists of eight separate phases including history taking, desensitisation and body scanning (Shapiro & Solomon, 1995). Some attempt will be made to highlight notable studies evaluating therapies with an imagery component, in order to sign-post clinicians and as it would be remiss of a review to not acknowledge this significant aspect of the imagery literature. In addition, a review delineating specific techniques may allow therapists to incorporate these techniques into their clinical practice more easily without having to change their preferred therapeutic modality altogether, in what has been termed “modular treatment” (Brewin et al., 2009). Brewin et al. (2009) propose the utility of concept of modular treatment which allows for appropriate interventions to be targeted towards specific symptoms, given the heterogeneity and complexity of presentation of different disorders such as depression (Fava, Ruini, & Belaise, 2007; Goldberg, 2011) and schizophrenia (Carpenter Jr. & Kirkpatrick. 1988).

Method

Electronic searches

The electronic databases PsycINFO, MEDLINE, Web of Science and the Cochrane Library (including the Cochrane Central Register of Controlled Trials; CENTRAL) were searched with the following key words to identify relevant articles: (imagery OR imagery(psychotherapy) OR imagination OR imaginal) AND (intervention OR therapeutics OR therapy OR therap* OR treatment OR treat*) AND (mental disorder* OR mental disorders). The databases were searched from the first available date to 1st April 2016.

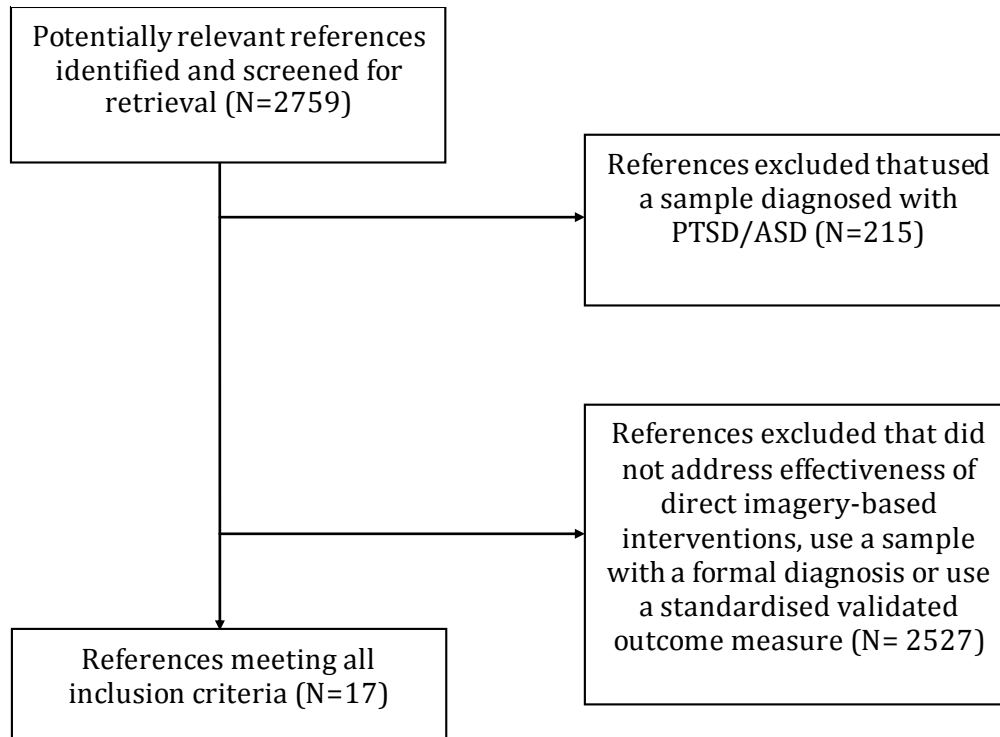
Inclusion and exclusion criteria

Articles were included in this review if:

1. they were published in the English language;
2. they were published in a peer-reviewed journal;
3. they described studies in which the effectiveness of direct imagery-based psychological interventions/techniques were evaluated, and not therapies consisting of multiple components;
4. a standardised, validated outcome measure was used to evaluate the intervention;
5. the sample was assessed to have a diagnosis of a psychological disorder as defined by a diagnostic classification system such as DSM-5 (Diagnostic and statistical manual of mental disorders (5th ed.); American Psychiatric Association, 2013) or ICD-10 (International Classification of Diseases, 10th Revision; World Health Organisation, 1992) but not of PTSD or ASD.

The database search returned 2759 unique hits. References were at first screened by title for potential relevance, with those identified subsequently screened by abstract. If an abstract appeared relevant the full article was read by the reviewer to ascertain whether inclusion criteria were met. A large number of references were discarded at the first stage as they did not relate to imagery-based interventions, but, for example, to neuroimaging studies or studies investigating phenomenology of imagery in participants. 2527 articles were discarded for failing to meet inclusion criteria 1 to 4. 215 articles were discarded as they related to samples with PTSD or ASD (criterion 5). Thus 17 articles were included in the final review. The selection process used is illustrated in Figure 1.

Figure 1
Electronic database search flow chart



Some notable studies were excluded for meeting some inclusion criteria but not others. Evaluation studies such as those by Wild, Hackmann, and Clark (2007; 2008) met all inclusion criteria except criterion 3, as they included multiple therapeutic components in their treatment, in this case imagery rescripting with the addition of verbal cognitive restructuring. Several studies were identified as meeting criteria 1 to 3, but not 4 and/or 5. Pajak and Kamboj's (2014) study, for example, investigates the use of imagery rescripting in bladder/bowel control anxiety as part of anxiety disorders such as social anxiety disorder, but the intervention was evaluated by participants' subjective ratings of distress (SUDS; Wolpe, 1958) only and not a standardised outcome measure and thus did not meet inclusion criterion 4. Studies that only used SUDS as an outcome measure were deemed to not meet criterion 4, due to concerns that SUDS may lack validity and reliability as an outcome measure (Debell & Jones, 1997; Lohr et al., 1992), despite being a useful tool for clinicians in practice. The

decision to exclude studies using SUDS, in order to preserve confidence in the validity and reliability of outcome measures used, was weighed against the inevitable exclusion of earlier studies published before 1990s and the development of many standardised measures.

SUDS were often found to be utilised in conjunction with the Behavioural Avoidance Test (BAT), an analogue test situation. BATS have been accused of being susceptible to demand characteristics (Gliksman & Winkler, 1980) and substantial variability in BAT methodology used (Steketee, Chambless, Tran, Worden, & Gillis, 1996) and thus studies using BATS to evaluate interventions, in the absence of other validated measures, were not included in this review. Inclusion criterion 4, relating to use of standardised and validated outcome measures only, increases the likelihood that the measures chosen were relevant for the target population, rather than generic subjective measures such as SUDS. This serves to ensure the inclusion of higher quality studies to allow clinicians to be able to make more informed decisions about employing imagery interventions.

Several studies were also excluded as participants were not noted to have had a formal diagnosis and thus did not meet criterion 5. These studies often recruited participants from student populations or advertisements who only self-identified as being particularly high in a certain trait for example anxiety or anger (e.g. Hecker, 1990).

Quality assessment of included studies

One of the aims of the current review is to provide an overview of current research on direct imagery interventions, to help inform clinicians about what techniques may be available and for which client groups and diagnoses. In addition, in order to help direct future research needs, an assessment of study quality is important. Study quality is linked to the strength of conclusions that can be drawn about

effectiveness studies and is thus relevant for scientist-practitioner clinicians who are inevitably interested in what techniques work for their clients. The authors assessed the included studies using Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (Kmet, Lee, & Cook, 2004). This checklist was developed for the evaluation for a variety of types of quantitative studies, not just randomised controlled trials (RCTs), which matches the wider search approach of this review.

The included studies were rated according to the degree that each of 14 criteria were met (“yes” = 2, “partial” = 1, “no” = 0). Checklist items not applicable to a particular study design were marked “n/a” and not included in the calculation of the summary score. A summary score was calculated for each paper by summing the total score obtained across relevant items and dividing by the total possible score. Table 1 shows the quality assessment of the included 17 studies.

Table 1
Quality assessment of included studies

Quality assessment criteria	Study					
	Brewin et al. (2009)	Chambless et al. (1982)	Clum et al. (1993)	Cornwall et al. (1996)	Esplen et al. (1998)	Foa et al. (1985)
Question / objective sufficiently described?	2	2	2	2	2	2
Study design evident and appropriate?	2	2	2	2	2	2
Method of participant/comparison group selection or source of information/input variables described and appropriate?	2	2	2	2	2	2
Participant (and comparison group, if applicable) characteristics sufficiently described?	2	1	2	1	2	2
If interventional and random allocation was possible, was it described?	N/A	1	0	1	2	0
If interventional and blinding of investigators was possible, was it reported?	N/A	0	0	0	1	0
If interventional and blinding of participants was possible, was it reported?	N/A	0	0	0	0	0
Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?	2	1	2	2	2	1
Sample size appropriate?	2	1	1	1	2	1
Analytic methods described/justified and appropriate?	2	2	2	2	2	2
Some estimate of variance is reported for the main results?	2	0	1	2	2	2
Controlled for confounding?	1	1	1	1	2	1
Results reported in sufficient detail?	2	2	2	2	2	1
Conclusions supported by the results?	2	2	2	2	2	2
Total score	21	17	18	20	25	18
Possible maximum score	22	28	28	28	28	28
Summary score	0.95	0.61	0.64	0.71	0.89	0.64

Quality assessment criteria	Study				
	Fracalanza et al. (2014)	Frets et al. (2014)	Ison et al. (2014)	Levinson et al. (2014)	Nilsson et al. (2012)
Question / objective sufficiently described?	2	2	2	2	2
Study design evident and appropriate?	2	2	2	2	2
Method of participant/comparison group selection or source of information/input variables described and appropriate?	2	2	2	1	2
participant (and comparison group, if applicable) characteristics sufficiently described?	2	2	2	1	2
If interventional and random allocation was possible, was it described?	0	N/A	N/A	N/A	2
If interventional and blinding of investigators was possible, was it reported?	0	N/A	N/A	N/A	0
If interventional and blinding of participants was possible, was it reported?	0	N/A	N/A	N/A	0
Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?	2	2	2	1	2
Sample size appropriate?	2	1	1	2	1
Analytic methods described/justified and appropriate?	2	1	1	2	2
Some estimate of variance is reported for the main results?	2	0	1	1	2
Controlled for confounding?	2	1	1	0	2
Results reported in sufficient detail?	2	2	1	2	2
Conclusions supported by the results?	2	2	2	2	2
Total score	22	17	17	15	23
Possible maximum score	28	22	22	20	28
Summary score	0.79	0.77	0.77	0.75	0.82

Quality assessment criteria	Study					
	Reimer & Moscovitch (2015)	Rus-Calafell et al. (2013)	Veale et al. (2015)	Watson & Marks, (1971)	Wheatley et al. (2007)	Whitaker et al. (2010)
Question / objective sufficiently described?	2	2	2	1	2	2
Study design evident and appropriate?	2	2	2	2	2	2
Method of participant/comparison group selection or source of information/input variables described and appropriate?	2	2	2	2	2	1
Participant (and comparison group, if applicable) characteristics sufficiently described?	2	2	2	2	2	2
If interventional and random allocation was possible, was it described?	0	1	N/A	0	N/A	N/A
If interventional and blinding of investigators was possible, was it reported?	0	0	N/A	0	N/A	N/A
If interventional and blinding of participants was possible, was it reported?	0	0	N/A	0	N/A	N/A
Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?	2	2	2	1	2	2
Sample size appropriate?	1	1	2	2	2	2
Analytic methods described/justified and appropriate?	2	2	2	0	2	2
Some estimate of variance is reported for the main results?	2	2	2	0	N/A	N/A
Controlled for confounding?	1	2	2	1	1	1
Results reported in sufficient detail?	2	2	2	0	2	1
Conclusions supported by the results?	2	2	2	2	2	2
Total score	20	22	22	13	19	17
Possible maximum score	28	28	22	28	20	20
Summary score	0.71	0.79	1.00	0.46	0.95	0.85

Results

Study characteristics

The 17 identified studies are presented in Tables 2 to 9, subdivided by diagnosis. Each table includes study characteristics, including study design and results.

Quality assessment

Watson and Marks's (1971) study was scored as lowest according to the quality checklist, with a summary score of 0.46 or 46%. The highest scoring was Veale et al. (2015) with a score of 1 or 100%. The most notable design weaknesses, highlighted by item scores of 0, related to blinding of investigators and participants. Only one study reported blinding of investigators (Esplen et al., 1998), and no studies reporting blinding of participants out of 10 studies where this was possible. It is interesting to note that the five lowest scoring studies are the five oldest. This is highlighted by a significant positive correlation between year of publication and quality checklist summary score, $r=.72, p=.001$. Methodological quality gains of this type over time have been demonstrated in psychopharmacology trials (Brunoni, Tadini, & Fregni, 2010) and may also be the case in psychological therapy evaluation trials, as demonstrated here.

Table 2

Study characteristics and results of studies investigating depressive disorders

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Brewin et al. (2009)	10	Major Depressive Disorder (adults)	Imagery Rescripting	As per clinical need, mean = 8.1 weekly sessions (1 hour each)	Case series	-	Pre-treatment baseline (3 weeks); During treatment (weekly); Follow-up (3, 6, 9, 12 months)	BDI: +; 6 of 10 participants showed clinically significant improvement Intrusive memory composite ratings: + Rumination composite ratings: +
Wheatley et al. (2007)	2	Major Depressive Episode (adult male)	Imagery rescripting	As per clinical need, mean = 11 weekly sessions	Case study	-	Pre-treatment baseline (3 weeks); During treatment (weekly); Follow-up (3, 6, 9, 12 months)	BDI: 2 of 2 participants showed clinically significant improvement Intrusive memory composite ratings: self-rated improvement
Whitaker et al. (2010)	1	Major Depressive Episode and GAD (in the context of cancer)(adult male)	Imagery rescripting	7 weekly sessions (1 hour each)	Case study	-	Pre-treatment baseline (3 weeks); During treatment (weekly); Follow-up (3, 6 months)	HADS: clinically significant improvement Intrusive symptoms ratings: self-rated improvement

Note + = statistically significant improvement; - = statistically significant worsening; +/- no statistical change.

BDI = Beck Depression Inventory; HADS = Hospital Anxiety and Depression Scale

Table 3

Study characteristics and results of studies investigating panic disorder and agoraphobia

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Chambless et al. (1982)	21	Agoraphobia (adults)	Imaginal Exposure	8 sessions (2 hours each) over 4 weeks	RCT (crossover)	Flooding under sedation and attention control	Pre-; Post-	AVS avoidance: +, imaginal exposure>controls AVS fear: +, imaginal exposure>attentional control, imaginal exposure=flooding under sedation AVS panic: +, imaginal exposure=controls AVS anxiety: +/-, imaginal exposure=controls
Clum et al. (1993)	24	Panic Disorder (adults)	Imaginal Exposure	6 individual sessions (1 hour each) + 4 group sessions (1.5 hours each) over 6 weeks	Quasi-experimental	Guided imaginal coping and wait list control	Pre-; Post-; Follow-up (4 months)	PASQ: +/- (trend improvement, $p<.10$), PACQ: +/- (trend improvement, $p<.10$)

Note + = statistically significant improvement post-treatment compared to pre-treatment; - = statistically significant worsening post- compared to pre-treatment; +/- = no statistical change between pre- and post-treatment; > = statistically significant difference in the direction indicated, < = statistically significant difference in the direction indicated, = = no statistical difference

AVS = Anxiety and Avoidance Scale; PASQ = Panic Attack Symptoms Questionnaire; PACQ = Panic Attack Cognitions Questionnaire

Table 4

Study characteristics and results of studies investigating specific phobias

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Cornwall et al. (1996)	24	Specific Phobia - darkness (children 7-10 years)	Emotive Imagery	6 weekly sessions (1 hour each)	RCT	Wait list control	Pre-; Post-; Follow-up (3 months)	FSSC-R: emotive imagery>control RCMAS: emotive imagery>control Darkness Fear Behaviour Questionnaire: emotive imagery>control Darkness Tolerance Test: emotive imagery>control
Rus-Calafell et al. (2013)	15	Specific Phobia - flying (adults)	Imaginal Exposure	6 sessions (1.25 hours each) over 3 weeks	RCT	Virtual reality exposure	Pre-; Post-; Postreal flight (within 2 weeks); Follow-up (6 months)	FFQ: +, imaginal exposure=virtual reality exposure FFS: +, imaginal exposure=virtual reality exposure DEFAS: +, imaginal exposure=virtual reality exposure ADIS-IV fear and avoidance: + LIS severity: + AVS: +
Watson & Marks (1971)	16	Specific Phobia - varied (adults)	Imaginal Exposure	8 sessions (1 hour each)	Crossover	-	Pre-; Post-	LIS severity: + AVS: +

Note + = statistically significant improvement post-treatment compared to pre-treatment; - = statistically significant worsening post- compared to pre-treatment; +/- = no statistical change between pre- and post-treatment; > = statistically significant difference in the direction indicated, < = statistically significant difference in the direction indicated, = = no statistical difference

FSSC-R = Fear Survey Schedule for Children – Revised; RCMAS = Revised Children’s Manifest Anxiety Scale; FFQ = Fear of Flying Questionnaire; FFS = Fear of Flying Scale; DEFAS = Danger Expectations and Flying Anxiety Scales; ADIS-IV = Anxiety Disorders Interview Schedule for DSM-IV; LIS = Life Interference Scale; AVS = Anxiety and Avoidance Scale

Table 5

Study characteristics and results of studies investigating social anxiety disorder

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Frets et al. (2014)	6	Social Anxiety Disorder (adults)	Imagery rescripting	Until satisfied with results, mean = 11.2 weekly sessions (45 minutes each)	Case series	Each participant as own control (no treatment baseline)	Pre-treatment baseline; During treatment (weekly); Post-treatment; Follow-up (3, 6 months)	SIAS: all participants improved post-treatment SPS: all participants improved post-treatment AVS: all participants improved post-treatment SPAI-N: all participants improved post-treatment, range 12-85% improvement BFNE: all participants improved post-treatment, range 17-65% improvement SIAS: imagery rescripting>control
Nilsson et al. (2012)	14	Social Anxiety Disorder (adults)	Imagery rescripting	One session	RCT	Reading task	Pre-; Post- (1 week)	FNE: imagery rescripting>control Distress ratings: imagery rescripting>control Meaning of image: imagery rescripting>control SPIN: +, imagery rescripting>control
Reimer & Moscovitch (2015)	25	Social Anxiety Disorder (adults)	Imagery rescripting	One session (1.5 hours)	Quasi-experimental	Waitlist control	Pre-; Post- (1 week)	LSAS: +, +, imagery rescripting>control Perceived validity and accuracy of negative appraisals: +, imagery rescripting>control

Emotions associated with memories: +,
imagery rescripting>control

Note + = statistically significant improvement post-treatment compared to pre-treatment; - = statistically significant worsening post- compared to pre-treatment; +/- = no statistical change between pre- and post-treatment; > = statistically significant difference in the direction indicated, < = statistically significant difference in the direction indicated, = = no statistical difference

SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; AVS = Anxiety and Avoidance Scale; SPAI-N = Dutch Social Phobia Anxiety Inventory; BFNE = Brief Fear of Negative Evaluation Scale; FNE = Fear of Negative Evaluation Scale; SPIN – Social Phobia Inventory; LSAS – Leibowitz Social Anxiety Scale;

Table 6

Study characteristics and results of the study investigating generalised anxiety disorder

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Fracalanza et al. (2014)	57	GAD (adults)	Imaginal Exposure (written - consistent exposure)	Writing on 3 consecutive days (20 minutes each)	RCT	Varied written exposure and neutral writing control	Pre-treatment baseline; Post- (1 week)	PSWQ: +, consistent exposure>controls WAQ: +, consistent exposure>varied exposure CAQ: +/-, consistent exposure=controls IUS: +, consistent exposure>controls

Note + = statistically significant improvement post-treatment compared to pre-treatment; - = statistically significant worsening post- compared to pre-treatment; +/- = no statistical change between pre- and post-treatment; > = statistically significant difference in the direction indicated, < = statistically significant difference in the direction indicated, = = no statistical difference

PSWQ = Penn State Worry Questionnaire; WAQ = Worry and Anxiety Questionnaire; CAQ = Cognitive Avoidance Questionnaire; IUS = Intolerance of Uncertainty Scale

Table 7
Study characteristics and results of studies investigating obsessive compulsive disorder

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Foa et al. (1985)	19	OCD (adults)	Imaginal Exposure	15 daily sessions (2 hours each) + 2 sessions at home (4 hours each) over a 3 week period	RCT	In vivo exposure	Pre-; Post- (3 days); Follow-up (3, 6, 12, 18 months)	MOCI: +, imaginal exposure=in vivo exposure
Veale et al. (2015)	12	OCD (adults)	Imagery rescripting	One session	Case series	Each participant as own control (discussion of imagery only)	Intake; Post control/Pre-treatment baseline; Post-; Follow-up (3 months)	Y-BOCS: 8 of 12 +, 5 of 12 participants showed clinically significant improvement, imagery rescripting>control OCI: mean improvement RIQ: mean improvement

Note + = statistically significant improvement post-treatment compared to pre-treatment; - = statistically significant worsening post- compared to pre-treatment; +/- = no statistical change between pre- and post-treatment; > = statistically significant difference in the direction indicated, < = statistically significant difference in the direction indicated, = = no statistical difference

MOCI = Maudsley Obsessive Compulsive Inventory; Y-BOCS = Yale-Brown Obsessive Compulsive Scale; OCI = Obsessive Compulsive Inventory; RIQ = Responsibility Interpretations Questionnaire

Table 8

Study characteristics and results of studies investigating eating disorders

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Esplen et al. (1998)	50	Bulimia Nervosa (adults)	Guided Imagery	6 weekly sessions (1 hour each) + daily homework practice	RCT	Weekly sessions discussing diary monitoring of eating behaviour	Pre-; Post- (1 week)	EDI: +, guided imagery>control, 56% clinically significant improvement after guided imagery compared to <10% post-control EAT-26: +, guided imagery>control Binging/purging (self-report): +, guided imagery>control, 25% symptom free after guided imagery compared to 0% post-control Soothing Receptivity Scale: +, guided imagery>control
Levinson et al. (2014)	1	Anorexia Nervosa (adult female)	Imaginal Exposure	12 sessions 3-7 days apart over 28 days	Case study	-	Pre-; Post-; Follow-up (1 month)	EDE-Q: +, 95% certainty of clinically significant improvement CIA: +, 95% certainty of clinically significant improvement BMI: 1.72 BMI increase

Note + = statistically significant improvement post-treatment compared to pre-treatment; - = statistically significant worsening post- compared to pre-treatment; +/- = no statistical change between pre- and post-treatment; > = statistically significant difference in the direction indicated, < = statistically significant difference in the direction indicated, = = no statistical difference

EDI = Eating Disorder Inventory; EAT-26 = Eating Attitudes Test; EDE-Q = Eating Disorder Examination Questionnaire; CIA = Clinical Impairment Assessment; BMI = Body Mass Index;

Table 9

Study characteristics and results of the study investigating schizophrenia spectrum and other psychotic disorders

Study	N	Diagnosis of sample	Direct imagery intervention	Intervention length	Design	Control Group?	Measurement timings	Main dependent measures and treatment effects
Ison et al. (2014)	4	Schizophrenia/Schizoaffective Disorder (adults)	Imagery rescripting	1 session (1.5 hours)	Case series	-	Pre-treatment baseline; Post-; Follow-up (1, 4 weeks)	PSYRATS- Auditory Hallucinations/Delusions: +/- Voice Power Differential Scale: +/- DASS: +/- Imagery frequency, uncontrollability, distress, negative affect ratings: 3 of 4 participants showed improvements

Note + = statistically significant improvement post-treatment compared to pre-treatment; - = statistically significant worsening post- compared to pre-treatment; +/- = no statistical change between pre- and post-treatment; > = statistically significant difference in the direction indicated, < = statistically significant difference in the direction indicated, = = no statistical difference

PSYRATS = Psychotic Symptoms Ratings Scales; DASS = Depression Anxiety Stress Scales

Direct imagery interventions

Four types of direct imagery interventions were evaluated in the 17 studies identified: imaginal exposure, imagery rescripting, guided imagery and emotive imagery. Each of these interventions is briefly described below, followed by a review of their effectiveness by disorder.

Imaginal Exposure. Exposure to a feared stimulus is a core treatment for anxiety and phobia related disorders. It can take a hierarchical form whereby individuals are progressively exposed to more anxiety-provoking stimuli over the course of treatment, or a more prolonged form (flooding) whereby the individual is exposed to their feared situation with the aim of experiencing their anxiety until it becomes tolerable. It is thought that exposure to a feared stimulus may reduce anxiety via habituation whereby there is a decremental neuronal response to repeated stimulation (Groves & Thompson, 1970). Foa and Kozak's (1986) emotional processing theory (EPT) combines habituation with corrective learning, whereby memory structures that hold information about the meaning of and responses to fear ('fear structures') are modified via the introduction of new information. This emotional processing is not necessarily conscious and with that in mind, exposure therapy is usually classed as an intervention derived from behavioural rather than cognitive theory.

Exposure to an actual feared stimulus (in vivo exposure) is not always feasible, if the feared stimulus is too costly or inconvenient to incorporate into treatment or is a past/hypothetical future event as is commonly the case in PTSD and GAD (generalised anxiety disorder) respectively. Imaginal exposure is an alternative that uses mental images of feared stimuli.

Seven studies evaluating imaginal exposure were found in the literature, spanning several anxiety disorders and anorexia nervosa. All of the studies evaluated

imaginal exposure delivered verbally with a therapist, except Frazalanza et al (2014) who used a written variant.

Imagery rescripting. Imagery rescripting (Smucker, Dancu, Foa, & Niederee, 1995) was the most common intervention to be evaluated, accounting for 8 of the 17 identified studies, spanning depression, social anxiety disorder, OCD and schizophrenia. It involves individuals holding intrusive and distressing mental images in mind, and vividly imagining alternative, more positive outcomes. A common procedure involves a three-stage rescripting (Arntz & Weertman, 1999). The first stage (reliving) involves the individual imagining the event in their mind, at the age they were when it occurred. This stage is arguably similar to imaginal exposure, except that the client is more active in producing a spoken account of their imagery, rather than listening to the therapist's voice of a script as is often the case during imaginal exposure. The second stage (exposure mastery) involves mentally reliving the event but this time observing from the perspective of their current self, at their current age. They would subsequently intervene in a disarming and often compassionate manner and convey to their younger self an alternative message or meaning of the situation. Thirdly (compassion/nurturing), individuals relive the second stage but from the perspective of their younger self, experiencing their present self intervening again, able to request and do what they need to, to feel safe in that situation.

There is notable variability in use of compassion within the third rescripting stage. Some use Arntz and Weertman's (1999) protocol but do not mention feelings of compassion and instead place more emphasis on imagining the content of imagery changing (Veale et al., 2015).

Emotive imagery. Emotive imagery is a variant of systematic desensitisation (Wolpe, 1969). Systematic desensitisation may be conceptualised as the gradual

habituation to a feared stimulus through the generation of anxiety-inhibiting responses (Wolpe, 1969). These anxiety-inhibiting responses take the form of relaxation as well as emotions other than fear such as anger. Emotive imagery has been applied to children, with imagination used to generate positive and anxiety-inhibiting emotions, such as self-assertion, pride or affection (Lazarus & Abramovitz, 1962). Only one evaluation study was identified that met all criteria, a randomized controlled trial of emotive imagery for the treatment of darkness phobia in children (Cornwall et al., 1996).

Guided imagery. Guided imagery is an intervention that involves the generation of positive images, rather than addressing existing negative imagery. It has been widely written about in various fields, including hypnotherapy and music therapy, as well as psychological therapy. Fifty-seven articles were identified as relating to guided imagery but were excluded from the present review at an early stage as that were not published in the field of psychology and not understood within frameworks based on psychological theory. These articles were not necessarily evaluations of guided imagery as an intervention and no guided imagery studies were identified that satisfied the inclusion and exclusion criteria of the present review but were not in the field of psychology. Guided imagery protocols may vary with some used in conjunction with other treatment components such as Apóstolo and Kolcaba's (2009) investigation of guided imagery as a treatment for depressive disorders within psychiatric inpatients that combined guided imagery with progressive muscle relaxation. Studies using multicomponent protocols such as this were not included in this review. The only reference identified that met all inclusion criteria and evaluated 'pure' guided imagery was Esplen et al.'s (1998) randomised controlled trial in bulimia nervosa.

Direct imagery interventions by disorder

In line with the aims of this review, the 17 identified studies have been classified by groups of disorders for ease of reference. Details of reported effectiveness and detail about what different interventions entailed are provided, so as to allow readers to contrast therapeutic methods, both between studies reported and with their own clinical practice. The authors' purported mechanisms of change are also highlighted. An overarching discussion in relation to active mechanisms is included in the Discussion section.

Direct imagery interventions for depressive disorders

Three studies were identified that tested the effectiveness of direct imagery interventions for depressive disorders in adults. These three studies evaluated imagery rescripting (Wheatley et al., 2007; Brewin et al., 2009; Whitaker et al., 2010).

These studies make the case that imagery interventions may be particularly useful in treating depression due to the high occurrence of distressing intrusive memories, with estimates varying between 44% (Patel et al., 2007) and 87% (Brewin, Hunter, Carroll, & Tata, 1996) in those suffering from depression. Greater levels of intrusion and avoidance of intrusive autobiographical memories are associated with greater depression severity and lower self-esteem (Kuyken & Brewin, 1994; 1999).

Effectiveness. Brewin et al. (2009) performed a case series of 10 clients diagnosed with major depressive disorder who received imagery rescripting and Wheatley et al. (2007) present a more detailed case study of two of the clients included in the series. Clients received as many hourly sessions of imagery rescripting based on manuals derived from Arntz and Weertman, (1999), Smucker et al. (2005) and Hackmann (1998), as was necessary according to clinical need, with more sessions offered if additional intrusive memories were reported. Post-treatment and at 12

month follow-up, measures of depression and measures of intrusive memories and rumination showed significant mean improvements. These gains were maintained after 12 months, and overall demonstrate that imagery rescripting has the potential to be an effective standalone intervention for depressed individuals.

Imagery rescripting has also been evaluated for depression and GAD in the context of cancer (Whitaker et al., 2010). Whitaker et al. (2010) used a three stage rescripting protocol that included notable variations such as imagining the comical humiliation of a bullying boss from work as a clown (mastery), and using compassionate imagery of a perfect nurturer, in this case an understanding and forgiving angel (Gilbert & Irons, 2004; Lee, 2005). The client's level of depression and anxiety had improved post-treatment and continued at six month follow-up. The client also reported decreased frequency, distress, and interference of the intrusive memories. Furthermore, he reported a generalisation of the use of the compassionate, perfect nurturer image between post-treatment and follow up, such that he would bring forth this image in times of stress.

It is notable that imaginal exposure has also been successfully employed as an imagery intervention to treat depression in a single case study (Kandris & Moulds, 2008). This study is not included in this review as the client was not formally assessed as having a diagnosis of a depressive disorder and thus did not meet inclusion criterion 5.

Proposed mechanisms. The retrieval competition hypothesis (Brewin, 2006) has informed Brewin et al. (2009) and Wheatley et al. (2007)'s evaluations of imagery rescripting for adults with depression. This concept emphasises the competition between various (positive and negative) memory representations that directly affect mood and behaviour. Brewin et al. (2009) and Wheatley et al. (2007) argue that imagery rescripting may incorporate new positive information to image, creating new

and more readily accessible images than the dominant negative memory representations in those who suffer from depression. EPT (Foa & Kozak, 1986) was used as the explanatory framework for imaginal exposure in depression (Kandris & Moulds, 2008).

Brewin et al. (2009) and Wheatley (2007) attempted to ensure that their imagery rescripting interventions did not include explicit verbal cognitive restructuring. Nevertheless, they elicited the meaning of clients' intrusions and appraisal ratings were taken before and after each rescripting. It cannot be discounted that clients may have been primed to engage in incidental cognitive restructuring of their own accord. Alternatively an implicit, unconscious form of restructuring may have taken place, which Wheatley (2007, p.378) names "spontaneous restructuring", which may also account for some of the findings.

In addition the reduction of self-criticism as a result of compassionate mind imagery (Gilbert & Irons, 2004; Lee, 2005) was another possible mechanism in Whitaker et al.'s (2010) study.

Direct imagery interventions for anxiety and obsessive-compulsive related disorders

Eleven studies were identified that tested the effectiveness of direct imagery techniques for anxiety and obsessive-compulsive related disorders, which represents the group of disorders in which these interventions have been utilised most.

Panic disorder and agoraphobia. Panic disorder and agoraphobia are closely linked, with approximately a fifth of those who have experienced panic disorder in their lifetime having also suffered from agoraphobia (Kessler et al., 2006). In vivo exposure/flooding has traditionally been a treatment for these disorders (Marks,

Boulougouris, & Marset, 1972) and studies have evaluated the possibility of using imaginal exposure too.

Effectiveness. Two studies were found that utilised imaginal exposure to treat panic disorder (Clum et al., 1993) or agoraphobia (Chambless et al., 1982). Several other notable studies were identified that investigated imaginal exposure but were not included in the final review due to failure to meet inclusion criteria as interventions were combined without the effects of each included as separate evaluations (e.g. Marks et al., 1972; Gelder et al., 1973).

Chambless et al. (1982) conducted a randomised multiphase crossover study comparing imaginal flooding with flooding in conjunction with a short-acting barbiturate sedative, as well as against an attentional control, for the treatment of agoraphobia. Hierarchical imagined flooding focused on phobic situations, and the hypothetical disastrous feared consequences of panicking. The imaginal flooding group (non-drug) showed significant reductions in post-treatment fear and avoidance, compared to the drug flooding and control groups, as measured by Watson and Marks' (1971) anxiety and avoidance rating scales (AVS). The second phase of the study included in vivo exposure components, which allowed for comparison between imaginal and in vivo flooding after controlling for covariance. It was found that imaginal exposure was as effective as the in vivo procedure.

In contrast, Clum et al. (1993) found that imaginal exposure was not statistically better than the wait-list control in the treatment of panic disorder and panic disorder with agoraphobia, with neither of these groups showing a statistically significant improvement. They were comparing imaginal exposure with guided imaginal coping, a multicomponent imagery therapy, of which imaginal exposure is one aspect.

Proposed mechanisms. Habituation has been proposed as the active mechanism for imaginal exposure for panic disorder and agoraphobia by Chambless et al. (1982). They included a drug flooding group to ascertain whether subjective anxiety (supposedly counteracted by the sedative in this group) was necessary for habituation. The sedative drug did not reduce subjective anxiety as expected. This group showed the same amount of within session habituation as the non-drug flooding group but less across session habituation. The authors do not suggest why the drug might affect across session habituation but, they note a possible expectancy effect across sessions. They suggest that, based on feedback from previous sessions, clients may approach subsequent exposure sessions with expectations of increased or decreased fear responses to phobic situations. Expecting to be scared may mean that they were less likely to habituate. This proposed mechanism thus combines a behavioural explanation of habituation with cognitive appraisal processes.

Specific phobias. Imaginal exposure was the imagery intervention used in the literature for treating specific phobias in adults (Watson & Marks, 1971; Rus-Calafell et al., 2013) and emotive imagery for children (Cornwall et al., 1996). Other notable studies investigated imaginal exposure in dental phobia but failed to meet inclusion criteria. Thom et al.'s (2000) study combined imaginal exposure with stress management training (Ning & Liddell, 1991), and Mathews and Rezin's (1977) did not diagnose participants.

Effectiveness. Two studies were identified, covering a range of specific phobias from fear of flying to fear of wearing clean shirts (Watson & Marks, 1971; Rus-Calafell et al., 2013). Watson and Marks' (1971) study evaluated the short-term effects of imaginal flooding in 16 clients with a variety of phobias. During imaginal flooding, the therapists read continuous descriptions of phobic situations and their feared

consequences, with the aim of eliciting high levels of fear in the clients. Imaginal exposure to the clients' main phobias showed significant improvement on phobic anxiety and avoidance (AVS; Watson & Marks, 1971) and phobic attitudes towards the feared situations. In addition it was reported that panic attacks and general anxiety were significantly improved.

Rus-Calafell et al.'s (2013) study into fear of flying was the other study identified in the literature that evaluated imaginal exposure for specific phobias. Rus-Calafell et al. (2013) found that hierarchical imaginal exposure was effective in improving fear of flying symptoms. ADIS-IV (Anxiety Disorders Interview Schedule; DiNardo, Brown, & Barlow, 1994) ratings also showed significant reductions in fear and avoidance, matching Watson and Marks' (1971) finding that these two dimensions are both affected by imaginal exposure.

Interestingly no studies of imaginal exposure for specific phobias in children were identified. Emotive imagery (Cornwall et al., 1996) was identified by this review as effective for specific phobias in children. Cornwall et al. (1996) tested this intervention on children, aged 7-10 years old, with a clinical diagnosis of darkness phobia. Several other studies of emotive imagery in the treatment of darkness phobia in children had been identified however were not included in the current review as they did not meet criterion 4 (e.g. Lazarus & Abramovitz, 1962; Kellerman, 1980) or criterion 5 (e.g. King, Cranstoun, & Josephs, 1989).

Cornwall et al.'s (1996) emotive imagery intervention involved the therapist reading individualised scripts of feared situations, with children instructed to close their eyes and concentrate on imagining the scenes, as well as focus on aspects of images in multiple sensory modalities. Scripts were read in a hierarchical fashion and crucially the children's favourite superheroes entered the scenes and would typically interact with the children in a collaborative and/or educational manner (King et al., 1989). Homework was also encouraged whereby children were asked to recall the

content of the script used in each session at home whenever they became scared of the dark. Post-treatment, fear of the dark significantly reduced and continued to improve at three month follow-up. A darkness tolerance test indicated that those in the emotive imagery condition could withstand significantly more time in darkness post-treatment and at follow up than those in the control group.

Proposed mechanisms. It is argued that imaginal exposure may act through extinction or habituation. The active mechanism of extinction presumes that the fear response is conditioned to the phobic situation and that exposure blocks avoidance or escape, which allows extinction to occur. Alternatively, exposure provokes experiences of fear and anxiety and subsequent habituation if maintained for long enough. Watson and Marks (1971) indeed state that both mechanisms could be at play. These proposed mechanisms and the parallel findings that both anxiety and avoidance were reduced after imaginal exposure highlight the importance of considering both of these dimensions in clients while delivering this intervention.

Cornwall et al. (1996) argues that the mechanism of emotive imagery is anxiety-inhibition by positive emotions that are elicited through imagining superheroes. They did not specify which positive emotions children felt in their study, but argued that these emotions have autonomic effects that are incompatible with anxiety (Cornwall et al., 1996; Lazarus & Abramovitz, 1962).

Social anxiety disorder. Hackmann et al. (2000) investigated the phenomenology of negative imagery within social anxiety disorder using a semi-structured interview. Imagery was often recurrent, focused on the self and linked to a past memory of an adverse social event, and is thought to be a maintaining factor in social anxiety disorder (Clark & Wells, 1995; Rapee & Heimberg, 1997).

Effectiveness. Three studies were identified that utilised a direct imagery technique in the form of imagery rescripting in the treatment of social anxiety disorder in adults (Nilsson et al., 2012; Frets et al., 2014; Reimer & Moscovitch, 2015).

Frets et al. (2014) performed a case series using a three stage imagery rescripting protocol (Arntz & Weertman, 1999). They focused on the client experiencing the adult in the third stage as being compassionate, soothing and showing affection towards them. All clients showed an improvement in social anxiety disorder symptoms post-treatment, but results at follow-up were mixed as half maintained gains or improved whereas the half deteriorated. The authors did not analyse why some clients performed worse at follow-up and indeed no demographic or treatment length discrepancies seem to be able to account for this.

Nilsson et al. (2012) and Reimer and Moscovitch (2015) performed larger scale trials of imagery rescripting than Frets et al.'s (2014) case series, but using a single-session protocol. Reimer and Moscovitch's (2015) study aimed in part to replicate Nilsson et al.'s (2012) study with both performing a three-stage imagery rescripting protocol (Arntz & Weertman, 1999). Nilsson et al. (2012) particularly noted the use of compassion in the third stage, whereas Reimer and Moscovitch (2015) instructed participants to imagine whatever they felt was needed for the outcome of the event to be "more positive or satisfying". The control group for Nilsson et al. (2012) study was a social anxiety disorder self-help reading task while for Reimer and Moscovitch (2015) control participants received no intervention.

Symptoms of social anxiety disorder were significantly reduced after one imagery rescripting session in both studies compared to control conditions. Both studies showed significant reductions in negative emotions and distress associated with memory retrieval and interestingly both also showed self-reported changes in

aspects of beliefs and meaning associated with social anxiety imagery, despite neither study utilising an explicit cognitive restructuring component.

Proposed mechanisms. The authors of these three studies (Frets et al., 2014; Nilsson et al., 2012; Reimer & Moscovitch, 2015) suggest that the active mechanism of imagery rescripting for social anxiety disorder may be related to changes in cognitive appraisals related to past memories. They argue that these changes can occur incidentally as a result of reliving and rescripting, without the need for explicit cognitive restructuring, rather like Wheatley et al.'s (2007) "spontaneous restructuring".

Given the overlap between the first stage of imagery rescripting and imaginal exposure however, it may be that habituation may account for some of the improvements in social anxiety disorder symptoms.

Generalised Anxiety Disorder (GAD). The Avoidance Model of Worry and GAD (Borkovec, 1994) proposes that mental imagery of feared situations can be a common experience of those suffering from GAD. It discusses the role that worry may play as a coping strategy in temporarily mitigating the effects of such imagery by serving as a method of avoidance, whereby worry as a linguistic activity can inhibit imagery.

Effectiveness. One study was identified that utilised a direct-imagery technique for the treatment of GAD (Fracalanza et al., 2014). Fracalanza et al. (2014) evaluated an imaginal exposure protocol, which has also been called worry exposure, and is often included in multicomponent CBT protocols for GAD (Barlow, Rapee, & Brown, 1992). Another noteworthy study (Hoyer et al., 2009) was identified through the reference list of Fracalanza et al.'s (2014) article that evaluated worry exposure in the treatment of

GAD. This study was not included in the current review, due to failing to meet inclusion criterion 3.

Fracalanza et al. (2014) tested a written variant of imaginal exposure, as opposed to the more common verbal method. Participants' feared hypothetical worst case scenarios (WCS) were first elicited and they then wrote continuously for 20 minutes about their WCS on three consecutive days. This consistent exposure condition was contrasted with participants writing about a few different WCSs (varied exposure) or a neutral topic of what they would do if given a day off work (control condition). Clients were specifically asked to write in the first person, in the present tense, and with reference to their emotional experience and consequences of their WCS coming true to ensure they vividly imagined their WCS while writing and to reduce the likelihood of emotionally distancing themselves from their WCS. Manipulation checks were carried out to ensure clients followed the writing instructions and wrote about what they were supposed to, but no other checks were put in place to measure whether participants imagined their WCS.

The results were promising in the consistent exposure condition as GAD and worry symptoms were reduced post-treatment. There was a reduction in intolerance of uncertainty but no change in self-reported cognitive avoidance. Behavioural avoidance was reduced however in a modified behavioural avoidance test (BAT) in which participants were asked to imagine their WCS coming true.

Proposed mechanisms. Fracalanza et al. (2014) used specific outcome measures to test hypotheses relating to proposed mechanisms. Borkovec's (1994) Cognitive Avoidance Theory of Worry suggests that abstract thinking in the form of worry plays a role in the avoidance of imagery of feared scenarios in the maintenance of GAD (Sibrava & Borkovec, 2006; Stöber & Borkovec, 2002). Fracalanza et al. (2014) administered the CAQ (Gosselin et al., 2002; Sexton & Dugas, 2008) to test whether

written imaginal exposure was effective via the reduction of such cognitive avoidance. Their findings from the CAQ did not support this hypothesis, however their findings from a BAT showed reduced fear and desire to avoid which supports the notion that reduced avoidance may be an active ingredient.

Improvement on the IUS (Bhur & Dugas, 2002) also demonstrated support for the role of imaginal exposure in decreasing intolerance of uncertainty (Dugas, Freeston, & Ladouceur, 1997). It is hypothesised that intolerance of uncertainty reduced through exposure to the hypothetical possibilities of uncertain elements of future WCSs (Frazalanza et al., 2014).

The authors also found some support for EPT (Foa & Kozak, 1986), as they found positive correlations between reduction in worry and the use of negative emotion words as well as self-reported anxious arousal on the SAM-A (Bradley & Lang, 1994).

Obsessive Compulsive Disorder (OCD). De Silva (1985) documented four independent types of obsessive-compulsive imagery from case studies and the literature. Obsessional images are mental images of the intrusive cognition itself and compulsive images are images of compulsive behaviour that often serve to alleviate anxiety/distress much as motor rituals do. The content of disaster images is the feared consequence if rituals are not performed, such as the death of loved ones or natural disasters. Disruptive images are images that enter into clients' minds while carrying out compulsive behaviour that subsequently invalidate these rituals. Speckens et al. (2007) found that that 81% of clients with severe OCD reported intrusive imagery, and 76% of these related to compulsive imagery. Cognitive-behavioural models suggest that OCD imagery can activate distressing emotions such as shame and fear and associated cognitions and avoidance or compulsive behaviours (Speckens et al., 2007).

Effectiveness. Two studies were identified that evaluated direct imagery techniques for OCD (Foa et al., 1985; Veale et al., 2015). Foa et al. (1985) used imaginal exposure for the treatment of OCD, and compared its effectiveness with in vivo exposure. Veale et al. (2015) evaluated imagery rescripting.

Foa et al. (1985) employed a relatively time-intensive imaginal exposure protocol (see Table 7) in which exposure scripts were presented in a hierarchical order on a daily basis. Clients lay down with their eyes closed and were instructed to imagine scenes including obsessional and disaster images that were read out by the therapist. Each session was taped with clients instructed to listen again at home for four hours. Clients were instructed not to carry out compulsive behaviours or engage in compulsive imagery. The in vivo condition was similar, involving in vivo exposure during sessions and further homework. Obsessive-compulsive symptomology significantly improved post-treatment and at follow-up. Foa et al. (1985) found that imaginal exposure and in vivo exposure were equally effective.

Veale et al. (2015) used a case series to evaluate a single session of imagery rescripting for OCD based on Arntz and Weertman's (1999) three stage protocol. Speckens et al. (2007) found that intrusive images within OCD were associated with adverse memories, and as such Veale et al. (2015) focused on rescripting these memories rather than the intrusive images themselves. Each client acted as their own control, by receiving a control intervention where they discussed the content of their associated aversive memory and the encapsulated meaning of this memory, without rescripting or restructuring. Then each client received a session of imagery rescripting in which Veale et al. (2015) placed more emphasis on restructuring the content of the visual memory in order to change its meaning to something less catastrophic, rather than invoking a feeling of compassionate or safety in the younger self as has been the focus of other imagery rescripting protocols (e.g. Frets et al., 2014). Imagery

rescripting was shown to decrease OCD symptoms at post-treatment and at 3-month follow-up but not after the control intervention.

Proposed mechanisms. Foa et al. (1985) propose the mechanisms of emotional processing and habituation consistent with EPT (Foa & Kozak, 1986) for the treatment of intrusive imagery in OCD using imaginal exposure. Veale et al. (2015) suggest various mechanisms for their use of imagery rescripting. Similar to EPT, they suggest that imagery rescripting may allow emotional processing of past memories to occur, reducing the likelihood of them returning in the form of fear or obsessions (Rachman, 1980; 2001). They also suggest that a cognitive focus may have helped clients to develop alternative meanings of adverse memory events and also develop a new understanding of their intrusive obsession image “as being emotionally conditioned to a past memory that had now lost its context and developed a sense of “nowness” (Veale et al., 2015 p. 235), much like in PTSD. This may suggest a spontaneous mechanism that shares similarities with meta-cognitive approaches (Wells, 2000).

Direct imagery interventions for eating disorders

The role and meaning of imagery in relation to eating disorders has been noted in the literature, both in relation to images of the self (Stopa, 2009) and body images within the media (Spettigue & Henderson, 2004). Ohanian (2002) theorises that utilising mental imagery therapeutically may allow access to “primitive” schemas about the self that formed from experiences during developmental stages prior to linguistic development.

Effectiveness. Two studies were identified that tested the effectiveness of direct imagery techniques for eating disorders. Levinson et al. (2014) evaluated

imaginal exposure in an adult client with anorexia nervosa, and Esplen et al. (1998) utilised guided imagery in the treatment of bulimia nervosa.

Exposure therapy has been used as a treatment for anxiety within anorexia nervosa, for example with the use of food or images of clients' bodies in the mirror as the feared stimulus (Steinglass et al., 2013). Levinson et al. (2014) extended the use of exposure therapy in the treatment of anorexia nervosa to feared situations that could not be reproduced in vivo. These fears may be hypothetical, such as being rejected or abandoned if they were to put on weight, or hypothetical immediate fatness. Levinson et al. (2014) performed an initial test of this hypothesis using a single case study of a female client with anorexia nervosa – restricting type. The client had a fear of becoming fat and feared that if she gained weight, her marriage would dissolve. She would avoid eating and situations related to food in order to manage her anxiety. 12 sessions of imaginal exposure were completed and recorded for the client to listen to as homework. Post-treatment and at one month follow-up, the client showed decreased disordered eating. Improvements were clinically and reliably significant after the follow-up period. The client's weight also increased by 1.72 BMI between pre-treatment and follow-up.

Spontaneous and distressing imagery has been documented in individuals with bulimia nervosa (Somerville, Cooper, & Hackmann, 2007). Esplen et al.'s (1998) was the only study that evaluated an imagery intervention for bulimia nervosa that met inclusion criteria. Ohanian's (2002) case study of imagery rescripting within CBT, and Cooper, Todd, and Turner's (2007) use of cognitive imagery modification are notable but the former failed to meet criterion 3 and the latter to meet criterion 4.

Esplen et al.'s (1998) use of guided imagery encourages the development of positive imagery, without necessarily addressing any negative imagery associated with a psychological disorder. In their protocol, clients with bulimia nervosa were not

required to generate any negative imagery that they may experience, but rather focus on generating self-comforting and relaxing images (Esplen & Garfinkel, 1998). Two types of guided imagery exercises were used in Esplen et al.'s (1998) study and sessions were recorded with clients asked to listen to the tapes as homework noting down the imagery experienced and any associated feelings and attached meanings. Results showed the effectiveness of guided imagery in reducing eating disorder symptomatology and bingeing and purging frequencies, even after controlling for levels of impulse expression. Capacity for soothing also significantly improved in the treatment group.

Proposed mechanisms. The authors suggest that the mechanism of change may be rooted in behavioural theory, through habituation and reduction of avoidance that serves to maintain anxiety through negative reinforcement - the anxiety-avoidance cycle (Heimberg, Brozovich, & Rapee, 2010). There was a suggestion that cognitive appraisals associated with hypothetical imagery seemed to be unintentionally elicited during the development of exposure scripts. It may be that some spontaneous cognitive restructuring took place during the imaginal exposure.

Esplen et al. (1998) draw on object relations theories (Kernberg, 1975; Adler, 1979) to discuss how binge-eating and vomiting, features of bulimia nervosa, can be thought of as impulsive emotional coping strategies that aim to self-soothe in the absence of more adaptive strategies (Bruch, 1973; Cross, 1993). As such, guided imagery was mooted as a treatment which may help individuals suffering from bulimia nervosa to internalise self-soothing experiences and indeed use of a therapist as an object to this end (Esplen et al., 1998). Supporting this, experience of aloneness and soothing receptivity in combination predicted most of the variance in binge frequency (38%) and soothing was the most explanatory predictor variable for purge frequency (23%).

Esplen et al. (1998) also discuss potential indirect mechanisms of guided imagery, that is, those that may have an effect but are not related to imagery itself. They noted that self-soothing could have been influenced by the therapeutic alliance and benefit of listening to the therapist's voice on tape on a daily basis. The authors suggest therefore that the active ingredient of self-comforting may have originated from both the imagery intervention and a 'non-specific' therapeutic alliance effect that can be explained using an object relations framework.

Direct imagery interventions for schizophrenia spectrum and other psychotic disorders

Morrison et al. (2002) found that 74% of individuals with psychosis experienced negative intrusive imagery associated with their psychotic symptoms. Of these, 69% experienced the intrusive visual imagery in conjunction with psychotic symptoms, for example experiencing visual images as the perceived source of auditory hallucinations. Visual images can therefore be thought of as maintaining factors in auditory hallucinations and their associated distress, (Morrison et al., 2002).

Effectiveness. One study was identified that tested the effectiveness of direct imagery interventions for schizophrenia spectrum and other psychotic disorders. This was a case series of four participants, evaluating a single session of standalone imagery rescripting for individuals who hear voices and were diagnosed with schizophrenia or schizoaffective disorder (Ison et al., 2014). Morrison (2004) demonstrated the use of imagery within cognitive therapy as a case example however as this did not evaluate a standalone direct imagery intervention.

Ison et al. (2014) used Arntz and Weertman's (1999) three-stage imagery rescripting protocol and participants were given a recording of the session to listen to as homework. Clients were given the choice to rescript either an intrusive image or an

associated memory if they had one. All four clients rescripted an intrusive image and three went on to also rescript the associated memory.

As a group, there was little change in psychotic symptoms, anxiety, depression or stress. While little change was detected on standardised measures, three of the four participants reported decreased imagery frequency and decreased negative affect and distress associated with images/memories as indexed by SUDS ratings. All clients demonstrated an increased perception of control over their images/memories. Conviction in the encapsulated beliefs associated with images and memories reduced for all clients over time and were maintained throughout follow-up.

Proposed mechanisms. Ison et al. (2014) posited that imagery rescripting may be a useful intervention in reducing the distress associated with intrusive imagery in psychosis, as well as the distress associated with auditory hallucinations. Their suggestion is that rescripting works through tacitly changing appraisals about imagery and beliefs.

Discussion

This review aims to provide an overview and analysis of evaluation studies of direct imagery interventions for psychological disorders that are not PTSD or trauma-related. Seventeen studies were identified that met this review's inclusion criteria, that evaluated four different direct imagery interventions: imaginal exposure, imagery rescripting, guided imagery and emotive imagery, applied to a range of different depressive, anxiety and psychotic disorders.

Navigating the imagery literature

It is important to note the intricacies of isolating imagery-based intervention studies from the literature. This was due to the use of a variety of terms that refer to

imagery and imagery-based interventions such as “visualisation”, “fantasy” and “exposure in sensu” but which may not make immediate explicit reference to “imagery”. In addition, documentation of the use of therapeutic imagery techniques can often be embedded in manuals of multicomponent therapies such as CBT, making it more difficult to search for standalone imagery interventions without knowing where to look. Indeed the terms “image” and “imagery” are remarkably common words, and a brief literature search for these terms often returns studies spanning neuroimaging, art and literature, which can also serve to add to the elusiveness of easily understanding the current state of imagery-based intervention research. The search terms used in this review aim to be as inclusive as possible, with references of included studies examined for further relevant references. It should be noted however that the search terms chosen in this review were, in themselves, an experiment of sorts in identifying their ability to capture most or all of a disparate research topic.

Directions for future research

Recommendations for future research in relation to direct imagery interventions for depressive disorders. A more formal evaluation of imaginal exposure as a standalone treatment for intrusive imagery in depression is warranted given Kandris and Moulds’ (2008) case study results. It can be argued that imagery rescripting procedures subsume imaginal exposure procedures. As such, an investigation of imaginal exposure with and without rescripting for depression, as has been done for PTSD (Arntz et al. 2007) would be a helpful addition to the literature. This would help to further evaluate the efficacy of these interventions as well as elucidate treatment mechanisms. The promise of these smaller studies naturally highlights the need for more rigorous and larger scale investigations that include control groups and random group allocation.

Recommendations for future research in relation to direct imagery interventions for panic disorder and agoraphobia. Despite trialling the same interventions for panic disorder and agoraphobia, the two cited studies found different results. Clum et al.'s (1993) was in fact aiming to show the superior effectiveness of guided imaginal coping rather than imaginal exposure, which may suggest an effect of allegiance bias for their study, or indeed Chambless et al.'s (1982) in the opposing direction. These inconsistent results highlight the need for further controlled studies in adults that have sufficient sample sizes to clarify treatment efficacy, particularly as Clum et al.'s (1993) study had only five clients in the imaginal exposure group. Arguably, the collection of studies from the 1970s and 1980s aimed at exploring the efficacy of in vivo and imaginal exposure in this area require updating and replicating, using more rigorous methodologies that allow for direct comparison between studies.

Recommendations for future research in relation to direct imagery interventions for specific phobias. Watson and Marks' (1971) and Rus-Calafell et al.'s (2013) studies demonstrate the effectiveness of imaginal exposure across a variety of different phobias in adults. It would be useful to evaluate imaginal exposure in children as no studies of this type were identified. With the advent of virtual reality exposure (Rus-Calafell et al., 2013), continued research comparing imaginal exposure with in vivo as well as virtual reality is warranted.

Cornwall et al.'s (1996) study provides support for emotive imagery as an intervention in darkness phobia for children, however requires further replication with the use of an attention-placebo control condition. The procedure used encouraged components of in vivo exposure to darkness as part of the homework in the treatment group and also as part of the darkness tolerance test. The authors themselves concede that the emotive imagery approach used incorporated elements of child-directed exposure in addition to emotive imagery (Cornwall et al., 1996). This study has yet to

disentangle the effects of exposure from the theorised benefits from the addition of emotive imagery. In addition, further identification of which positive emotions were elicited to inhibit anxiety would be a helpful next step.

Recommendations for future research in relation to direct imagery interventions

for social anxiety disorder. As noted by Nilsson et al. (2012) the relative effects of habituation and cognitive changes as a result of imagery rescripting have not been separated. Further studies of imaginal exposure with and without rescripting for social anxiety disorder would be helpful in this regard.

Three noteworthy studies that were excluded from the current review evaluated imagery rescripting procedures with an explicit verbal cognitive restructuring element (Wild et al., 2007; 2008; Lee & Kwon, 2013). These studies demonstrate reductions in social anxiety disorder symptoms and distress after imagery rescripting, and changes in encapsulated meaning of memory events, much like Nilsson et al.'s (2012) and Reimer and Moscovitch's (2015) studies. Lee and Kwon's (2013) study included a 3 month follow-up, in which they showed belief changes were maintained. Nilsson et al.'s (2012) and Reimer and Moscovitch's (2015) studies of imagery rescripting alone, did not include a longer term follow-up period and thus it has not been demonstrated thus far that belief change post-imagery rescripting in social anxiety disorder can be maintained without explicit verbal cognitive restructuring.

Recommendations for future research in relation to direct imagery interventions

for generalised anxiety disorder (GAD). Fracalanza et al.'s (2014) study shows promise but requires further replication, particularly with a longer follow-up period, as it is unclear whether any gains made were maintained and thus whether a written imaginal exposure variant is cost-effective over the longer term.

Further research into the various possible treatment mechanisms should be incorporated into future studies, with Fracalanza et al.'s (2014) use of validated outcome measures aimed at testing mechanism-specific hypotheses being a good strategy.

An interesting finding that warrants further exploration was that WAQ scores improved in the neutral condition too. Analysis of these passages indicated that clients tended to write about pleasurable activities to take part in during their hypothetical day off or goal-directed activities such as housework. Further investigation into the effect of writing about and imagining goal-directed or pleasurable activities on anxiety or depression symptoms would be interesting, perhaps understood from a behavioural activation framework (Dimidjian, Barrera, Martell, Muñoz, & Lewinsohn, 2011).

Recommendations for future research in relation to direct imagery interventions for obsessive compulsive disorder (OCD). Veale et al. (2015) demonstrate the promise of a single session of standalone imagery rescripting in the treatment of OCD. Their case series warrants replication on a larger scale, using a between-participants design, to provide further support for treatment efficacy.

A notable difference between these two interventions was that Foa et al. (1985) focused their intervention on the intrusive imagery itself, whereas Veale et al. (2015) rescripted memories associated with images. Their separate, positive results suggest that targeting both the imagery itself and associated memories can be effective. It would be helpful to further delineate these mechanisms, perhaps by directly comparing imagery interventions targeted at images versus memories in OCD.

Recommendations for future research in relation to direct imagery interventions for eating disorders. Levinson et al.'s (2014) study demonstrates the possibility that imaginal exposure to hypothetical feared situations could be an effective treatment for

adults with anorexia nervosa. Larger scale evaluations of this intervention that include the use of control groups are required to make more reliable conclusions about the efficacy of imaginal exposure for this population.

As the only included study that utilises an intervention solely directed towards positive imagery, further studies in this area are warranted that may build on Esplen et al.'s (1998).

Recommendations for future research in relation to direct imagery interventions for schizophrenia spectrum and other psychotic disorders. Ison et al.'s (2014) highlights the possibility of using imagery rescripting in a population of those who hear voices as psychotic symptoms, however the small-scale of their study, coupled with their failure to find significant overall effects on standardised measures, means that empirically-based conclusions about the efficacy of this treatment for this population group still remain difficult to make. In addition the recognised heterogeneity of auditory hallucinations and psychotic symptoms within psychotic disorders (Schrader, 2013; Seaton, Goldstein, & Allen, 2001) render small scale quantitative evaluations such as this difficult to interpret, and expose the need for larger scale trials. It is also unclear whether further sessions of imagery rescripting would have yielded better results.

Mechanisms

The wide-reaching search process nevertheless highlights the ubiquity of imagery within psychological therapy literature. Interventions have been developed that draw on multiple theoretical backgrounds and proposed mechanisms. With the exception of guided imagery, all of the direct imagery interventions involved addressing existing or related negative imagery in some way. To use Holmes et al.'s (2007) analogy, imaginal exposure, imagery rescripting and emotive imagery all

involved examining the painting in some way. Examining mental imagery, in the form of imaginal exposure, the reliving phase of imagery rescripting or the first phase of emotive imagery may be beneficial in itself, without needing to change the image, or re-paint the picture. Behavioural and physiological mechanisms are often attributed to improvements as a result of exposure to negative imagery, such as habituation (Groves and Thompson, 1970), emotion processing through activation of the feature structure (Foa and Kozak's, 1986), and breaking of the anxiety-avoidance negative reinforcement cycle (Heimberg et al., 2010). These proposed mechanisms do not require any conscious change in appraisal of the image.

Imagery rescripting and emotive imagery share characteristics in that they describe reliving imagery content with the addition of changing it in a positive way, in other words, re-painting parts of the picture. There have been various suggested mechanisms by which re-painting of imagery is thought to be effective in reducing distress. Brewin's (2006) retrieval competition hypothesis suggests that new positive imagery that has been generated becomes more accessible over time in the context of cues that elicit imagery, thus directly affecting mood. Cornwall et al. (1996) suggests that more positive imagery (produced through emotive imagery) has an effect through inducing positive emotions which serve to inhibit anxiety (Wolpe, 1969). This explanation seems to suggest that emotions compete rather than accessibility of images.

The majority of imagery rescripting efficacy studies ascribed their findings to changes in appraisal and beliefs associated with imagery and memories. These relatively recent studies mostly draw on cognitive theories, whereas the older studies included in this review tended to cite behavioural mechanisms. Studies that incorporated an explicit cognitive restructuring element (e.g. Wild et al., 2007; 2008) were not included in this review, nevertheless it is argued that imagery rescripting can cause spontaneous belief change (Wheatley et al., 2007; Nilsson et al., 2012). In

addition, some protocols used explicitly focused more on the use of compassion rather than cognitive restructuring in the third stage of imagery rescripting than others.

It is interesting to observe the shift in proposed mechanisms of imagery techniques over time, from so-called first wave behavioural therapy to second wave cognitive therapy and latterly to third wave CBT drawing on compassionate-focused approaches (Gilbert, 2009). Esplen et al.'s (1998) use of guided imagery involved generating positive and soothing imagery, which they explained as being effective using an object relations framework, although can be thought of having some similarities to compassionate mind approaches. It is possible that other third wave CBT processes also play an active, if indirect, role in the efficacy of direct imagery interventions. Veale et al. (2015) hint at the possibility that cognitive changes in relation to past memories and images can result in meta-cognitive changes, such that individuals change their relationship with their imagery and develop an understanding that the imagery and its meaning is of the past rather than the present. This shares similarities with Wells' (2000) meta-cognitive school of thought and thought defusion as part of Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Kelly, 2003).

The current review highlights that there may be transdiagnostic mechanisms that are relevant to imagery interventions across disorders, such as habituation. The variety of proposed mechanisms to underpin similar interventions highlights the opportunity to further empirically test these mechanisms and their relative contributions, either through use of specific outcome measures (as demonstrated by Fracalanza et al., 2014) or dismantling/comparison between interventions such as imaginal exposure with and without rescripting. Fracalanza et al.'s (2014) was an example of a study that used outcome measures designed to explicitly test the hypotheses of diagnosis-specific theories, within their study of general anxiety disorder. Therefore, some mechanisms may be thought of as more specific to disorders, such as reducing intolerance of uncertainty in GAD (Frazalanza et al., 2014) and others

more specific to interventions, such as the development of soothing imagery in guided imagery (Esplen et al., 1998). The same interventions may have multiple and indeed overlapping mechanisms, which highlights the importance of noting the protocol of the imagery intervention used when evaluating research studies. An example of this is the inconsistent use of compassionate imagery within imagery rescripting.

Commonalities and high rates of comorbidity between disorders, particularly anxiety disorders and depression, strengthen the argument for a “personalised transdiagnostic approach” (Craske, 2012), similar to Brewin et al.’s (2009) suggestion of a modular approach to treatment.

Limitations

There are several limitations related to the current review to discuss that primarily focus on decisions made about inclusion and exclusion criteria for searching the literature.

Exclusion criteria 3 excluded studies in the search process that may have evaluated direct imagery interventions embedded within multi-modal therapy protocols. As such, despite wishing to provide a broad overview of available interventions, it is likely that some interventions may have been missed by the current review. A systematic literature search of such embedded interventions may be more difficult to execute if studies of whole therapies do not have keywords relating to imagery associated with them. In addition, it may be that inclusion of such studies would make it more difficult to make conclusions and recommendations about the efficacy and underlying mechanisms of direct imagery interventions separate from the effects of other aspects of these treatments.

Studies using SUDS as their only outcome measure were not included in the current review (exclusion criteria 4), due to concerns about their validity and reliability (Debell & Jones, 1997; Lohr et al., 1992). A limitation relating to the scope of this review

is that SUDS ratings were more likely to be used as the only means of evaluation in historically earlier studies, before 1990s and the development of validated measures. In addition, these earlier studies were more likely to investigate behavioural methods of anxiety reduction (e.g. Foa & Chambless, 1978), which may have the effect of skewing the view of the literature.

Conclusions

This review highlights a wide breadth but shallow depth in studies evaluating direct imagery interventions. Several studies have utilised case series or single case studies (e.g. Ison et al., 2014; Levinson et al., 2014) in order to demonstrate initial feasibility and it is clear that further more rigorous studies are the next step in proliferating the evidence-base for imagery-based interventions. Adding to the evidence-base would be particularly timely given the promising evaluations demonstrating the power of standalone imagery rescripting delivered in only a single session in the face of the increasing prevalence of mental health difficulties and cost of treatment in the United Kingdom (McCrone, Dhanasiri, Patel, Knapp, Lawton-Smith, 2008).

It is hoped that the small-scale feasibility studies included in this review pave the way for clinicians reading to have the confidence to use imagery-based interventions with their clients and indeed evaluate them to add practice-based studies toward the evidence-base for other disorders and client groups.

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Part 2: Empirical Paper

The effect of adult attachment on intrusive imagery

Abstract

Aims

Involuntary memories are a frequent occurrence in daily life. Involuntary and intrusive memories of negative events are experienced by those suffering from some psychological disorders. Attachment style has been suggested as an individual difference that can affect the experience of intrusions within posttraumatic stress disorder. This study aims to investigate the effect of attachment anxiety and avoidance on the experience of involuntary memories in the general population.

Method

A modified paired-associated paradigm was used to control factors relating to encoding and retrieval of involuntary memories, in adults from the general population. Participants viewed scenes of attachment-related distress during encoding and involuntary memories were triggered 24-hours later.

Results

Attachment anxiety and avoidance influenced the experience of involuntarily recalled emotional social stimuli, but not the frequency of recall. Attachment avoidance was associated with decreased emotional intensity during recall, consistent with attachment-system deactivation, and there was a trend for attachment anxiety being associated with increased intensity, consistent with attachment-system activation.

Conclusions

Attachment theory was shown to be a promising framework for further understanding individual differences in attention and emotion regulation in relation to involuntary memory recall. Further research should focus on developing and replicating paradigms for investigating the experience of involuntary memories in both general and clinical populations.

Introduction

Intrusive mental imagery and psychological difficulties

Mental imagery is the recreation and reproduction of perceptual information stored in memory (Kosslyn, Ganis, & Thompson, 2001). Images can be recalled both voluntarily and involuntarily, with studies showing phenomenological and experiential differences between these two processes. For example recall of involuntary images has been found to be more specific (Watson, Berntsen, Kuyken, & Watkins, 2013), more often in relation to positive emotion (Berntsen, 1996) and faster (Staugaard & Berntsen, 2014) than recall of voluntary images. In clinical practice, involuntary images are often labelled as 'intrusive' to connote their unwanted and distressing nature.

Intrusive, involuntary imagery has been widely reported by clients with a variety of disorders and been studied in psychopathology literature. Intrusions as flashbacks form a key aspect of the diagnosis of posttraumatic stress disorder (PTSD; DSM-5; American Psychiatric Association, 2013), and have also been studied in relation to other disorders such as social anxiety disorder (Hackmann, Clark, & McManus, 2000), schizophrenia (Aleman, de Haan, & Kahn, 2005) and depression (Birrer, Michael, & Munsch, 2007).

Variability in the experiences of involuntary, intrusive imagery and memories by those suffering from these disorders has been documented. For example, estimates of the proportion of those suffering from depression that experience distressing, involuntary memories vary between 44% (Patel et al., 2007) and 87% (Brewin, Hunter, Carroll, & Tata, 1996). It is currently unclear which risk factors predispose individuals to experience intrusive imagery and visual memories within psychological disorders. It is also unclear why some individuals go on to experience PTSD, the disorder most defined and characterised by intrusive imagery, after a traumatic emotional experience, whereas others do not. Prevalence rates of probable PTSD after experiencing trauma

have been found to be up to 39% after a few months (Blanchard et al., 1996). Haagsma et al. (2012) found that female gender and suffering from a co-morbid medical condition such as diabetes or cancer were strong predictors of probable PTSD one year after trauma. Mikulincer, Shaver, and Horesh (2006, p. 83) present the hypothesis that attachment-system functioning may play a key moderating role between traumatic experiences and PTSD, such that attachment insecurity 'can prevent restoration of emotional equanimity' and places individuals at greater risk of developing PTSD. Studies supporting this have shown the relationship between attachment style and PTSD symptom intensity such as Dieperink, Leskela, Thuras, and Engdahl's (2001) exploration of American prisoner of war veterans.

Attachment theory and emotion regulation in response to trauma

Attachment theory (Bowlby, 1969/1982) is a well-known conceptual framework for understanding and formulating aspects of interpersonal and emotional functioning of both general and clinical populations. Attachment theory places emphasis on individual differences in internal representations of self and others, contributing towards individual differences in affect regulation and resilience in response to threat (Bowlby, 1969/1982, 1973; Mikulincer, Shaver, & Pereg, 2003). Bowlby (1973) drew an initial broad distinction between individuals who are securely attached and those who are insecurely attached. Secure attachment is thought to be the result of having had an available caregiver to act as an attachment figure in times of need while growing up and consequently developing positive representations of one's self and others. Attachment insecurity is characterised by often unreliable support from caregivers leading to failures in relieving the child's distress appropriately, leading to negative representations of self and others and a reduced ability to self-regulate when in distress later in life throughout adulthood.

Ainsworth, Blehar, Waters, and Wall (1978) identified three original categorical attachment styles based on their observations of infants and caregivers in the Strange Situation paradigm: secure, insecure-ambivalent (anxious) and insecure-avoidant. Brennan, Clark and Shaver (1998) discussed a dimensional view of attachment for adults, through factor analysis of existing self-report attachment measures and proposed two independent dimensions of attachment, attachment-related anxiety and avoidance. Attachment anxiety relates to an individual's worry that attachment figures will be unavailable (attachment system activation) and attachment avoidance relates to an individual's desire for emotional distance as a result of low confidence in their attachment figures' availability and support (attachment system deactivation).

Attachment theory has been used to inform development of theories about affect regulation in children (Bowlby, 1969/1982; Ainsworth et al., 1978) and subsequently in adults (Mikulincer et al., 2003), such that insecure modes of attachment are generally thought of as maladaptive (Mikulincer et al., 2006). Theoretically attachment insecurity has been linked with maladjustment and emotional difficulties later in life and is more prevalent in a variety of clinical populations (Mikulincer & Shaver, 2007) such as those with depression (Catanzaro & Wei, 2010), anxiety (Bosmans, Braet, & Van Vlierberghe, 2010), PTSD (Ein-Dor, Doron, Solomon, Mikulincer, & Shaver, 2010) and obsessive compulsive disorder (Doron, Moulding, Kyrios, Nedeljkovic, & Mikulincer, 2009). While attachment insecurity alone is not thought to be a sufficient factor in causing psychopathology, there is a consensus that it is very likely to have a role to play in interacting with other risk factors in disorder development as well as maintenance.

The importance of attachment security in emotion regulation in adulthood (Mikulincer et al., 2003) has provoked interest into what role attachment style might play in individuals' coping responses and emotion regulation after traumatic emotional experiences. It is at these times that these authors argue emotion regulation

mechanisms are crucial. Crucially, Mikulincer et al. (2006) suggest that individuals who are anxiously attached may be more likely to develop and exhibit intrusions as part of their PTSD symptomology whereas those with an avoidant attachment style are more likely to develop posttraumatic avoidance symptoms. Studies to support this link between attachment style and posttraumatic intrusion or avoidance symptoms (Horowitz, 1982) have been conducted with people from Israel after the 1991 Gulf War (Mikulincer, Florian, & Weller, 1993) as well as during more recent violence in Israel (Miterany, 2004).

Attachment theory, motivated attention and memory retrieval

Individual differences in motivated attention, dictated by attachment orientation, may provide some explanation for the mechanism by which attachment orientation influences the development of posttraumatic symptoms after trauma, and the frequency and experience of intrusive memories in general. Shaver and Mikulincer's (2002) control systems model of the attachment system posits that individuals high on attachment anxiety use hyperactivation strategies in response to threat which results in heightened attentional focus on attachment figures and relationships, hyperactivation of negative thoughts and emotions, and hypervigilance and increased likelihood of directed attention toward sources of distress (Mikulincer et al., 1993; Kobak & Sceery, 1988). This model is congruent with studies that demonstrate the influence of attachment styles on perception and/or appraisal of social stimuli, particularly those related to social threat. Vrtička, Sander, and Vuilleumier (2012) showed that individuals scoring high on attachment anxiety rated negative social images from the IAPS (International Affective Picture System; Lang, Bradley, & Cuthbert, 2008) as eliciting more arousal and less control than those high on attachment avoidance. In addition, anxiously attached individuals have been shown to exhibit greater amygdala activation in response to threatening and negative social

stimuli e.g. angry faces (Vrtička et al., 2008), a region associated with fear processing (Phelps & LeDoux, 2005).

The heightened attentional focus towards, often negative, social stimuli in anxiously attached individuals overlaps with Ickes and Simpson's explanation for their Empathic Accuracy Perspective (Ickes & Simpson, 1997; Simpson, Ickes, & Grich, 1999), whereby these individuals are more accurate at inferring the thoughts and feelings of their attachment figures. Similar to Shaver and Mikulincer's (2002) theory, the Empathic Accuracy model uses attachment theory to understand how those who are anxiously attached have an implicit motivation to closely monitor attachment figures in order to keep track of their psychological availability and maintain proximity, given the inconsistent nature of such availability from primary attachment figures in early infancy. In addition, the converse has been suggested for avoidantly attached individuals, that is, they may be *less* motivated to attend to and gather information in relation to attachment figures (Rholes, Simpson, Tran, Martin, & Friedman, 2007), as this information is generally inconsistent with their working models (Bowlby, 1980). Thus it can be said that attachment orientation influences motivated attention towards attachment-relevant information.

Further evidence for a motivated attention hypothesis comes from studies utilising event-related brain potentials (ERP). ERP studies have shown differences in late-positive potential (LPP) amplitudes between individuals with anxious or avoidant attachment styles in response to emotional social scenes and words (Chavis & Kisley, 2012; Lathrop, Davis, & Kisley, 2015). The amplitude of the LPP waveform is thought to be related to the motivational relevance of stimuli and serve as a measure of motivated attention (Schupp et al., 2000). Schupp et al. (2004) use the phrase 'motivationally determined selective attention' which illustrates the notion that one's attention can be attuned toward stimuli relevant to a priori incentives or strategies. Within an attachment framework, these incentives relate to attachment-related goals of security

which are determined by proximity or distance, depending on attachment anxiety or avoidance respectively. Chavis and Kisley (2012) found that people with anxious attachments tended to show greater LPP amplitudes to positive interpersonal images depicting closeness and those with avoidant attachments showed greater LPP amplitudes to negative interpersonal images. They suggest that the differences in the motivational relevance of social stimuli can account for the observed differences between the avoidant and anxious groups.

The evidence discussed above, in line with Shaver and Mikulincer's (2002) affect-regulation theory of attachment, suggests that motivated attention plays a role in managing emotions in the face of attachment-related threat across attachment styles. It is this study's contention that individual differences in attentional focus towards attachment-related information may also affect memory encoding of such information, and thus affect subsequent memory retrieval, both voluntary and involuntary. Increased attentional focus towards attachment-related stimuli, as in those who are anxiously attached, should increase encoding strength and thus probability of later retrieval.

Models and processes of memory storage and retrieval

In order to link attachment, attention and memory, it is important to discuss models of memory encoding, storage and retrieval. While it is beyond this paper's remit to describe the vast literature and debates therein relating to models of memory storage, it is relevant to broadly distinguish between multi-store models of memory and those that advocate single stores. The concept of multiple memory stores draw on computational models to explain observed memory phenomena, such that different storage systems exist, rather like separate computer hard-drives. These different stores have different functions and limitations, and the most common storage distinction is between short-term and long-term memory stores (Baddeley & Warrington, 1970).

Clinical multi-store models have been suggested that attempt to explain the processing of voluntary and involuntary memories in the context of PTSD (Brewin, Dalgleish, & Joseph, 1996; Brewin, Gregory, Lipton, & Burgess, 2010; Ehlers & Clark, 2000). Brewin et al.'s (1996; 2010) dual representation theory of PTSD suggests that involuntary memory retrieval is more likely when accessing emotionally stressful, traumatic and partially processed material. They suggest that these representations are processed and stored separately from non-traumatic material. They argue that traumatic and partially processed material or sensation-near representations (S-reps) are the product of processing in the dorsal visual stream, insula, and amygdala and contextualised representations (C-reps) of processing in the ventral visual stream and medial temporal lobe.

On the other hand, traditional multi-store models have been contested by those that advocate single storage. Craik and Lockhart's (1972) Levels of Processing (LOP) framework, that was further developed by Craik and Tulving (1975), suggests that multi-store formulations are unsatisfactory and instead proposes that memory performance explanations should focus on variations in encoding processes rather than separate stores. The most important encoding operation for these authors is the level or depth of processing, such that that greater depth of encoding and processing leads to greater memory trace persistence and retention. Shallow encoding processes may be concerned with mere sensory features such as angles and brightness of light, and deeper levels of analysis concerned with semantic and cognitive processing, triggering associations with past experiences. Individuals are thus more likely to remember events that have some meaning based on prior experience and future goals.

Berntsen and Rubin (2008) propose a single storage account relevant to involuntary memories in the general population which stands in contrast to a dual-representation model (Brewin et al., 1996). Similar to a LOP argument, they suggest voluntary and involuntary memories may be generated from the same underlying

structures, but through different retrieval mechanisms (Staugaard & Berntsen, 2014), with material that is more highly accessible having an increased probability of being recalled involuntarily. They argue it is more parsimonious to assume that voluntary and involuntary memory recall are shaped by the same accessibility constraints as have been found for autobiographical memory in general. In contrast to the approach of dual representation theory (Brewin et al., 1996), this view states that involuntary memories are not special to PTSD in some way, but are in fact a “basic mode of remembering” (Berntsen, 2010) that operates on the same episode memory system as voluntary memory. It is by understanding memory processes in the general population, we can understand involuntary and intrusive memories in clinical populations.

Berntsen et al. (2013) and Staugaard and Berntsen (2014) further detail memory encoding and retrieval processes involved in involuntary recall. They argue that the conditions of encoding and retrieval are important to understand involuntary remembering and can be tested empirically. They highlight the importance of encoding specificity (Tulving & Thomson, 1973; Conway, 2005) whereby a memory is more likely to be voluntarily and involuntarily retrieved if there is information present in the environment at retrieval that is similar to the original event. This information acts as a reminder or cue, prompting retrieval. In addition they cite the notion of cue overload (Watkins & Watkins, 1975) whereby a memory is also more likely to be retrieved if the cue is more unique to that memory. Cue overload helps to explain why individuals are not constantly bombarded with memories, as there is very often similar information in the present situation to situations held in memory. It would be therefore stand to reason that cues that are more unique and specific to particular memories increase the probability of memory retrieval. For example, if an individual had seen a tall male clown with distinct blue hair at a circus, a cue of a blue wig would be more likely to trigger involuntary remembering of this event than merely seeing a normally dressed tall man with an unremarkable hairstyle. The notion of cue-item discriminability

(Rubin, 1995) integrates these two principles, and can be thought of how easily a particular cue can be isolated from all else in memory.

In addition to the processes, described above, which operate at retrieval, Staugaard and Berntsen (2014) highlight the importance of processes that unfold over time, namely consolidation, forgetting and interference. It is recognised that encoding of memories takes place over time rather than immediately upon exposure. This process of consolidation has been researched in animals (McGaugh, 2004) with the suggestion that synaptic changes within the hippocampus and other areas take place over time which correlate with memory consolidation and retention. This is in line with Wixted's (2004) consolidation theory of forgetting, whereby events that are associated with increased synaptic potentiation of hippocampal neurons have stronger memory traces, and are more resistant to forgetting. While consolidation takes place, it is argued there is a process of interference, whereby formation of memories can be inhibited by either prior memories or exposure to events that take place in the retention interval.

An understanding of these processes fundamental to human memory and learning provides the foundation for experimentally testing hypotheses that can be extended to clinical phenomena. By controlling for encoding specificity, cue overload, cue-item discriminability and accounting for consolidation and forgetting rates, it should be possible to test the effect of motivated attention as a function of attachment style on involuntary memory retrieval. It is hypothesised that increased attentional focus leads to stronger consolidation, and possibly reduced forgetting due to interference, and thus increased likelihood of involuntary retrieval.

Studying intrusive mental imagery

Intrusive imagery is difficult to accurately induce and measure by virtue of its fleeting nature. There have been attempts to study it in a variety of different ways. Some of the ways of studying involuntary memories thus far have involved post hoc

recall through semi-structured interviews (Hackmann et al., 2000; Hackmann, Ehlers, Speckens, & Clark, 2004) or through the use of diaries. These retrospective methods can be criticised for poor experimental control over retrieval and are more vulnerable to reporting biases in individuals related to the conscious and effortful retrieval of memories (Berntsen et al., 2013). Indeed it is problematic to ask participants to voluntarily recall involuntary memories.

An interesting experimental technique of using 'mundane' distractor tasks has been used to elicit involuntary memories within laboratory settings (e.g. Schlagman & Kvavilashvili, 2008; Ball, 2007; Brewin & Soni, 2011). These monotonous tasks reliably induce mind-wandering and simulate the conditions under which involuntary memories might occur in daily life, such as when in the shower or brushing one's teeth (Giambra, 1989; 1995). Schlagman and Kvavilashvili (2008) asked participants to detect infrequently presented vertical lines in a stream of horizontal lines, whilst Ball (2007) asked participants to make a string of consecutive word associations in the CWAT (Continuous Word Association Task). These creative experimental designs have allowed researchers to thus manipulate involuntary memory retrieval, unlike post hoc methods described above, but have demonstrated little experimental control over the properties of encoding (Berntsen et al., 2013).

Systematically controlling and manipulating the properties of scenes to be encoded and later retrieved allows the factors that affect the likelihood of involuntary memory retrieval to be tested. Ideally, it would be important to have control over both the encoding and retrieval phases of memory, in order to investigate the mechanisms of intrusive autobiographical memories as accurately as possible, and delineate the effects of the two. This is what Berntsen et al. (2013) sought to do using a paired-associate methodology that utilised a distractor task.

Berntsen et al. (2013) paired visual scenes with sounds that were either unique or repeated in an initial encoding phase. Repeated sounds were derived from a

category that was presented several times (e.g. various different dog barks) whereas unique sounds were from a category that was only presented once from a category (e.g. the sound of a chainsaw). These picture-sound pairings in the encoding phase replicated 'events' in memory, consisting of visual and auditory information. In a subsequent retrieval phase, Berntsen et al. (2013) attempted to activate memories of these 'events', or pairings, by presenting some of this event-related information, or cues. In the retrieval phase, sounds from the encoding phase were presented without their associated pictures, while participants simultaneously performed a distractor task. They found that, during a mundane distractor task performed immediately after encoding, participants reported involuntary memories of pictures from the encoding phase in response to cues, and also that more scenes were retrieved in response to unique sound cues rather than repeated ones. This was explained by encoding specificity (Tulving & Thomson, 1973; Conway, 2005) and cue overload (Watkins & Watkins, 1975).

Staugaard and Berntsen (2014) adapted this paradigm to show that negative emotion was a factor that increases encoding strength. They found that emotional pictures were more frequently retrieved in voluntary and involuntary memory conditions, independent of and in addition to the factors relating to the cues described above. Interestingly this effect of emotion was only present if the retrieval phase occurred after a period of 24 hours of consolidation, that is, 24 hours after the encoding phase. It was argued that the effect of emotion, as an encoding factor rather than a retrieval factor, required time to develop, in line with expected memory processes. Wixted's (2004) consolidation theory of forgetting was used to explain this, with highly emotional events suggested to lead to stronger memory consolidation, through increased synaptic potentiation of hippocampal neurons over the 24-hour consolidation period. In addition they argued that greater consolidation of emotional

memories means that they are in turn more resistant to interference compared to neutral ones (Staugaard & Berntsen, 2014).

As expected, Staugaard and Berntsen (2014) seemed to observe forgetting of the auditory aspects of the memory events (pairings) as well as visual aspects, such that the effectiveness of cues changed over time. The effect of cuing, whereby unique cues were more effective at eliciting involuntary memories, was present with a short consolidation period of a few minutes but not present after 24 hours or 7 days. This was explained by participants forgetting more unique sound cues and their associations over time than repeated cues, such that in fact after 7 days, repeated cues were more effective cues (Staugaard & Berntsen, 2014). It was argued that participants may have created “schematic representations” of repeated sounds, thus over time, making it easier to remember many similar repeated and related cues, than multiple different unique cues (Staugaard & Berntsen, 2014, p. 1953). Over time, however, the development of such schematic representations of similar sound cues would likely affect accuracy of recall, based on cue-item discriminability (Rubin, 1995).

Phenomenology of intrusive imagery

The subjective, felt characteristics of intrusive imagery of memories have been explored in different disorders, such as PTSD (Hackmann et al., 2004; Reynolds & Brewin, 1999), depression (Reynolds & Brewin, 1999) and social anxiety disorder (Hackmann et al., 2000). Phenomenological investigations of imagery are usually performed using semi-structured interviews, with common dimensions including frequency of imagery, vividness, associated emotional distress and any bodily reactions/sensations in response to the imagery. In general, across disorders, these studies found similarities whereby intrusive imagery is associated with high levels of vividness, a range of negative emotions such as sadness, fear, anger, and accompanying bodily reactions or sensations such nervousness, sweating and heart rate changes.

Staugaard and Berntsen (2014) investigated the characteristics of involuntary intrusive memories in the general population using Likert rating scales. Consistent with the hypotheses of differential motivated attention between attachment orientations and subsequent depth of processing affecting memory recall (Craik & Lockhart, 1972), it may be that memories that are more 'deeply' processed are associated with greater vividness, emotional intensity and bodily reactions upon recall.

Present study

The links between attachment theory and intrusive imagery symptomology in PTSD have been outlined above (Mikulincer et al., 1993). The present study looks to build on this by drawing on aspects of autobiographical memory literature (Craik & Lockhart, 1972; Berntsen & Rubin, 2008) to suggest that attachment orientation may have an effect on involuntary memories through differences in motivated attention (Shaver & Mikulincer, 2002; Chavis & Kisley, 2012). Further elaborating upon the work of Berntsen et al. (2013) and Staugaard and Berntsen (2014), this study will use a modified version of their paired-associate paradigm for controlling and eliciting involuntary memories in an experimental laboratory setting, to test whether attachment orientation is a predicting factor in memory retrieval, in addition to the factors of encoding specificity, cue overload and negative emotion that they have found. The aims of this study are relevant to the attachment field as well as the memory field in relation to the general population as well as clinical populations. The primary aims of this study, relating to attachment theory, are to:

- support the link between motivated attention in attachment and memory retrieval;
- test the hypothesis that anxiously attached individuals may have more involuntary memories of attachment-related stimuli than individuals with an

avoidant attachment, under laboratory conditions, using Berntsen et al.'s (2013) and Staugaard and Berntsen's (2014) paired-associate paradigm;

- investigate attachment orientation as a predisposing factor in the experience of intrusive imagery within the general population and thus in clinical populations too, particularly Mikulincer et al.'s (2006) hypothesis that attachment can be a moderator between traumatic experiences and PTSD development;

The secondary aims of this study are to:

- provide a replication of Berntsen et al.'s (2013) and Staugaard and Berntsen's (2014) paired-associate paradigm for eliciting and studying involuntary memories;
- contribute to the debate between single-store models of voluntary and involuntary memories, such as Berntsen and Rubin's (2008) and the dual representation model (Brewin et al., 1996; 2010).

Main Hypotheses

The primary hypotheses relating to the primary aims of this study are:

1. An interaction effect is predicted such that anxiously attached individuals would recall attachment-related distress scenes more frequently than neutral scenes due to attachment system hyperactivation, whereas avoidant individuals may recall fewer attachment-related distress scenes than neutral scenes due to attachment system deactivation.
2. Individuals high in attachment anxiety may also experience distressing scenes as more emotionally intense, vivid and with more bodily reactions than those high in attachment avoidance. This is expected given Vrtička et al.'s (2008; 2012) findings.

The secondary hypotheses relating to the secondary aims of this study are:

3. After a retention interval of 24 hours, it is predicted that there would be a main effect of emotion, whereby across attachment types, significantly more scenes showing attachment-related distress would be involuntarily recalled compared to neutral scenes. This would replicate Staugaard and Berntsen's (2014) main effect of emotion.
4. After a retention interval of 24 hours, it is predicted there would *not* be a main effect of cuing. Staugaard and Berntsen's (2014) finding that the effect of cue distinctiveness decreased over the retention interval leads us to predict that there would not be a main effect of cuing. These authors argued that the effect of cue distinctiveness decreased over time likely reflecting a weakening of the association between scenes and their cues due to interference. This would replicate Staugaard and Berntsen's (2014) non-effect of cuing after 24 hours.
5. While a main effect of cuing is not hypothesised for overall memory frequency, it is hypothesised that there will be an accuracy effect of cuing, whereby increased accuracy is expected for unique cues and decreased accuracy for repeated cues.

Method

Participants

52 adult participants (31 female, mean age 25.60 years, range 18-53 years) took part in the study. They participated in exchange for monetary compensation. This sample size was calculated using Cohen's power primer (1992) to provide sufficient statistical power. To the author's knowledge, there was no similar literature that linked attachment and controlled inducement of involuntary memories on which to estimate an effect size. As a result, a large effect size was estimated based on the large effect (η_p^2

=.25) found in Experiment 3 of Staugaard and Berntsen's (2014) study. A type 1 error rate of .05 and statistical power of .80 were used in addition to a large effect size estimate to calculate the sample size for the present study.

Participants were recruited from the London area via Internet advertisements on research participation websites. An exclusion criterion was that individuals were not currently receiving help for a DSM-5 diagnosis (American Psychiatric Association, 2013). This was stated on advertisements and confirmed in person by the experimenter before the start of the study. No prospective participants were identified and excluded from taking part due to this criterion.

The participants were of a wide range of ethnicities, with 26 different ethnic backgrounds reported, the largest group being Chinese (n=15, 28.80%), followed by Welsh/English/Scottish/NI/British (n=7, 13.50%). 34 participants were students (65.38%), with 51 (98.08%) educated to at least undergraduate degree level. 100% of participants were retained in the 24 hours between encoding and retrieval, with none dropping out of the study.

Design

An adapted version of the paired-associate paradigm used by Berntsen et al. (2013) and Staugaard and Berntsen (2014) was developed for this study and used to elicit and measure involuntary episodic memories in participants. This is further detailed below (see Procedure).

Attachment (anxiety and avoidance), cuing (repeated vs. unique) and emotion (neutral vs. attachment-related distress) were within-subjects independent variables. Dependent variables included the number of involuntary memories recalled in total and in each condition, along with subjective phenomenological characteristics of retrieved memories (emotional intensity, vividness and bodily reactions).

Measures

The 30-item Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994; see Appendix III) was administered to participants to gain a self-report measure of general attachment, rather than attachment within a specific relationship or domain. The RSQ was scored dimensionally, using a measurement model based on Simpson, Rholes, and Nelligan's (1992) anxiety and avoidance dimensions. Using this approach, attachment anxiety is assessed by items 11, 18, 21, 23, and 25 and avoidance by items 10 (reverse scored), 12, 13, 15 (reverse coded), 20, 24, 29, and 30 (reverse scored) (Kurdek, 2002; Roisman et al., 2007).

The RSQ is the most widely used self-report measure of adult attachment (Guédeney, Fermanian, & Bifulco, 2010) and was used as a suitable attachment measure in this study as it yields scores on attachment anxiety and attachment avoidance, constructs that conceptually map onto this study's hypotheses. Fraley, Heffernan, Vicary, and Brumbaugh (2011) noted that there may be 'differentiation in working models' across different relational contexts/domains, such that individuals may differ in their level of attachment security/insecurity depending on the attachment figure in question. With this in mind, Chris Fraley recommends use of the RSQ as a measure of general or aggregated attachment across domains (personal communication, 22 October, 2015). The Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985) is arguably the gold standard of adult attachment measurement (Rich, 2005; Goodman, 2010), but is notably time-consuming and impractical to administer and score in research of this kind. Evidence for the construct validity of the RSQ has been provided in English (Griffin & Bartholomew, 1994) and in other languages (e.g. Guédeney et al., 2010, Bäckström & Holmes, 2001). The evidence suggests that there is not a significant correlation between the AAI and RSQ (Roisman et al., 2007, Creasey & Ladd, 2005), however it is thought that they predict distinct

aspects of attachment functioning in relationships (Roisman et al., 2007; Bartholomew, 1990).

Participants also completed the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), a widely validated and reliable self-rating measure for anxiety, to ascertain whether state anxiety and depression affected involuntary memory retrieval.

Materials

Thirty-two scenes were taken from the Besançon Affective Picture Set - Adolescents (BAPS-Ado; Szymanska et al., 2015). This picture set, specifically developed for attachment-related research, includes validated photographs of social scenes developed to evoke attachment-related emotions such as distress and comfort. Sixteen pictorial scenes were of interpersonal content of a distressing nature, depicting themes of sadness, loss and abandonment. The remaining sixteen scenes were affectively neutral, containing people with neutral facial expressions and limited interaction.

The BAPS-Ado picture has, thus far, only been validated in adolescent samples (Szymanska et al., 2015). It is expected that the picture set would be rated similarly by the adult population. A pilot validation was performed where 10 adults who did not take part in the main study rated the valence of all 32 scenes as neutral, positive or distressing. There was 95% agreement between these pilot ratings and intended valence of the scenes based on Szymanska et al.'s (2015) validation study.

Sixty-four royalty-free sounds were taken directly from two previous studies by Berntsen et al. (2013) and Staugaard and Berntsen (2014) to be used in the encoding phase and as filler sounds in the retrieval phase. All sounds were normalised and four seconds in length. Left and right monophonic versions of each sound were created from

the original sixty-four stereophonic versions. All sounds have previously been rated as affectively neutral by a panel of independent judges (Staugaard & Berntsen, 2014).

Half of the 64 sounds were divided into three sets of sounds that were highly similar to one another (birds singing, car engines revving and rainfall). These similar sounds were classed as “repeated” as, within their sets, they would sound repeated to the participants. The other 32 sounds were dissimilar to each other and thus classed as “unique” (e.g. a bell ringing or a person sneezing).

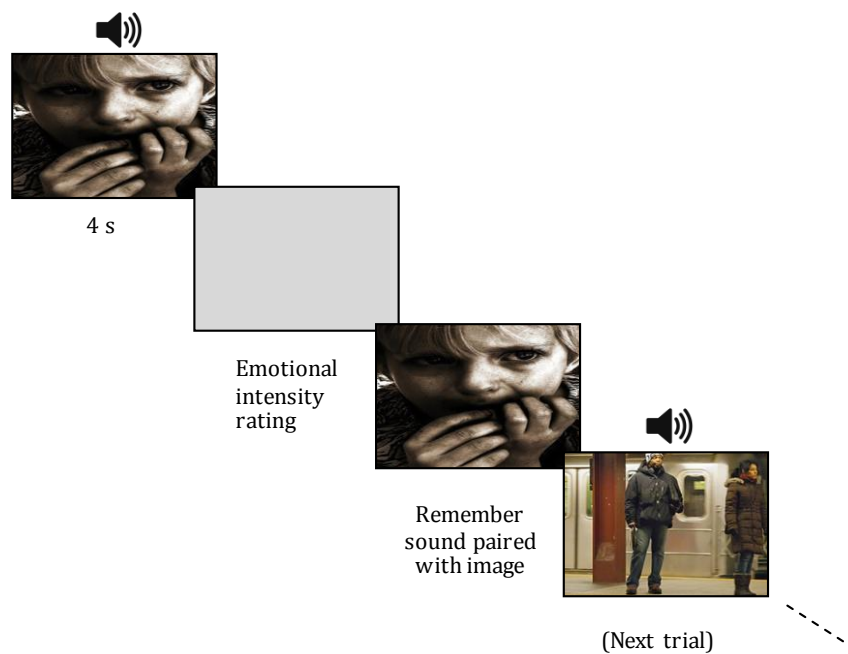
Task Procedure

Participants were presented with the information sheet, which informed them that they would be asked to pay attention to various pictures and hear sounds, and take part in a computer-based attention task. Participants were informed that some images may be “upsetting or distressing” and reminded that their participation was entirely voluntary and they could withdraw their consent to participate at any point. Participants were told that the nature of the task was primarily one of attention to maintain the validity of the memory task.

After participants’ gave informed written consent, they completed the HADS and RSQ questionnaires. They were then seated in front of a laptop computer with a 14.1-inch widescreen display set at screen resolution 1366 X 768, with a set of headphones with integrated microphone. They then completed the task which consisted of an encoding phase, followed by retrieval, recognition and debriefing phases 24-hours later, based on Berntsen et al. (2013) and Staugaard and Berntsen’s (2014) experimental task design and which is described below. Participants were not informed beforehand that there would be a recognition phase of the study. The task was programmed using psychophysics presentation software PsychoPy (version 1.83; Peirce, 2007).

Encoding phase. Participants were shown 32 trials of scenes from the BAPS-Ado paired with sounds. On each individual trial (Figure 1), a pictorial scene and a sound were presented simultaneously for four seconds. Sounds were presented to both ears simultaneously using headphones. Next, participants were asked to indicate on a 5-point Likert scale how emotionally intense they thought the picture was, with 1 = *Not at all intense* to 5 = *Very intense* to ensure that they focused on the image. The same scene was then presented on its own and participants were asked to try to remember in their minds the sound that it was paired with. The next trial and picture-sound pair was then presented.

Figure 1
Encoding Trial Sequence



Encoding was divided into four types of trials depending on the picture-sound pairing combined a neutral or distressing with a unique or repeated sound cue. Using a nomenclature similar to Staugaard and Berntsen's (2014) for convenience these four

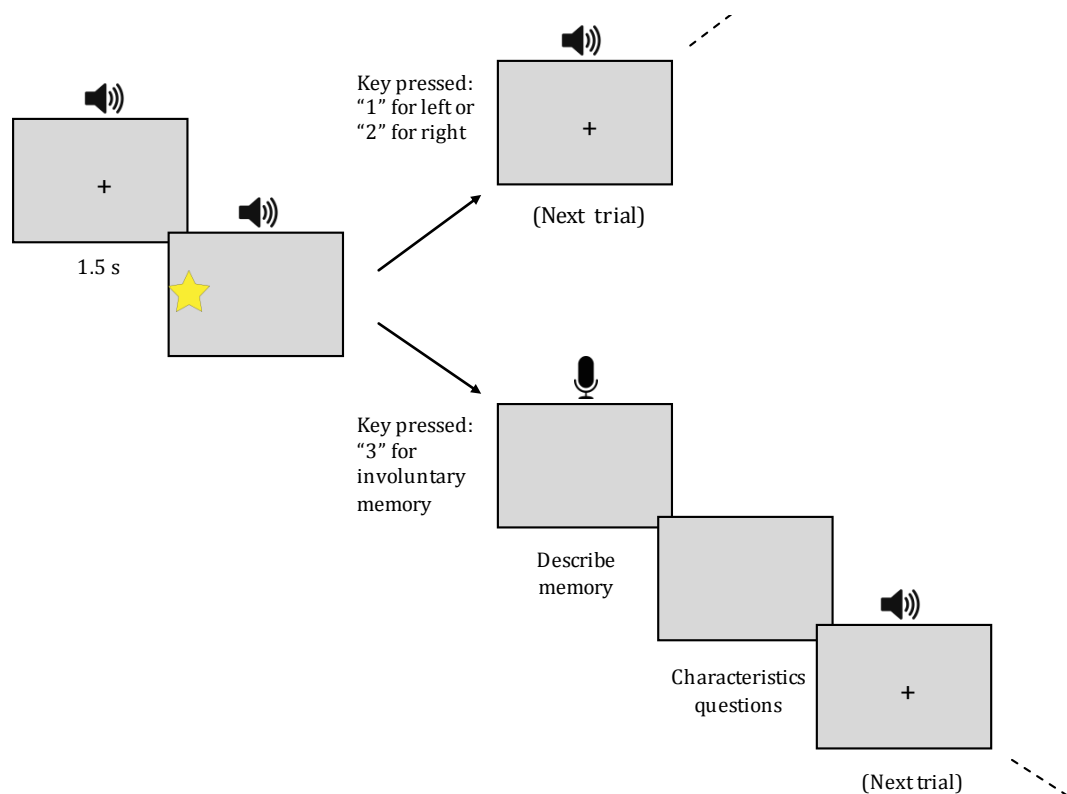
types of trial are named UniCue_NeuScene, UniCue_DisScene, RepCue_NeuScene and RepCue_DisScene. Participants were presented with eight trials of each of these four types in an unblocked and randomised sequence. In addition, within each trial type the picture and sound pairings were randomised so that the same sound was not paired with the same picture. This randomisation was performed four times to create four different pairing sets. Each participant was presented with one of the four pairing sets. The creation of four different sets of randomised picture-sound pairings avoided all 52 participants viewing the same trial composition, reducing the possible effect of unequal relatedness between pictures and sounds affecting recall.

Retrieval phase. Participants returned to complete the retrieval phase 24-hours after encoding. Each trial (Figure 2) consisted of a sound being presented to either the left or right ear of the participant. They heard each of the 32 sounds from the encoding phase presented once to each ear. They also heard 32 unfamiliar filler sounds that they had not heard in the encoding phase presented once to each ear. Half of these were classified as unique and the other half repeated. Participants thus completed 128 trials in the retrieval phase, with sounds being presented in a fixed random order ensuring that familiar and unfamiliar sounds were not presented more than three times in succession.

Figure 1 displays the trial sequence. On each trial, a sound was presented with a centred fixation cross. One and half seconds into each sound, a bright star appeared on either the left or the right side of the screen. The participants were asked to indicate which side of the screen the star was located by pressing “1” for left and “2” for right. This non-demanding attention task simulates the conditions under which involuntary memories are likely to occur and serves as a cover task to minimise the chance that participants would deliberately search for memories of scenes from the encoding phase.

During the attention task, participants indicated whether they spontaneously remembered a scene from the encoding phase. If so, they were told to press “3”, and were subsequently invited to briefly verbally describe their memory using the microphone. After this they were asked to rate three characteristics of the retrieved scene. Five point Likert response scales were used to ascertain the emotional intensity (from 1 = *Not intense at all* to 5 = *Very intense*) and the vividness of the retrieved scene (from 1 = *Not vivid at all* to 5 = *Very vivid*) as well as any experience of bodily reactions such as increased heart rate or tension (from 1 = *Not at all* to 5 = *Very much*). These phenomenological characteristics match those used in previous studies exploring of involuntary and intrusive memories (Hackmann et al., 2004; Reynolds & Brewin, 1999).

Figure 2
Retrieval Trial Sequence



Recognition phase. After completing the retrieval phase, participants viewed 32 trials of each of the 32 encoding scenes, presented alongside a foil. Participants rated which

of the two scenes they thought they had seen before and their confidence in their decision on a 5 point Likert scale, with 1 = *Not at all confident* to 5 = *Very confident*. The recognition phase checked that participants looked at all of the scenes during the encoding phase rather than potentially 'looking past' the scenes, especially those that may be distressing. Aspects of the encoding and foil scenes were matched but dissimilar enough to expect that participants would accurately and confidently recognise the encoding scenes.

Debrief. After completing the recognition phase, participants were shown 10 scenes from the joy/complicity category of the BAPS-Ado in order to induce a positive mood. They were then debriefed, compensated for their participation and had the opportunity to ask questions and informally feedback their experiences of taking part.

Data preparation

Images recalled in the retrieval phase were coded as correct, indiscriminate or errors, using the same classification system as Staugaard and Berntsen (2014). Memories were coded as correct if they were recalled in response to the sound cue with which hit they were originally paired in the encoding phase. If participants retrieved a scene in response to a sound that was different from the scene that it had been paired with during encoding, the memory was coded as indiscriminate. If participants recorded a memory in response to a filler sound or if the scene described could not be readily identified, this was recorded as an error.

Coding was performed by the first author and a second judge independently coded 10% of participants' memories to ensure reliability. Interrater agreement was 80%. Cohen's kappa was used to test interrater reliability, producing a statistically significant result and kappa that indicates substantial agreement ($k=.633$, $p<.001$; Landis & Koch, 1977).

Results

Data cleaning

The statistics software programme SPSS version 22.0 was used to analyse the data. The data were manually checked several times to minimise the chances of transcription errors.

Normality of dependent variables at encoding. In order to test the normality of the data, Kolmogorov-Smirnov tests were performed and histograms with normal plots drawn of the dependent variables at encoding (rated emotional intensity of scenes in each of the four encoding conditions: UniCue_NeuScene, UniCue_DisScene, RepCue_NeuScene, RepCue_DisScene). As the Kolmogorov-Smirnov is a liberal test when used to test deviation from normality, the significance threshold, alpha, was set at 0.01. Intensity ratings for three of these conditions were non-significant on the Kolmogorov-Smirnov test ($ps > .02$), indicating approximately normal distributions, except ratings in the RepCue_NeuScene ($D = .20, p < .001$). Inspection of the histogram for this condition shows a positive skew. It was decided that parametric tests would be used for analysing the encoding dependent variables, despite one variable departing from normality, given the general robustness of parametric tests to deviations from normality (Ghasemi & Zahediasl, 2012; Pallant, 2007; Field, 2013).

Normality of dependent variables at retrieval. In order to test the normality of the data, Kolmogorov-Smirnov tests were performed and histograms with normal plots drawn of the dependent variables at retrieval (total number of images recalled, number of correct and indiscriminate images recalled, number of images recalled per trial type (UniCue_NeuScene, UniCue_DisScene, RepCue_NeuScene, RepCue_DisScene), emotional intensity, vividness and bodily reactions to neutral and distressing images). The

Kolmogorov-Smirnov tests were significant for nearly all of these variables ($p < .001$) indicating departures from normality. Ratings of emotional intensity for neutral ($D = .14$, $p = .03$) and distressing ($D = .12$, $p = .10$) images and vividness for distressing images ($D = .11$, $p = .18$) were those variables that were non-significant and thus normally distributed. As a result of these tests and visual inspection of the data distribution in histogram form, it was decided that non-parametric tests would be used in the analysis of the variables from the retrieval phase.

Normality of independent variables. In order to test the normality of the data, Kolmogorov-Smirnov tests were performed and histograms with normal plots drawn of the independent variables of attachment anxiety and avoidance as measured by the RSQ and anxiety and depression over the last week as measured by the HADS. Inspection of histogram distributions and non-significant results on the Kolmogorov-Smirnov test ($p = .20$) indicated normally distributed variables and thus parametric tests were performed on these data.

Outliers. Standardised values of variables were created to identify scores that are 3 standard deviations from the mean or greater (z-scores greater than or equal to 3), in other words statistical outliers. Three participants' scores on dependent variables related to numbers of images recalled were greater than 3 standard deviations above the sample mean (range: 3.13 - 4.93), and a further three participants' scores on variables related to image characteristics were classified as statistical outliers (SD range: 3.28 - 4.11). These values were double-checked as valid entries rather than errors and it was decided that these scores should remain in the analyses on the basis that they seem to represent a genuine variation in the target variable rather than error (Freedman, Pisani, & Purves, 2007). In addition, non-parametric tests based on ranked

data were used to analyse these dependent retrieval variables, thus eliminating the effect of outliers (Field, 2013).

Questionnaire measures. Cronbach’s alpha was calculated for the RSQ-anxiety and RSQ-avoidance subscales, and HADS-A and HADS-D subscales, as a measure of internal consistency. Alpha statistics, along with means and standard deviations for each of the subscales are presented in Table 1. Alphas were over 0.8 indicating high internal consistency and reliability within scales (Bland & Altman, 1997).

Table 1

Means, Standard Deviations and Cronbach's Alphas for RSQ and HADS subscales

Scale	N=52	M	SD	Cronbach's Alpha
RSQ-Anxiety		10.83	4.65	0.83
RSQ-Avoidance		21.17	6.6	0.87
HADS-A		6.48	4.08	0.82
HADS-D		3.37	3.45	0.83

Validation of participant attention

To examine whether participants had paid attention to the scenes in the encoding phase and were able to remember them, a recognition task was used. The results of this task indicate that participants did pay attention through the encoding phase and likely recalled these images in the retrieval phase as the mean accuracy (92.73%) and confidence (4.14 out of 5) were high.

Emotional intensity ratings at encoding

A paired-sample t-test was performed comparing emotional intensity ratings at encoding for neutral and distressing scenes. As expected, distressing scenes were rated as significantly more intense than neutral ones (M=3.60, SD=.64 vs. M=1.53,

SD=.42), $t(51)=19.68$, $p<.001$, $d=2.73$. This result is in accordance with the data obtained at the pilot validation stage presented earlier.

Retrieval of involuntary memories (Hypotheses 3, 4 and 5)

In order to analyse the number of memories recorded in each trial category a Friedman test was performed, which indicated no significant differences between the four conditions (UniCue_NeuScene, UniCue_DisScene, RepCue_NeuScene, RepCue_DisScene), $\chi^2(3, N=52)=3.14$, $p=.37$. Descriptive statistics of the frequency of retrieved scenes are illustrated in Table 2. This non-significant result thus indicates no significant differences by emotion (contrary to Hypothesis 3) or cuing (consistent with Hypothesis 4).

Table 2

Means, Standard Deviations and Range for numbers of Retrieved Scenes per condition

Condition	<i>N</i> =52	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
UniCue_NeuScene		1.33	1.48	0.00	7.00
UniCue_DisScene		1.27	1.50	0.00	6.00
RepCue_NeuScene		1.40	2.20	0.00	13.00
RepCue_DisScene		0.98	1.09	0.00	4.00

A Friedman test was also performed to analyse whether cuing had an effect on the frequency of correct vs. indiscriminate scenes. This test was significant, $\chi^2(3, N=35)=27.52$, $p<.001$ and Wilcoxon's signed-rank tests were performed to further investigate where the difference was located. Correct retrievals occurred significantly more frequently in response to unique cues, $Z=-2.63$, $p=.009$, and repeated cues led to significantly more indiscriminate than correct retrievals, $Z=-4.66$, $p<.001$. This effect of accuracy related to cuing is in the direction expected (Hypothesis 5).

Phenomenology of retrieved scenes

In Staugaard and Berntsen's (2014) original study, only a small number of participants retrieved memories in response to repeated cues. As a result, they analysed subjective phenomenological characteristics of retrieved scenes in response to unique cues only, excluding those in response to repeated cues. In this study, participants retrieved equivalent numbers of memories in response to repeated and unique cues, as there was no effect of cuing in the Wilcoxon signed-rank test reported above. In light of this, analyses of memory characteristics were performed for all memories, regardless whether correct or indiscriminate or in response to unique or repeated cues.

Wilcoxon signed-rank tests were performed for each of the image characteristics with the valence of the scenes as the repeated measure. The means, standard deviations, Z-statistics and effect sizes (r) are presented in Table 3. Distressing scenes were rated significantly higher than neutral scenes on all characteristics: emotional intensity, vividness and bodily reactions.

Table 3

Means, Standard Deviations, Z-Statistics and Effect Sizes, r , for the Subjective Phenomenological

Characteristics of Retrieved Scenes

Variable	N=44	Neutral		Distress		Statistics	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Z</i>	<i>r</i>
Emotional intensity		1.55	0.84	3.26	1.18	-5.20**	-0.78
Vividness		2.88	1.09	3.27	1.16	-2.18*	-0.33
Bodily reactions		1.21	0.47	1.87	1.04	-3.69**	-0.56

Note. * $p < .05$. ** $p < .01$

Attachment and retrieval of involuntary memories (Hypotheses 1)

As the dependent variable is count data, rather than continuous data, a Poisson regression analysis was performed to predict the number of emotionally distressing scenes retrieved based on RSQ attachment anxiety and avoidance, independent predictor variables (Hypothesis 1). Neither attachment anxiety nor avoidance significantly predicted the retrieval frequency of emotionally distressing scenes, contrary to Hypothesis 1 (Table 4).

Table 4

Summary of Poisson Regression Analysis for Retrieval Frequency of Distressing Scenes

Variable	<i>B</i>	<i>SE B</i>	<i>Exp(B)</i>	χ^2	Sig. (p)
Intercept	.57	.32	1.78	3.13	.08
RSQ Anxiety	.00	.02	1.00	0.07	.52
RSQ Avoidance	.02	.02	1.02	0.41	.79

Attachment and phenomenology of involuntary memories (Hypotheses 2)

Stepwise multiple regression analyses using a backward variable entry method were performed to investigate whether state anxiety and attachment anxiety and avoidance could predict the subjective characteristics of involuntary memories of scenes depicting attachment-related distress (Hypothesis 2). A backward method is preferable to a forward method, as it reduces the chances of making a Type II error due to suppressor effects (Field, 2013). RSQ anxiety and avoidance scores and HADS-A and HADS-D scores were entered as independent variables with emotional intensity, vividness and bodily sensation ratings of distressing scenes as the dependent variables. Subjective vividness of and bodily reactions to distressing scenes were not found to be significantly predicted by any of the three independent variables, such that the stepwise regression analyses removed all variables in turn as they did not make

statistically significant contributions to the models' fit ($p > .13$). The regression analysis showed a non-significant trend for a predictive model of attachment anxiety and attachment avoidance for the emotional intensity of distressing scenes, (Model 2), $F(2, 41) = 2.58, p = .09, R^2 = .11$. HADS-Depression and HADS-Anxiety were successively removed from the first two models due their non-significant contribution. Table 5 illustrates the regression analyses for the three models.

Table 5

Summary of Multiple Regression Analysis for Emotional Intensity of Distressing Scenes

Variable	Model 1					Model 2					Model 3				
	<i>B</i>	<i>SE B</i>	β	<i>t</i>	Sig. (<i>p</i>)	<i>B</i>	<i>SE B</i>	β	<i>t</i>	Sig. (<i>p</i>)	<i>B</i>	<i>SE B</i>	β	<i>t</i>	Sig. (<i>p</i>)
Constant	3.84	.60		6.37	.00	3.81	.57		6.67	.00	3.80	.57		6.64	.00
RSQ Anxiety	0.09	.05	.35	1.94	.06	0.09	.05	.35	1.94	.06	0.08	.05	.33	1.80	.08
RSQ Avoidance	-0.06	.04	-.32	-1.59	.12	-0.05	.03	-.31	-1.61	.12	-0.07	.03	-.39	-2.17	.04
HADS-Anxiety	-0.06	.06	-.21	-1.00	.033	-0.06	.05	-.19	-1.09	.28					
HADS-Depression	0.01	.07	.03	0.17	0.87										

Note. $R^2=.14$ for Model 1, $\Delta R^2=-.00$ for Model 2, $\Delta R^2=-.03$ for Model 3

Despite the non-significance of the overall model incorporating attachment anxiety and avoidance, Table 5 shows the significant predictive factor of attachment avoidance in the felt intensity of distressing images, in the direction expected (Hypothesis 2), $\beta = -.39$, $t(43) = -2.17$, $p = .04$. The negative coefficients indicate that as avoidance increases, emotional intensity ratings decrease. There is a non-significant trend in the expected direction for attachment anxiety too, such that increased attachment anxiety is associated with increased felt emotional intensity of scenes of attachment-related distress. $\beta = .33$, $t(43) = 1.80$, $p = .08$. In addition, variance inflation factors (VIF), a measure of collinearity between independent variables, were all below 1.74, indicating that multi-collinearity is not an issue in this regression analysis as Myers (1990) suggests that a VIF of below 10 is acceptable.

Discussion

The results show some effect of attachment on the characteristics of involuntarily recalled distressing social scenes. Some hypotheses were not supported based on the results found, particularly in relation to frequency of recall. Each of the results will be discussed in turn.

The effect of emotion on frequency of involuntary memory recall

There was a failure to replicate Staugaard and Berntsen's (2014) main effect of emotion whereby it was expected that scenes of negative emotional content would be involuntarily recalled more frequently than neutral scenes, after a consolidation period of 24 hours (Hypothesis 3).

In attempting to explain a non-replication of the main effect of emotion result, it is important to consider whether any differences between Staugaard and Berntsen's (2014) and the present study may have impacted the results. It is notable that in this study,

participants, on average, retrieved fewer scenes overall compared to Staugaard and Berntsen's (2014), and with a smaller proportion of these classified as correct.

The BAPS-Ado was used in this study, compared to the IAPS (Lang et al., 2008) in the original. The BAPS-Ado was chosen for use in this study as it has been specifically developed and validated for attachment-related research, with the aim of activating participants' attachment systems, where the IAPS is a more generic affective picture set. The IAPS has been validated amongst adult samples, in contrast to the BAPS-Ado which is yet to have results of adult validation published. It is possible that the BAPS-Ado was less valid with an adult sample with regard to soliciting the intended emotions, however the results of the modest pilot validation of these images as part of this study, and emotional intensity ratings obtained from the encoding phase would suggest that this would not have had a large effect on the overall results.

Another, perhaps more significant, difference between the two picture sets may be the similarity of the scenes themselves. There appeared to be a high degree of similarity, and thus lower discriminability, within each BAPS-Ado picture type (neutral or attachment-related distress), for example 11 out of the 16 (68.75%) neutral images used at encoding were of individuals within public transport settings, and 11 of the 16 distressing images were of children in distress. This may have served to increase the 'difficulty' of the retrieval task, through reduced cue-item discriminability. Arguably this would be more likely to account for low overall retrieval rates and a low proportion of correct compared to indiscriminate memories recalled, rather than the lack of a main effect of emotion, however the chances of finding this main effect would have been reduced as the overall number of scenes retrieved was lower.

Staugaard and Berntsen (2014) asked participants to rate the relatedness between the pictures and sounds in their pairings at encoding, using these data to ensure equal relatedness across trial types. More related pictures and sounds may meaningfully or commonly co-occur, for example a scene of a forest may be rated as

more related to bird song than the sound of a train. Relatedness was not controlled for this in this study, and thus may have been a confounding factor. Indeed some participants mentioned informally that they felt pairings with higher perceived relatedness between the scene and accompanying sound were more prominent. As a limitation in this study, it is important that replications of this paradigm include methods for controlling relatedness.

To the author's knowledge, Berntsen et al.'s (2013) and Staugaard and Berntsen's (2014) paradigm is the first to allow experimental control over both the encoding and retrieval processes theoretically involved in involuntary memory retrieval, but future replications would be required to further demonstrate the validity and reliability of this method.

The effect of cuing on involuntary memory recall

Staugaard and Berntsen (2014) found that a main effect of cuing was present if the retention interval was only a few minutes. Consistent with their finding and with our predictions, no main effect of cuing was found after 24 hours (Hypothesis 4). They argued that the effect of time may be due to a weakening of the association between the scene and its sound cue over time due to interference (Staugaard & Berntsen, 2014). It is possible that participants forgot many of the various unique cues whereas they may have inadvertently strategically grouped the similar repeated sounds together, and thus only remembered "birds singing" or "cars driving". Unique cues may thus have become relatively less effective than repeated cues over 24 hours, as the repeated cues may have been more protected from decay through interference via this strategic cognitive grouping. As a result after 24 hours, there was no significant difference between the numbers of retrieved scenes depending on the distinctiveness of the cue. Further support for this hypothesis comes from Staugaard and Berntsen's (2014) finding that after a retention interval of seven days, the effectiveness of unique cues

declined further, while repeated cues remained approximately as effective as after a few minutes and 24 hours.

Given this explanation involving strategic cognitive grouping, or what Staugaard and Berntsen (2014, p. 1953) suggested was a development of a “schematic representation of ...subjectively similar sounds”, it was expected that repeated cues may be more likely to lead to indiscriminate memories than correct ones, as participants held less specific and more general representations of repeated cues (Hypothesis 5). This was supported by the data as it was found that retrievals in response to repeated cues were more often classified as indiscriminate than correct. In addition, unique cues more successful than repeated cues at eliciting correct retrievals. This finding may help to explain clinical anecdotes of involuntary memories in response to vague or otherwise general cues, which may share more semantic than structural associations with the original memory event.

The effect of attachment orientation on characteristics of involuntary memory recall

The hypothesis that links individual’s attachment style with their emotional experience of social stimuli (Hypothesis 2) was partially supported by the results of this study. Consistent with studies by Vrtička et al. (2008; 2012), attachment avoidance was associated with reduced felt emotional intensity of scenes of attachment-related distressed and there was a trend for an association between attachment anxiety and increased emotional intensity. These findings support the notion of hyperactivating and deactivating emotional regulation strategies of attachment anxious and avoidant individuals (Shaver & Mikulincer, 2002)

The effect of attachment orientation on frequency of involuntary memory recall

Despite some effect of attachment orientation on the felt emotional intensity of scenes of attachment-related distress, there was no effect on recall frequency. Attachment anxiety or avoidance was not associated with any differences in recall frequency of recalled scenes, as was expected to be the case (Hypothesis 1). This lack of an effect may be due to the failure to find an overall effect of emotion or low overall memory retrieval and thus be an artefact of this replication of the paradigm rather than related to the hypothesis itself or specific testing of it. However, this study contained several potential limitations in the testing of this hypothesis.

The RSQ is a continuous attachment measure that relies on explicit appraisal of relationship behaviour, in contrast to other dimensional attachment measures such as the AAI (George, Kaplan, & Main, 1985) which rely more on implicit processes (Jacobvitz, Curran, & Moller, 2002). As such, there may be a greater potential for a bias towards social desirability in participants' RSQ responses. The study took place in a culturally Western location and institution, where individualism is the norm over collectivism. Indeed individualism/collectivism has been suggested as a moderator between culture and attachment (Agishtein & Brumbaugh, 2013). Participants may have generally responded to items in a manner deemed desirable in the prevailing individualistic culture, where personal independence, self-reliance and autonomy are more highly regarded than cohesion and potentially a greater level of dependence on relevant others. As a result, there may have been a bias against overtly identifying with statements such as "I worry about being alone" and "I want to merge completely with another person" and bias towards being seen to endorse statements such as "It is very important to me to feel self-sufficient", which are all items from the RSQ. Conversely there may also have been a desirability bias in the other direction, with the overall consequence being that more extreme values of attachment anxiety and avoidance may have been censored by participants. The measurement error introduced by a social

desirability bias may have impacted on the results found, however may be difficult to avoid.

Whilst attachment anxiety and avoidance are independent dimensions (Brennan et al., 1998), they may both exert separate and opposing influences on motivated attention and subsequent memory encoding and retrieval, as hypothesised in this study. The effects of attachment anxiety and avoidance on memory retrieval were tested using a Poisson regression model, however it is possible that the effects of one dimension may have counteracted the effects of the other. This cancelling out effect would have particularly affected the number of scenes retrieved by participants who scored equivalently on RSQ anxiety and avoidance. Participants were not selected for participation on the basis of their attachment orientations, however this may have been a method of reducing this confound. Initial screening of individuals to create two groups of those who demonstrate high attachment anxiety/low avoidance and low anxiety/high avoidance facilitates the comparison of the effects of anxiety and avoidance more independently of each other.

The present study's hypotheses linking attachment and involuntary memory retrieval were not supported given the data, however it is unclear why not. It may be that there is indeed no effect to be found or it may be that limitations related to this study's method, such as attachment measurement and in the execution of the paired-associated paradigm, impaired this study's ability to find an effect. As such, it would be worth continuing to investigate the two, either through replications of this experiment or others.

Experiments like the present study that investigate mechanisms of involuntary memory retrieval within the general population may also help to elucidate distressing memory-related phenomena within clinical populations such as PTSD or depression. The following paragraphs discuss the similarities between experiences of memory retrieval between healthy individuals and those suffering from psychological disorders,

despite differences in terminology used to describe such experiences. Subsequently, future directions for research in this area along with some potential issues and limitations to be aware of are discussed.

Terminology

The confluence of clinical (e.g. Brewin et al., 1996) and memory-focused cognitive research (e.g. Berntsen, 2001) has highlighted a discussion about the use of different terminology used. Kvavilashvili (2014) comments that “involuntary autobiographical memories”, “intrusive memories” and “flashbacks” are often used interchangeably but in her opinion have key differences. She argues that involuntary autobiographical memories are predominantly unremarkable, one-off memories that she characterises as “mind-pops” (Kvavilashvili, 2014). She describes intrusive memories as repetitive, distressing and disruptive involuntary memories that are often accompanied by behaviours aimed at avoidance. Flashbacks are conceptualised as overwhelming re-experiencing of traumatic events that is associated with a sense of “nowness” and immediate fear and startle. Brewin et al. (1996) made a similar distinction, between intrusive memories and flashbacks, with flashbacks being a qualitatively different phenomena from any form of involuntary autobiographical memories. Kvavilashvili (2014) makes the crucial point that these terms should be clearly defined with the aid of fMRI and lesion studies.

This study comes from the viewpoint held by cognitive researchers (e.g. Berntsen, 2001), which suggests that “involuntary autobiographical memories”, “intrusive memories” and “flashbacks” are likely on a spectrum. This stance argues that despite variations in frequency, emotional intensity and interference with daily life, the differences between these three types of phenomena are quantitative rather than qualitative, and thus open to study using models derived from the general autobiographical memory literature.

Studying involuntary memory phenomena in clinical populations

Involuntary memory research that bridges clinically relevant literature with general memory literature is an exciting area. There are a number of recently developed experimental involuntary memory tasks which can develop this interest such as the task used in this study. Investigating intrusive images and memories using these approaches allows greater experimental control over memory characteristics, and allows us to test expectations from a range of hypotheses spanning both autobiographical memory and clinical psychology literature. This work is in its infancy and can potentially be developed to further empirically explore the viability of a competing and arguably more parsimonious “single representation” model of involuntary memories, in comparison to the dominant dual representation theory.

Brewin (2014) argues the distinction between single and dual representation theories is not necessarily clear-cut and that it may be more helpful to conceptualise how ordinary memory mechanisms operate under different circumstances. This is a further argument for the promotion of experiments based on general memory mechanisms aimed towards testing clinically-related hypotheses.

It is useful to note some of the limitations of these experimental psychology approaches that future research would do well to overcome or minimise. Increased experimental control is often coupled with reduced ecological validity, in this case in the form of tasks lacking personal relevance for participants. In the current study, while images of attachment related distress retrieved were rated as emotionally intense and reflected participants’ actual experience (of the encoding phase), they were not relevant to participants’ belief systems, cultures, prior experiences, values and goals. Incorporating participants’ loved ones/attachment figures as meaningful stimuli would be one way to investigate the effect of attachment on involuntary memories, by increasing the likelihood of activating participants’ attachment systems and related cognitive and behavioural processes that follow. In addition it has been argued that

stimuli lacking personal meaning are unlikely to provoke dissociative experiences which are a common response in PTSD (Brewin, 2014). The inability and ethical issues related to provoking traumatic dissociative experiences in experiments may not preclude the application of these types of experiments to other disorders too in which involuntary memories and images without dissociation have been reported, such as social phobia (Hackmann et al., 2000) and depression (Birrer et al., 2007) and body dysmorphic disorder (Veale & Neziroglu, 2010). With this in mind, future research should incorporate personally relevant material as far as is practicable in order to make assertions about clinical phenomena.

Clinical implications

Distractor tasks, mimicking the mundane conditions under which involuntary memories occur in daily life have been cleverly utilised in experimental tasks. These tasks highlight the use of distraction as a possible helpful avenue for introducing people to mental imagery construction, who may have a tendency to avoid generating imagery voluntarily due to their associated distress. This in turn may help with the application of imagery interventions such as imaginal exposure and imagery rescripting (Arntz, Tiesema, & Kindt, 2007).

This research supports the notion that differences in attachment orientation may be able to explain some of the variance in symptomatology of different disorders. For example it is estimated that between 44% (Patel et al., 2007) and 87% (Brewin, et al., 1996) of those suffering from depression experience distressing, involuntary memories. With this in mind, attachment experiences and emotional regulation strategies may also be useful additions to clinical formulations of disorders where intrusive imagery is a maintaining factor.

Conclusions

The effects of attachment orientation on the emotional experience of involuntary visual memories of images of attachment-related distress have been demonstrated in this study. High attachment-related avoidance is associated with experiencing attachment-related scenes as less emotional, consistent with accounts of attachment system deactivation. Attachment-related anxiety, on the other hand, trends towards increased felt emotional intensity of such scenes, consistent with attachment system hyperactivation. Using Berntsen et al. (2013) and Staugaard and Berntsen's (2014) paired-associated paradigm, these differences did not translate to differences in the frequency of involuntary memories recalled. Limitations in the experimental design may account for this, and thus further study using both this paradigm and others to test this hypothesis is warranted.

More broadly, much could be gained from investigating involuntary memories in clinical populations from the point of view of general memory mechanisms. Investigating the influence of individual differences, such as attachment orientation, on memory recall is recommended using controlled experiments. Such research could further elucidate the interplay between individual factors and situational and environmental factors that contribute to involuntary memory activation, distress and clinical disorder maintenance.

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Part 3: Critical Appraisal

Introduction

This critical appraisal contains some of my reflections upon the process of conducting the first two parts of this thesis. In addition, my experience of this research process will be contrasted to my clinical experiences, with this conflict being central to discussion of the broader context of clinical psychology research, training and healthcare provision. It is hoped that, rather than solely extending critiques of experimental design and statistical analyses of the first two parts, a critical discussion of this type can provide an additional perspective for the reader.

Reflections on Part 1: Literature Review

Finding a literature review topic. In considering a starting point for the literature review, my aim was to select a topic that addressed a clinically-meaningful gap in the literature. The final review collates direct imagery interventions which may be used as a 'reference manual' for therapists and was partly borne out of my own sense of uncertainty in navigating the imagery literature. My experience was shared by other clinicians, as confirmed by Bell et al.'s (2015) interpretative phenomenological analysis of therapists' experiences of clinical imagery interventions. This was the second review topic I had researched the feasibility of, the first being related to cross-cultural attachment. Attachment theory (Bowlby, 1969/1982) has been prominent in my psychodynamically-oriented clinical thinking and formulation, and I was interested in finding out more about critical and social constructionist approaches towards it; indeed writing a review on a topic is a good way of learning more about it.

My initial scoping searches unveiled several difficulties in beginning to conceptualise a critical review question in relation to cross-cultural stances on attachment theory. Despite attachment theory being so well-known and popular within the field, there seemed to be a relative paucity of literature on cross-cultural influences

on our understanding of adult attachment. Several studies have employed the Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978) with mothers and infants from different cultural and ethnic backgrounds in order to compare attachment classifications inter-culturally (e.g. Bakermans-Kranenberg et al., 2004; Takahashi, 1990). Van IJzendoorn and Kroonenberg (1988) have written review of these studies. Heidi Keller (Keller, 2013; Otto, & Keller, 2014) deconstructs attachment theory, citing anthropological research to highlight the argument that Western middle-class values that promote the nuclear family unit and autonomy imbue assumptions of attachment theory. She asserts that that cross-cultural Strange Situation studies still apply a culturally-bound paradigm and attachment classification system to other cultures, rather than taking account of and incorporating different culture's conceptualisations of parenting practices into theory and research. Keller (2013) calls for the development of a new research strategy of this type.

My desire to write a literature review detailing this was hindered by this strategy not yet being developed. In addition, it may well be that a proliferation of attachment "theories" that are adapted to different cultures is unlikely to happen in the near future, due to the view that attachment theory draws on aspects of evolutionary theory and thus is a stable construct irrespective of culture. Culture-specific research also faces the obstacle of the current dominance within published psychological thinking and research globally of Western cultural values and the English language. This dominance perhaps explains why often studies relating to cross-cultural attachment seem to be published in "niche" journals such as the *Journal of Cross-Cultural Psychology*. In addition, several articles were written in other languages, as expected, further compounding the difficulty I had in further exploring this area. These initial difficulties during the scoping search process suggested that perhaps part of attachment theory's appeal and popularity is its proposed universality, and the comfort gained from a theory that supposedly encapsulates and is applicable to all cultures and

families. Indeed in writing to Joseph Hooker, Darwin himself (1857) used the terms “lumpers” and “splitters” which may be applicable here, with psychologists generally preferring to lump behaviour across cultures into one over-arching theory.

Diagnosis as an inclusion criterion. My final choice of literature review topic was more straightforward to search for and carry out. The inclusion criteria for the systematic search required evaluation studies to use samples that were assessed as having a diagnosis of a psychological disorder. This inclusion criterion was aimed at increasing the validity of conclusions made about interventions’ effectiveness for a given population. While this is a common practice in literature reviews of this type, several studies were excluded as a result of not meeting this criterion, while satisfying all of the other criteria (e.g. Kandris & Moulds, 2008). Attempts were made to highlight relevant excluded studies, however it is unclear how many studies were unknowingly excluded in the earlier electronic search procedure.

I felt some conflict between abiding by diagnostic criteria for the purposes of the review, and my clinical practice, in which I tend to eschew diagnostic labelling if possible. Indeed this conflict has been highlighted in the British Psychological Society’s policy and guidance in relation to diagnosis (BPS, 2013), whereby it is recognised that reference to diagnostic terms by psychologists may facilitate communication and research, but they recognise the limitations of such systems. It is in keeping with these guidelines and my own current position on the use of diagnostic labelling that I use a portion of this critical appraisal to note this discordance, as opposed to providing tacit acceptance of the general use of diagnostic classification systems.

Standardised outcome measures as an inclusion criterion. A similar conflict arose in relation to inclusion criterion 4 which stipulates that studies should include the use of standardised quantitative outcome measures. As with the use of diagnostic criteria, a

dissociation between my research and clinical practice was evident. The aim and measure of therapeutic success in evaluations studies included in the review was improvement on questionnaire scores, whereas my notion of outcome has tended to be broader as a clinician. It has been my experience that relying on outcome measures alone, as research studies often do, can be deceiving, have little meaning and be a relatively poor indicator of how a client is functioning in reality.

For example a client may show improvement on self-rated depression measures post-therapy but far from having resolved their presenting problem, may now feel angry instead, as a separate mechanism for managing a core pain (Busch, 2009). The over-reliance on diagnostic categories and associated outcome measures can have the effect of over-simplifying our conceptualisation of treatment, such that there is a move to treat the depression as indexed by depression scores, for example, rather than a focus on helping an individual with a unique set of difficulties. Within clinical work outcomes are often more nuanced and meaningful than may be measured by questionnaire such as a client being able to attend outpatient appointments on time, or be able to cry. While acknowledging the convenience of using standardised measures, it is my view that a broader conceptualisation of what constitutes a meaningful outcome in therapy interventions pays more respect to the individual variability of human suffering, and indeed human triumph over suffering.

Treatment mechanisms. The discussion of active mechanisms of treatment interventions as part of my review brought to mind the longstanding debate between specific and non-specific treatment effects within psychotherapy literature (e.g. DeRubeis, Brotman, & Gibbons, 2005). With the exception of Esplen et al. (1998), the studies included in the review suggested specific effects only. This may have been more likely given they evaluated specific imagery interventions rather than whole therapies. It was also notable that similar interventions were often ascribed to being effective via

different mechanisms, which may reflect the a priori orientation and research interests of the researchers. At least seven separate mechanisms were described to understand the four imagery interventions. In addition, within interventions, it appeared that minor variations in technique also reflected these interests. Veale et al.'s (2015) study of imagery rescripting in OCD, for example, cited behavioural and cognitive changes as the likely mechanism of change, which reflects the first and second wave CBT orientation of the body of his research work. Interestingly, the protocol used in their study seemed to depart from the imagery rescripting protocol (Arntz & Weertman, 1999) that they utilised, by not including a compassion component, which more reflects third wave CBT. While immersed in reading these research papers, I found the theoretical arguments for specific effects internally coherent and thus more persuasive. However, in writing this critical appraisal, and taking a step back, these arguments seem less persuasive in the face of studies citing other mechanisms, as well as a broader view taking account of a multitude of possible non-specific effects. An alternative approach to the specific/non-specific hypothesis that I currently advocate is that of Butler and Strupp (1986), who argue that the distinction between specific and non-specific effects cannot be meaningfully made. They put this extremely well, echoing some of my thoughts above in relation to universal cross-cultural theories:

Dividing a complex phenomenon into two conceptually distinct but inclusive categories is an intellectual exercise of remarkable popularity in psychology. Dichotomies seem to capture our scientific imagination, generating volumes of published material. We begin to feel that a previously monstrous complexity has receded, yielding to the bright light of our simple, clear understanding. This sense of mastery is sometimes justified...unfortunately, there is a scientifically dangerous side to such divisions of reality that must always be weighed against their utility. (Butler & Strupp, 1986, p. 30)

Reflections on Part 2: Empirical Paper

Attachment measures. A significant hurdle to overcome in designing the empirical paper came from how to measure participants' attachment orientations. Within the literature, there are two independent theoretical and practical approaches to this. Traditionally the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985), which involves a detailed discourse analysis and coding of participants' attachment histories, is often regarded as the gold standard adult attachment measure (Barbot, Heinz, & Luthar, 2014; McCluskey, 2005). This line of research developed from investigations into parenting of young infants in child and developmental psychology. It is concerned with adults' states of mind in relation to attachment, and may have the advantages of activating the attachment system and a reduced impact of response bias due to defence mechanisms or social desirability. The AAI is costly and inconvenient to administer across multiple participants, due to extensive prior training that is required, and the several hours to transcribe and code each participant's interviews.

The second line of research stems from Hazan and Shaver's (1987) development of a self-report attachment measure, which focused on adult loneliness and romantic attachments. Their approach to Bowlby's attachment theory from a personality and social psychology background was an important step in facilitating research into adult attachment from an individual differences perspective. Self-evaluation attachment measures can be easily administered to multiple participants and provide accessible attachment scores. These self-report measures require individuals to have awareness of feelings and behaviours in close relationships which can distort responses (Ravitz, Maunder, Hunter, Sthankiya, Lancee, 2010).

Bartholomew (1990) reviewed these two traditions within attachment research and noted several differences. A key difference between the two approaches was the

domains with which they focus on. The former focuses on parent-child relationships and the latter on adult romantic relationships. The notion that attachment styles may differ depending on the attachment figure has been demonstrated by Fraley, Hefferman, Vicary, and Brumbaugh (2011) who use the phrase 'differentiation in working models' across different relational contexts/domains. With this differentiation in mind, general measures of attachment that could be used across domains were developed such as the Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994) and the Experience in Close Relationships questionnaire (ECR; Brennan, Shaver, & Clark, 1998) which can be re-worded based on the relationship or domain in question. I was helped through navigating the minefield of attachment-related measures by Professor R. Chris Fraley of the University of Illinois Urbana-Champaign (personal communication, 22 October, 2015), who recommended the RSQ on the basis that it is a convenient self-report measure of general attachment that can be scored in a variety of ways, both dimensionally and categorically.

Despite the nomothetic appeal of the RSQ and other self-report attachment measures, issues of response bias were evident in my experience of administering the RSQ. The transparency of RSQ items may have explained why some participants explicitly professed to me how important their independence was to them, and one participant to remark, "I know I'm securely attached anyway" before completing the measure. Some of the issues of the effect of social desirability and culture on attachment self-report measurement are further discussed in the empirical paper. While the RSQ is a 30-item measure, scoring based on Simpson, Rholes, and Nelligan's (1992) anxiety and avoidance dimensions (Kurdek, 2002; Roisman et al., 2007), utilises only 5 items to create the anxiety subscale and 8 for the avoidance subscale. The small number of items in each subscale may have also contributed to an increase in the overall effects of response biases on anxiety and avoidance scores.

Overarching reflections

My undergraduate degree in Experimental Psychology was a decidedly scientific discipline, classified as a medical science and concerned with the development and critique of experimental method to understand human behaviour. A computational theory of mind (McCulloch & Pitts, 1943) underpins some aspects of an experimental psychology approach, such that the human mind can be thought of as an information-processing computational system. Within this approach, the mind can be loosely thought of as like a Turing machine, and within experimental psychology research, individual variation was controlled using large samples and probabilistic statistical tests. As a result, during my undergraduate training, people were mostly seen as 'participants' (formerly 'subjects'). My subsequent experiences in the field of clinical psychology, both pre-training and while on placements as part of training, were mostly in the context of a different philosophical framework. People are most often called 'clients', with complex histories, emotions, personalities and relationships.

Throughout the process of conducting the first two parts of this thesis, a tension between viewpoints of how individuals are thought about and conceptualised arose. This tension has also arisen during the course of other aspects of my clinical training.

The culture and practice of utilising diagnostic classification systems, and nomothetic self-report measures of symptoms and attachment dimensions may serve to represent examples of the oversimplification of human experience that can occur when there is an over-reliance on using such quantitative methods. Indeed the dominance of quantitative research in published literature has been noted (Gagliardi & Dabrow, 2011; Greenhalgh et al. 2016), which may have a reductionist influence on our knowledge of human phenomena in clinical psychology, which subsequently has an effect on teaching and the development of the field.

The views of the psychologist and critical humanist Sigmund Koch (Smith, 2001) resonate with some of my own. His 'cognitive pathology' or 'pathology of inquiry'

approach observes and critiques the tradition of human inquiry, mostly within the sciences and psychology, as well as aspects of the humanities (Koch, 1999). He suggested that “meaningful pursuit of the widely varied psychological studies will demand of the inquirers in each area rich and specialized sensibilities relevant to the particular phenomenological domain at issue” (Koch, 1999, p. 27). On the other hand, he suggested that 20th century psychology in particular was afflicted by “pseudo-inquiry” and “ameaningful thinking” such that:

knowledge is an almost automatic process of a gimmickry, an assembly line, a methodology. It assumes that inquiring action is so rigidly and fully regulated by rule that in its conception of inquiry it often allows the rules totally to displace their human users. Presuming as it does that knowledge is generated by processing, its conception of knowledge is fictionalistic, conventionalistic. So strongly does it see knowledge under such aspects that at times it seems to suppose the object of inquiry to be an ungainly and annoying irrelevance. Detail, structure, quiddity are obliterated. Objects of knowledge become caricatured, if not faceless, and thus they lose reality. The world, or any given part of it, is not felt fully or passionately and is perceived as devoid of objective value. (Koch, 1999, p. 28-29)

Koch critiques the scientific ambitions of psychology, notably during the middle of the 20th century in a time when Skinnerian behaviourism and cognitive psychology were foremost.

It is my contention that, in some respects, we may not have moved on that far within clinical psychology from the days of Koch. My experience of conducting this thesis has, at times, led me to feel slightly disillusioned with the research process. The criticism of reductionism levelled at the use of nomothetic outcome measures and

diagnostic labelling has contributed to my sense of researching within a vacuum at times, perhaps guilty of a meaningful thinking. The dominance of an all-encompassing view of attachment theory may be an example of what Koch termed “single-principle imperialism”.

This pathology of inquiry may be also present throughout other aspects of clinical psychology, not just research. Indeed, throughout clinical training, I have felt a disconnect at times between the realities of clinical work on placements and the knowledge presented through academic teaching. In addition evidence of a meaningful reductionism may arguably be seen in the evolving landscape of clinical psychology provision within the NHS. The IAPT (Improving Access to Psychological Therapies) programme has arguably constrained the choice of available psychological therapies (Winter, 2007) to a dominant CBT model (Burkeman, 2016). The championing of CBT within IAPT services and commissioning may again be an example of single-principle imperialism, whereby there is a tendency to “*persist so rigidly, so blindly, patiently in the application of the rules – despite fulsome indications of their disunity – that the behaviour would have to be characterized as schizophrenic in any other context*” (Koch, 1999, p. 398). An unfortunate consequence of which is that other forms of therapy cannot be allowed to flourish. It has been an interesting exercise to reflect upon how the issues raised during the process of conducting this thesis may serve as a microcosm of wider perceived issues within the field of clinical psychology as a whole. By situating my experiences within different historical and philosophical contexts, it is my view that perhaps current clinical psychology is not so far away from seeing people as Turing machines as it would be comfortable to assume.

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Appendices

Appendix I

Ethical Approval Amendment Form

Amendment Approval Request Form

1	Project ID Number: CEH9/2014/519	Name and e-mail address of Principal Investigator:
		Dr Viji Huddy [REDACTED]
2	Project Title: Project Title: Looking into the Future: A Resource for Wellbeing?	
3	<p>Type of Amendments (tick as appropriate)</p> <p>Research procedure/protocol (including research instruments) <input type="checkbox"/></p> <p>Participant group <input type="checkbox"/></p> <p>Sponsorship/collaborators</p> <p>Extension to approval needed (extensions are given for one year) <input type="checkbox"/></p> <p>Information Sheets <input checked="" type="checkbox"/></p> <p>Consent forms <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p>Other recruitment documents</p> <p>Other <input type="checkbox"/></p> <p>Please specify: Demographics form</p>	
4	<p>Justification (give the reasons why the amendment/s are needed):</p> <p>An amendment is required for a DCInPay project, which investigates attachment type and involuntary memory recall.</p>	
5	<p>Details of Amendments (provide full details of each amendment requested, state where the changes have been made and attach all amended and new documentation)</p> <p>A new information sheet and consent form will be drawn up for this study. The information sheet informs participants that they would participate in an attention task, when in fact they will be taking part in a memory task. This deception is required to maintain the involuntary nature of the memory task. The information sheet informs participants that they will be presented with images, some of which may be distressing. They are informed of their right to withdraw at any time from the study and signposted to the researcher and/or research programme principle investigator should they want further assistance.</p> <p>The consent form has been amended to highlight to participants that if they are paid for their participation their details may be passed to UCL finance for administration purposes.</p> <p>The demographics form now asks for the participants' occupation.</p>	
6	<p>Ethical Considerations (insert details of any ethical issues raised by the proposed amendment; in the case of adding a new researcher, please confirm in writing that you have discussed ethical issues of the project with this researcher and that you have taken them through the risk assessment form for the project, which they have signed)</p>	

	<p>I have discussed the ethical issues of the project with the researcher. Participants will be informed via the information sheet prior to taking part about exposure to potentially distressing images. The information sheet will state:</p> <p>"You may find some of the pictures presented uncomfortable or distressing. If you would not like to continue, you can withdraw from participating in the study at any time for this or another reason."</p> <p>Participants will be debriefed and shown positive images at the end of the study, as has been done in previous replications of this experiment.</p>
7	<p>Other information (provide any other information which you believe should be taken into account during ethical review of the proposed changes)</p>
	<p>Declaration (to be signed by the Principal Researcher)</p> <ul style="list-style-type: none">• I confirm that the information in this form is accurate to the best of my knowledge and I take full responsibility for it.• I consider that it would be reasonable for the proposed amendments to be implemented. <p></p> <p>Signature:</p> <p>Date: 8th January 2018</p>

Appendix II

Information Sheet

Consent form



You will be given a copy of this information sheet

Title of Project: **Individual differences in relational style and social scene processing**

This study has been approved by the Research Department of Clinical, Educational and Health Psychology Ethics Chair

Project ID Number: CEHP/2014/519

Researcher: Lawrence Yong, University College London, 1-19 Torrington Place, London WC1E 7HB, [REDACTED]

Principle Investigator: Vyv Huddy, University College London, 1-19 Torrington Place, London WC1E 7HB, [REDACTED]

We would like to invite you to participate in this research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, please read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or you would like more information.

What is this research about? The purpose of this research is to investigate how relational style can affect how individuals attend to and process social scenes. We are interested in the impact of individual differences on these processes and their underlying mechanisms.

What will I have to do? This is a two-part study, with participation occurring on two consecutive days. Part one of the experiment involves asking you to pay attention to various pictures and hear sounds. You will also be asked to complete some questionnaires that ask about mood, personality and relationships. Part two of the experiment takes place 24 hours later and asks you to take part in a computer-based attention task.

Are there any risks or possibility of discomfort? The risks involved in participating are minimal. If there are questions that you find distressing or intrusive, you are free to not answer those questions or to withdraw from participating. Some of the pictures presented to you may be upsetting or distressing. If you find yourself becoming distressed during the study, you can choose to stop at any time or withdraw from the study altogether. You can also talk to the researcher during participation or afterwards with the researcher or research programme principle investigator VH, a qualified clinical psychologist. If you are distressed or upset as a result of participation, the researcher will be able to provide information for accessing resources or services which you may find helpful.

How will we maintain your privacy and confidentiality? You will be asked to give some demographic information, such as your age and ethnicity. All information will be stored anonymously and only the researchers involved in the study will have access or process the data. Some of your responses could be audio recorded and transcribed at a later date by the researcher conducting the study. Participation cannot take place without your agreement. All data will be collected and stored in accordance with the Data Protection Act 1998. If you choose to withdraw from the study you have the option of also requesting that all data be deleted.

When and where will the study take place? The study will take place at a time convenient to you. Part one of the study should take between half an hour to one hour. Part two of the study should take approximately one hour.

What I have questions about the project? If you have any questions or require more information about this study, please contact the principle investigator using the contact details above.

If you feel you require any additional support or participation has harmed you in any way, you can contact the principle investigator using the details above for further advice and information.



Informed Consent Form for Participants in Research Studies

(This form is to be completed independently by the participant after reading the Information Sheet and/or having listened to an explanation about the research.)

Title of Project: Individual differences in relational style and social scene processing	
This study has been approved by the Research Department of Clinical, Educational and Health Psychology Ethics Chair	
Project ID Number: CEHP/2014/519	—
Participant's Statement	
I	
agree that I have	
<ul style="list-style-type: none">▪ read the information sheet and/or the project has been explained to me orally;▪ had the opportunity to ask questions and discuss the study; and▪ received satisfactory answers to all my questions or have been advised of an individual to contact for answers to pertinent questions about the research and my rights as a participant and whom to contact in the event of a research-related injury.▪ I am aware some of my responses could be audio recorded and I consent to the recording.▪ I understand that if I am being paid for my assistance in this research, some of my personal details will be passed to UCL Finance for administration purposes.	
I understand that I am free to withdraw from the study without penalty if I so wish, and I consent to the processing of my personal information for the purposes of this study only and that it will not be used for any other purpose. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.	
Signed:	Date:
Investigator's Statement	
I	
confirm that I have carefully explained the purpose of the study to the participant and outlined any reasonably foreseeable risks or benefits (where applicable).	
Signed:	Date:

Appendix III

Relationship Scales Questionnaire (RSQ)

RSQ

Please read each of the following statements and rate the extent to which you believe each statement best describes your feelings about close relationships.

	Not at all like me	2	Somewhat like me	4	Very much like me
1. I find it difficult to depend on other people.	1	2	3	4	5
2. It is very important to me to feel independent.	1	2	3	4	5
3. I find it easy to get emotionally close to others.	1	2	3	4	5
4. I want to merge completely with another person.	1	2	3	4	5
5. I worry that I will be hurt if I allow myself to become too close to others.	1	2	3	4	5
6. I am comfortable without close emotional relationships.	1	2	3	4	5
7. I am not sure that I can always depend on others to be there when I need them.	1	2	3	4	5
8. I want to be completely emotionally intimate with others.	1	2	3	4	5
9. I worry about being alone.	1	2	3	4	5
10. I am comfortable depending on other people.	1	2	3	4	5
11. I often worry that romantic partners don't really love me.	1	2	3	4	5
12. I find it difficult to trust others completely.	1	2	3	4	5
13. I worry about others getting too close to me.	1	2	3	4	5
14. I want emotionally close relationships.	1	2	3	4	5
15. I am comfortable having other people depend on me.	1	2	3	4	5
16. I worry that others don't value me as much as I value them.	1	2	3	4	5
17. People are never there when you need them.	1	2	3	4	5
18. My desire to merge completely sometimes scares people away.	1	2	3	4	5
19. It is very important to me to feel self-sufficient.	1	2	3	4	5

	Not at all like me		Somewhat like me		Very much like me
20. I am nervous when anyone gets too close to me.	1	2	3	4	5
21. I often worry that romantic partners won't want to stay with me.	1	2	3	4	5
22. I prefer not to have other people depend on me.	1	2	3	4	5
23. I worry about being abandoned.	1	2	3	4	5
24. I am somewhat uncomfortable being close to others.	1	2	3	4	5
25. I find that others are reluctant to get as close as I would like.	1	2	3	4	5
26. I prefer not to depend on others.	1	2	3	4	5
27. I know that others will be there when I need them.	1	2	3	4	5
28. I worry about having others not accept me.	1	2	3	4	5
29. Romantic partners often want me to be closer than I feel comfortable being.	1	2	3	4	5
30. I find it relatively easy to get close to others.	1	2	3	4	5