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# Can an experimental self-efficacy induction through autobiographical recall modulate analogue posttraumatic intrusions?

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ABSTRACT

*Background and objectives:* Research has shown a link between self-efficacy appraisals and PTSD symptoms. Less is known about the relation between perceived self-efficacy and specific PTSD symptoms such as intrusions. These two experiments tested the causal relationship between perceived self-efficacy and intrusions from a trauma film.
*Methods:* In Experiment I, healthy student participants received a self-efficacy manipulation consisting of the recall of autobiographical memories of success (high self-efficacy condition), failure (low self-efficacy condition) or 'important' memories (control condition). Afterwards, they viewed a trauma film and recorded their intrusions of the film in the following week. In Experiment II the self-efficacy manipulation was given after the film.
*Results:* In contrast to expectations, the high self-efficacy condition reported a higher number of intrusions relative to the low self-efficacy condition in both experiments.
*Limitations:* The trauma film provides experimental control but precludes generalization to real-life trauma. The effect of the experimental manipulation was small. The control condition also affected mood and confidence.
*Conclusions:* The results suggest that the relation between self-efficacy and intrusions development is causal, but not straightforward. Recalling personal memories of success before or after a traumatic event may increase the risk of developing intrusions, at least under some circumstances. Conversely, recalling past failure experiences may be protective, perhaps by preparing the individual for adversity, or prompting them to search for coping strategies that have been successful in the past. Overall, autobiographical recall involves complex processes related to the self that could be useful but need to be more fully understood.



## 1. Introduction

The way in which an individual interprets and appraises a traumatic event plays a key role in their adjustment to the event and their subsequent mental health outcomes. Experiencing a traumatic event can have a negative impact upon an individual's beliefs about the world being safe and predictable, as well as beliefs about the extent to which they are a capable person (e.g. Dalgleish, 2004; Ehlers & Clark, 2000; Foa & Riggs, 1993; Horowitz, 1997; Janoff-Bulman, 1992). Indeed, cognitive models of PTSD have proposed that negative appraisals, in part, underlie the pathogenesis of the PTSD (Ehlers & Clark, 2000; Foa & Riggs, 1993; Foa & Rothbaum, 1998; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). For example, there is evidence that the presence of maladaptive self-appraisals prior to trauma exposure increases the likelihood of PTSD onset subsequent to a traumatic event (Bryant & Guthrie, 2007). Maladaptive appraisals also appear to have an impact on the course of PTSD. Specifically, longitudinal studies have shown that maladaptive appraisals of perceived threat were associated with PTSD symptoms at 1, 6, and 12 months after the trauma

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(Dougall, Ursano, Posluszny, Fullerton, & Baum, 2001), and there is further evidence that appraisals predict symptoms after 3 years post-trauma (Mayou, Ehlers, & Bryant, 2002). Furthermore, treatment studies have shown that negative self-appraisals are modifiable and that changes in negative self-appraisals are associated with a reduction in PTSD symptoms (Kleim et al., 2013).

One type of self-appraisal that has been linked with vulnerability to traumatic stress is the extent to which an individual believes in his or her ability to cope with adversity, referred to as 'self-efficacy'. According to self-efficacy theory (Bandura, 1977), individuals construct self-appraisals of capability that are critical to the goals they pursue and to the agency they employ over their environments, thoughts, emotions, and actions. Importantly, Bandura (1997) proposed that behavior is often better predicted by self-efficacy beliefs rather than what a person is actually capable of accomplishing. A robust body of research has demonstrated that perceptions of self-efficacy have an impact upon a range of cognitive, affective, and clinical outcomes. For example, there is evidence that individuals with higher levels of perceived self-efficacy react with less physiological arousal and distress to a range of stressors than do individuals who have a lower sense of control. Such stressors include dental surgery (Litt, Nye, & Schafer, 1993), panic attacks (Sanderson, Rapee, & Barlow, 1989), post-partum depression (Cutrona & Troutman, 1986), and self-health assessments (Cheever & Hardin, 1999).

Levels of perceived self-efficacy also appear to affect reactions to traumatic experiences (for a review see Benight & Bandura, 2004). For example, a survey of people working in a municipal after-school program in New York City revealed that both higher threat appraisal and reduced self-efficacy were correlated with PTSD symptom severity after the 9/11 terrorist attack (Piotrkowski & Brannen, 2002). In samples of both female child sexual abuse victims and motor vehicle accident survivors, perceived self-efficacy mediated the relation between negative cognitions about the self and the world and posttraumatic stress symptoms (Cieslak, Benight, & Lehman, 2008). Longitudinal studies have shown that levels of perceived self-efficacy after a traumatic event predicted lower levels of symptoms over four years (Bosmans & Van der Velden, 2015).

Despite this body of evidence demonstrating that perceived self-efficacy is associated with lower levels of PTSD, little is known about the relationship between perceived self-efficacy and specific PTSD symptoms. However, cognitive theories and the findings of experimental research suggest that perceived self-efficacy may directly reduce the onset of intrusive and unwanted memories, the hallmark symptom of PTSD (American Psychiatric Association, 2013). For example, Ehlers and Clark (2000) posit that maladaptive self-appraisals increase the accessibility of distressing trauma-related memories. In contrast, they posit that positive self-appraisals, such as those which reflect a sense of mastery and control over adversity, should reduce a sense of current threat and thus reduce the activation of trauma memories. Additionally, this model also proposes that an individual's level of perceived self-efficacy before and during a traumatic event will also influence the likelihood of them experiencing intrusive memories (Ehlers & Clark, 2000).

According to this account, the likelihood of intrusions developing after a traumatic event is dependent in part upon the level of stress that an individual experiences during the encoding of the trauma memory, as well as the way in which they appraise the traumatic event. Specifically, Ehlers and Clark (2000) propose that higher arousal results in more 'data-driven' processing of information, resulting in a trauma memory that is high in perceptual detail but low on conceptual integration within autobiographical memory database. This increases the likelihood of the memory being activated automatically; i.e., the experience of an intrusion (Ehlers & Clark, 2000; see also; Brewin, Gregory, Lipton, & Burgess, 2010). Thus, according to this account, an individual's pre-trauma level of self-efficacy may be an important determinant in the emergence of intrusions following a traumatic event.

Moreover, exposure to a traumatic event may also have an impact on one's perceived self-efficacy; e.g., leading the person to believe that s/he is not a capable person. Such a response has the potential to pose a threat to an otherwise generally stable view of oneself and one's environment, and may thereby lead to a disorganization in the autobiographical knowledge base on which these views are based. Such disorganization in memory could potentially result in more cue-driven recall as a top-down regulation of memory recall has become more difficult, which would result in more intrusions (Conway & Pleydell-Pearce, 2000; Conway, 2005; Ehlers & Clark, 2000). It follows then that if an individual is able to maintain a high level of self-efficacy after a traumatic event then this may serve as a buffer and thus result in fewer subsequent intrusions.

In an experimental study using cognitive bias modification (CBM), Woud, Holmes, Postma, Dalgleish, and Mackintosh (2012) investigated the causal effect of negative appraisals (including self-efficacy type appraisals) on intrusion development. Healthy student participants were trained to adopt either a positive appraisal style (e.g., 'in a crisis, I predict my responses will be helpful') or a negative appraisal style (e.g., 'In a crisis, I predict my responses will be useless') by completing appraisal related sentences systematically in either a positive (e.g. 'helpful') or negative way (e.g., 'useless'). After the CBM appraisal training participants were shown a film with distressing content, which included footage of terrorist attacks and traffic accidents (see Woud et al., 2012 for details). Participants monitored their intrusions of the film over the following seven days. Those in the positive appraisal training condition reported fewer intrusions than participants in the negative appraisal condition. In a follow-up experiment participants completed the appraisal training after viewing the trauma film rather than preceding it (Woud, Postma, Holmes, & Mackintosh, 2013). Although participants in the two conditions did not differ in the number of self-reported intrusions, the level of distress associated with the intrusions was lower for those in the positive appraisal training condition. These studies showed that self-appraisals have a causal effect on the development of intrusions of an analogue traumatic experience as well as intrusion-related distress. Although the training included sentences that could be considered related to self-efficacy, we note that the study did not focus on self-efficacy appraisals specifically or exclusively.

One study has been reported in which the investigators specifically targeted self-efficacy (Brown, Joscelyne, Dorfman, Marmar, & Bryant, 2012). Healthy student participants were led to believe that they belonged to the top 1% of 'copers' (high self-efficacy group) or the lower 30 percentile of 'copers' (low self-efficacy group) based on false feedback from a questionnaire on coping skills that they had completed earlier in the academic year. After receiving this false feedback, participants were presented with a trauma film that depicted the aftermath of a motor vehicle accident. Participants who were led to believe that they possessed high levels of self-efficacy reported fewer intrusions immediately and 24 h after watching the film compared to those that were led to believe that they had low levels of self-efficacy. These findings suggest that there is a causal relationship between self-efficacy and intrusions of analogue trauma. However, a limitation of the study was that intrusions were only assessed over a 24 h period, and furthermore, the number of intrusions were assessed retrospectively, based on estimations from the participant. Also, the experimental manipulation may have induced socially desirable responses inasmuch as

the participants may have felt that they were required to respond to the task in a manner that was consistent with the feedback that they had been given.

Building on these findings, in the two experiments reported in this paper we aimed to further examine the causal effect of self-efficacy on the development of intrusions of a trauma film. The self-efficacy manipulation involved autobiographical recall, based on the assumption that autobiographical recall can activate self-schemata. Specifically, according to the Self-Memory System model of autobiographical memory (SMS; Conway & Pleydell-Pearce, 2000), our view of ourselves as a person, or our self-schema, is based on an autobiographical knowledge base that contains information from relevant autobiographical memories. For example, a self-schema of being a self-efficacious person would be linked to memories of achievements of success, whereas a self-schema of being a failure would be linked to memories of failure. A similar link between self-schema and autobiographical memory retrieval has been proposed in cognitive theories of psychopathology (e.g., Beck & Haigh, 2014), and also has received empirical support. For example, Çili and Stopa (2015) recently demonstrated that participants reported higher self-esteem and more achievement related goals after recalling positive self-defining memories (i.e., autobiographical memories that are emotional and important for the identity of the individual) as opposed to following the recall of negative self-defining memories. Moreover, Brown et al. (2016) recently demonstrated that recalling memories of self-efficacy led to improvement on cognitive and decision making tasks. That is, combat veterans with and without PTSD performed better on social decision making tasks and imagined future events in more adaptive ways after they recalled three self-efficacy related autobiographical memories.

In Experiment I, we tested whether self-efficacy has a causal effect on intrusions of an analogue traumatic stressor (trauma film). In order to do so, participants were randomly assigned to a high self-efficacy condition, a low self-efficacy condition, or a self-efficacy unrelated control condition prior to viewing a trauma film. The high self-efficacy condition was included to induce self-efficacy, while the low self-efficacy condition was included to reduce self-efficacy and to maximize the visibility of any causal effects. The control condition was included in order to facilitate interpretations of any relative differences that emerged between participants in the high and low self-efficacy conditions. To induce high self-efficacy, participants were asked to recall three specific autobiographical memories of times when they were successful at something important to them. To reduce self-efficacy, in the low self-efficacy condition participants were asked to recall three specific autobiographical memories of times when they failed at something important to them. Participants in the control condition were instructed to recall 'important' autobiographical memories without any further specification. After recall, participants viewed the trauma film of a motor vehicle accident used by Brown et al. (2012). They reported their intrusions of the film in an event-related diary that they completed over one week, and at one-week follow-up with a validated questionnaire and an online assessment of memory accessibility.

In Experiment II, the order of the manipulation and trauma film was reversed such that participants completed the self-efficacy manipulation following viewing of the trauma film. For both experiments we predicted that participants in the high self-efficacy condition would report fewer intrusions of the film than participants in the low self-efficacy condition and the control condition, and that participants in the low self-efficacy condition would report the highest number of intrusions across the three conditions.

## 2. Experiment I

### 2.1. Material and methods

#### 2.1.1. Participants

Participants were recruited from the Sydney community with flyers posted on noticeboards on The University of New South Wales (UNSW) campus, and via online advertisements on a local trading website and the UNSW careers website. The advertisements stated that a film would be shown that could be experienced as distressing and that participants with past or present psychological difficulties were not eligible to take part. For ethical reasons, participants were also extensively screened for the following exclusion criteria before the start of the experiment: posttraumatic stress disorder (lifetime or current), major depressive episode (lifetime or current), psychotic episode (lifetime or current), panic attacks or panic disorder (current), current intoxication, history of fainting and blood phobia. Ethical approval for this study was obtained from the Human Research Ethics Advisory Panel C (HREAP Approval No: 123-165 – Behavioural Sciences) at UNSW. Participants were paid $30 after completion of the study.

In total, 137 individuals expressed interest in participating in the study. One person was excluded because their responses to the screening measures indicated that they experienced blood phobia, and another was excluded because of insufficient English language skills. Five participants did not return for the second session. Data from 14 participants was not recorded due to a technical problem. Two participants terminated the study preliminarily. The final dataset included 113 participants (high self-efficacy condition: $n = 37$; low self-efficacy condition: $n = 39$; control condition: $n = 37$), including 66 women and 47 men, aged $M = 23.84$, $SD = 4.94$, range 18–48 years old. Of these participants, 34 were Australian, 63 Asian (predominantly Indian and Malaysian), 12 European, 2 South American, 1 African, and 2 reported 'mixed' for their nationality.

#### 2.1.2. Materials

*2.1.2.1. Individual differences.* Trait anxiety was measured with the State-Trait Anxiety Inventory (STAI-T; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). This self-report questionnaire contains 20 items about general anxiety that are rated on a scale from 1 ('almost never') to 4 ('almost always'). Internal consistency (0.86-0.95) and test-retest reliability (0.65-0.75) are good (Spielberger et al., 1983)

Depressive symptoms over the past two weeks were measured with the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). This self-report questionnaire contains 21 items that are rated on a scale from 0 to 3 with higher scores reflecting higher levels of depression. Internal consistency (0.91) and test-retest reliability (0.93) are good (Beck, Steer, Ball, & Ranieri, 1996).

Self-discrepancy was assessed with a computerized version of the Self-Strength Guide (Higgins, Shah, & Friedman, 1997; Holmes, Lang, & Shah, 2009). Participants were asked to provide five attributes that described characteristics that they would ideally like to have and five attributes that they felt they ought to have. For each attribute participants rated the extent to which they would ideally like to (Ideal Self) and believed they should possess that attribute (Ought Self) and the extent to which they believed that they already possessed it (Actual Self score) on a scale from 1 ('slightly') to 4 ('extremely'). For each participant an Ideal-Actual self-discrepancy score was calculated by subtracting the Actual Self scores from the Ideal Self scores. An Ought-Actual self-discrepancy score was calculated by subtracting the Actual Self scores from the Ought Self scores. For the self-discrepancy scores absolute values were used in the analyses.

General self-efficacy was measured with the Generalized Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995). This is a 10 item self-report questionnaire for which participants rate their answers on a 1 ('not at all true') to 4 ('exactly true') scale. The authors of the scale recommend interspersing the GSE items within a larger pool of items to avoid demand effects. For this reason, seven of their recommended filler items were included (e.g., 'I enjoy watching or practicing extreme sports') as well as the six items of the social self-efficacy subscale of the Self-Efficacy Scale (Sherer et al., 1982). The filler items were not included in the analysis. Internal consistency (0.75-0.91) and test-retest reliability (0.55-0.75) of the GSE are good to adequate (Scholz, Gutiérrez Doña, Sud, & Schwarzer, 2002).

*2.1.2.2. Self-efficacy manipulation.* Participants were asked to write a detailed description of three specific memories from their lives, starting with a memory from when they were young, and proceeding (in chronological order) to memories from when they were older. Participants in the high self-efficacy condition (HSE) were asked to recall three specific memories of times that they were successful, and when they had succeeded in doing something that was very important. Participants in the low self-efficacy condition (LSE) were asked to recall three specific memories of times when they were a failure and had failed at something that was very important. Participants in the control condition were asked to recall three important memories from their lives without any indication of whether these should be of success or failure experiences.

For each memory participants indicated when the event took place on a sliding scale from birth (0) to the present (100). Participants in the HSE condition indicated how successful they were in each memory on a scale from 0 ('not at all') to 10 ('very'). Participants in the LSE condition indicated how badly they had failed in each memory on a scale from 0 ('not at all') to 10 ('very'). Participants in the control condition indicated how important each memory was on a scale from 0 ('not at all') to 10 ('very'). Participants rated the valence of each memory on a scale from −5 ('very negative') to +5 ('very positive'). As a manipulation check, participants were asked "*Based on these experiences, how do you cope with situations in your life?*" to indicate how well they believed that they generally coped with important situations in their life based on the memories that they had just recalled, on a scale from 0 ('poorly') to 10 ('very well').

*2.1.2.3. Distressing film.* A 10 min film showing real-life footage of the aftermath of a severe road traffic accident in the USA was used to induce temporary stress symptoms (Brown et al., 2012; Small, Kenny, & Bryant, 2011).

*2.1.2.4. Manipulation checks.* Negative mood state was measured with five single-item VAS scales that measured current happiness, anxiety, horror, depressed mood, and anger, which participants rated on a scale from 0 ('not at all') to 10 ('extremely') (MoodQ; e.g., Davies & Clark, 1998; Holmes, Brewin, & Hennessy, 2004). Self-confidence was measured with a single-item VAS scale which participants rated from 0 ('not at all confident') to 10 ('extremely confident'). Attention for the film was measured on a single-item VAS scale which participants rated from 0 ('none at all') to 10 ('total attention').

*2.1.2.5. Intrusive memories.* Intrusive memories of the film were measured with three different measures (Krans, Näring, Holmes, & Becker, 2010). First, participants were provided with a one-week paper-and-pencil diary to record any spontaneously occurring intrusive memories of the film (e.g., Holmes et al., 2004). The diary contained space to provide a brief description of each intrusive memory, whether it was an image, thought or both, and ratings of the level of distress, vividness and detail for each entry on a scale from 0 ('not at all') to 10 ('extremely'). Intrusive memories of the film were defined on the front page as spontaneously occurring memories rather than times when the participant deliberately thought about the film. Participants were encouraged to record an intrusive memory in the diary as soon as it occurred and to check the diary at a fixed time each day to check for any omissions. Only intrusions that were visual images were analyzed, consistent with the approach taken in previous research (Hagenaars, Brewin, Van Minnen, Holmes, & Hoogduin, 2010).

At follow-up, seven days after film viewing, 'online' accessibility of the memory for the film was tested with an intrusion provocation task (Krans et al., 2010; Lang, Holmes, & Moulds, 2009). Participants were presented with eight neutral still frames from the film (i.e., that did not contain blood, injuries, emotional faces, car wrecks, etc.). These pictures were presented one by one for four seconds each. Then, participants monitored their thoughts with their eyes closed for two minutes and pressed a button each time they had an intrusive memory of the film. After the two minutes was over a beep sound played through the headphones to indicate that the time was over.

Third, frequency of intrusive memories and avoidance related to the film was measured with the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979). The Intrusion subscale includes seven items with good internal consistency (0.86) and test-retest reliability (0.89) (Sundin & Horowitz, 2002). The Avoidance subscale included eight items with good internal consistency (0.82) and test-retest reliability (0.79) (Sundin & Horowitz, 2002). Items are rated on a scale from 0 ('not at all'), 1 ('rarely'), 3 ('sometimes') to 5 ('often'), and were adapted to specifically refer to the film instead of a traumatic event in general (e.g., 'I tried not to talk about the film').

*2.1.2.6. Voluntary memory.* Voluntary memory of aspects of the film was assessed with a cued-recall questionnaire (Brown et al., 2012; Small et al., 2011). The questionnaire included 21 open-ended questions such as '*What colour was the upturned car?*'

*2.1.2.7. Control measures.* To assess compliance with the diary instructions, participants were asked to rate how true the following statement was: '*I have often been unable (or have forgotten) to record my intrusive memories in the diary*' on a scale from 0 ('not at all true') to 10 ('extremely true of me') (Davies & Clark, 1998; Holmes et al., 2004). To account for self-continuity, participants rated the extent to which they thought they were still the same person as they were in the three memories they had recalled during the experimental manipulation on a scale from 1 ('exactly the same person') to 10 ('a completely different person').

Participants were asked in an open-ended question what they considered to be the goal of the study. Based on their responses, participants were categorized into one of two groups – i.e., those who mentioned intrusion modulation, and those who did not. After the open-ended question, participants were asked whether they expected that the memory recall task would result in more, fewer, or would not affect the number of intrusive memories of the film that they experienced.

### *2.1.3. Procedure*

Participants read and signed an Information Statement/Consent Form that informed them about the potentially distressing nature of the film used in the study, and advised them that they could terminate the study at any moment without consequences. Participants were then screened for exclusion criteria. Eligible participants proceeded with the study. All participants were tested

individually and the experimenter left the testing cubicle while the participant completed the study tasks. All measures, unless otherwise stated, were presented using Inquisit software version 4.0.2 on a PC with a 24 inch monitor. Participants wore headphones throughout the experiment to cancel out any distracting sounds and so that they were able to listen to the film audio without any disturbance.

Participants first completed a demographic questionnaire, followed by the STAI-T, BDI-II, self-discrepancy measure, and the GSE. A paper version of the MoodQ was then completed, which the experimenter scored in a different room. Participants were randomly allocated to one of three experimental conditions (HSE, LSE, control). Before memory recall, participants were asked to rate their self-confidence. After each memory they immediately rated when the event happened, how successful/how badly they failed/how important the memory was according to their allocated condition (compliance score), and the valence of the memory. After recalling all three memories, participants rated how well they coped with important situations in their life based on these memories, and then completed the second self-confidence rating.

In order to ensure that the experimental effects were not simply due to mood effects, the experimenter provided a second MoodQ after the experimental manipulation. The experimenter calculated the score and compared this to the first MoodQ. If a participant's second MoodQ score differed by five or more points from the first MoodQ, a simple word search puzzle with the theme 'fruit' was given to the participant to complete in order to restore their mood to baseline level. When the participant had completed the puzzle, the MoodQ was completed a third time. This score was then compared to the first MoodQ score. In the event that a participant's third MoodQ score was five or more points different from their first MoodQ score, a second word search puzzle, with the theme 'Australian animals', was provided. In such cases a fourth MoodQ was administered, but the score was not checked, and the experiment was continued. Eight participants required the first puzzle, and three of them required the second puzzle.

Next, the film was presented. Participants were instructed to focus all of their attention on the film, and not look away or disengage from the film in any way. After the film, the MoodQ and attention rating for the film were administered. Participants were then instructed about how to use the diary and the date and time of the second session was confirmed. Participants returned to the lab exactly 7 days later, at the same time of day. In the second session, participants completed the intrusion provocation task, the IES, diary compliance rating, the cued-recall questionnaire, self-continuity item, and the demand questions. Finally, participants were debriefed, thanked, and paid.

## 2.2. Results

### 2.2.1. Statistical approach

The data were checked for multivariate outliers using Mahalanobis distances (Tabachnick & Fidell, 1996); none were detected. The provocation task and the diary intrusions were checked for univariate outliers within each condition using visual inspection with boxplots and a cut off score of 2.5 *SD* from the mean. There were two univariate outliers in the diary intrusions, and six univariate outliers in the intrusion provocation task. These scores were changed into one unit smaller than the most extreme score that was not yet an outlier (Tabachnick & Fidell, 1996). See Table 1 for

**Table 1**
Descriptive statistics for individual differences and baseline mood, experimental manipulation measures, film-related measures, intrusion measures, and other control measures from Experiment I.

| | HSE condition M (SD) | LSE condition M (SD) | Control condition M (SD) |
|---|---|---|---|
| *Individual differences and baseline mood* | | | |
| Age | 24.59 (4.93) | 23.28 (3.63) | 23.68 (6.05) |
| STAI-T | 35.00 (8.60) | 36.64 (7.08) | 33.59 (6.28) |
| BDI-II | 4.73 (5.24) | 5.23 (6.09) | 3.38 (3.27) |
| Ideal-Actual self-discrepancy | 6.32 (2.48) | 6.51 (2.75) | 6.32 (2.60) |
| Ought-Actual self-discrepancy | 5.51 (2.69) | 6.05 (2.60) | 5.62 (2.80) |
| GSE | 32.14 (3.37) | 30.64 (4.59) | 30.95 (3.96) |
| Baseline MoodQ | 5.62 (4.40) | 6.10 (4.73) | 6.00 (6.21) |
| *Experimental manipulation* | | | |
| Average memory age | 66.59 (14.70) | 65.81 (15.12) | 70.29 (15.83) |
| Average memory compliance[a] | 6.86 (1.13) | 6.65 (1.65) | 8.57 (0.96) |
| Average memory valence | 4.23 (1.01) | −1.89 (1.89) | 3.03 (2.00) |
| Post-recall Coping rating | 8.22 (1.36) | 6.28 (2.44) | 8.11 (1.73) |
| Self-confidence pre-recall | 7.57 (1.66) | 7.46 (2.13) | 7.51 (1.76) |
| Self-confidence post-recall | 8.00 (1.89) | 6.62 (2.93) | 7.97 (1.76) |
| *Film measures* | | | |
| MoodQ pre-film | 3.68 (3.49) | 6.74 (5.30) | 5.54 (5.99) |
| MoodQ post-film | 22.24 (9.02) | 23.03 (9.38) | 26.11 (9.17) |
| Attention rating | 8.92 (1.30) | 9.15 (0.96) | 9.16 (1.04) |
| *Intrusion measures* | | | |
| Diary intrusions – frequency | 3.76 (3.22) | 2.64 (2.17) | 2.92 (2.51) |
| Diary intrusions – distress | 3.68 (2.33) | 3.79 (2.61) | 3.38 (2.79) |
| Diary intrusions – vividness | 4.96 (2.82) | 4.57 (2.89) | 5.04 (2.94) |
| Diary intrusions – details | 4.64 (2.79) | 4.14 (2.72) | 4.63 (2.91) |
| Provocation task intrusions | 7.81 (7.74) | 7.23 (6.86) | 6.78 (6.13) |
| IES intrusions | 7.73 (6.16) | 8.00 (6.21) | 7.08 (6.08) |
| IES avoidance | 10.14 (7.57) | 12.54 (9.74) | 7.73 (6.88) |
| *Control measures* | | | |
| Diary compliance | 1.62 (1.71) | 2.18 (2.35) | 1.35 (1.90) |
| Voluntary memory of the film | 8.84 (2.47) | 8.82 (2.54) | 8.92 (2.13) |
| Self-continuity rating | 3.41 (2.49) | 2.74 (2.07) | 2.92 (2.27) |

[a] Level of success/failure/importance for the HSE, LSE, and control condition respectively.

descriptive statistics from Experiment I.

*2.2.2. Randomization check*

The experimental conditions were comparable on all demographic variables and baseline measures (trait anxiety, depression, self-discrepancies, self-efficacy, and negative mood), all $p > 20$.

*2.2.3. Task compliance*

*2.2.3.1. Experimental manipulation.* There was a significant difference between the conditions in the extent to which the memories that participants recalled on average reflected success/failure/importance, $F(2, 110) = 30.11$, $p < 0.001$. That is, participants in the LSE condition rated their memories as reflecting failure to a significantly lesser extent than participants in the HSE condition rated their memories as reflecting success, $p < 0.001$, or importance in the control condition, $p < 0.001$. There was no significant difference between the HSE and control conditions, $p = 0.72$. However, based on the means it can be concluded that the manipulation resulted in memories that complied with the experimental instruction.

As expected, there was a significant difference in valence of the recalled memories between the conditions, $F(2, 110) = 139.46$, $p < 0.001$. Memories in the HSE condition and control condition were rated as positive, whereas those in the LSE condition were rated as negative, all $p < 0.01$.

There was no significant difference in the average age of the memories recalled by participants across the three experimental conditions, $F(2, 110) = 0.93$, $p = 0.40$.

*2.2.3.2. Film, diary, and social desirability.* There was a significant increase in negative mood from pre-to post-film across conditions, $F(1, 110) = 375.25$, $p < 0.001$. There was no significant main effect of condition and no time × condition interaction, both $p > 0.07$. There was no significant difference between the three conditions in the amount of attention for the film or diary compliance, both $p > 0.18$. Diary compliance was good overall, $M = 1.73$, $SD = 2.02$ (reversed score). There was no difference between the conditions in self-continuity, $F(2, 110) = 0.85$, $p = 0.43$, indicating that participants in all conditions still identified with the recalled memories to a similar extent.

ANOVAs showed that there were no significant differences between participants who mentioned intrusion modulation as the perceived goal of the study ($n = 23$) and the number of intrusions on the provocation task, IES, or diary, all $p > 0.68$.

There was no difference between participants who expected that recalling the three memories would result in more, fewer, or not affect their number of intrusions on the number of intrusions in the diary or intrusion provocation task, both $p > 0.26$, but there was a marginally significant difference on the IES intrusion subscale, $F(2, 110) = 3.00$, $p = 0.05$. Participants who expected the memory recall task to result in more intrusions had significantly higher scores than participants who expected fewer intrusions, $p = 0.02$, and marginally significantly higher than those who did not expect a change, $p = 0.07$, with no significant difference between the latter, $p = 0.92$. To account for this difference statistically, this demand question was added as a covariate in the experimental analyses.

*2.2.4. Manipulation check*

*2.2.4.1. Self-confidence.* To test the effect of the manipulation on self-confidence, a mixed-model repeated measures ANOVA was run with Time (pre- and post-manipulation) as the within-subjects factor, Condition (HSE, LSE, control) as the between-subjects factor, and self-confidence scores as the dependent variable. The main effects of Time and Condition were not significant, smallest $p = 0.15$, but there was a significant Time × Condition interaction, $F(2, 110) = 6.35$, $p < 0.01$. Paired sampled $t$-tests within each condition showed that, although the means were in the expected direction, self-confidence ratings did not increase significantly in the HSE condition, $p = 0.20$, but ratings decreased as expected in the LSE condition, $t(38) = 2.45$, $p = 0.02$, and ratings increased in the control condition, $t(36) = 2.39$, $p = 0.02$. Self-confidence ratings after the manipulation differed significantly between the conditions, $F(2, 110) = 4.72$, $p = 0.01$, with pairwise comparisons showing that self-confidence was significantly lower in the LSE condition than in the HSE and control condition, both $p = 0.01$, with no significant difference between the latter, $p = 0.96$.

*2.2.4.2. Coping.* There was a significant difference between the three experimental conditions in their perceived efficacy in coping with life events based on their recalled memories, $F(2, 110) = 12.45$, $p < 0.001$. Pairwise comparisons showed that participants in the LSE condition rated their coping skills as significantly lower than participants in HSE condition, $p < 0.001$, and participants in the control condition, $p < 0.001$. There was no difference in perceived coping between the HSE and control condition, $p = 0.81$.

*2.2.4.3. Negative mood.* The emotional impact of the experimental manipulation was assessed with a mixed-model repeated measures ANOVA, with Time (pre- and post-manipulation) as the within-subjects factor, Condition (HSE, LSE, control) as the between-subjects factor, and MoodQ scores as the dependent variable. There were no main effects of Time or Condition, smallest $p = 0.24$, but there was a significant Time × Condition interaction, $F(2, 110) = 10.32$, $p < 0.001$. Paired sampled $t$-tests within each condition showed that negative mood significantly reduced in the HSE condition, $t(36) = 4.22$, $p < 0.001$, significantly increased in the LSE condition, $t(38) = 2.36$, $p = 0.02$, and did not significantly change in the control condition, $t(36) = 1.49$, $p = 0.15$. Despite our efforts to normalize mood using puzzles after the experimental manipulation, there was a significant group difference before film viewing, $F(2, 110) = 3.55$, $p = 0.03$. Pairwise comparisons showed that negative mood was significantly higher in the LSE condition than the HSE condition, $p = 0.01$, with no significant differences with the control condition, smallest $p = 0.12$. Therefore, the final MoodQ scores before the film were included as a covariate in the experimental analyses.

*2.2.5. Intrusive memories and avoidance*

*2.2.5.1. Diary.* A one-way ANCOVA was run with condition (HSE, LSE, control) as the between-subjects factor, the (visual) intrusions in the diary as the dependent variable, and MoodQ before the film and the demand question as covariate. There was a significant main effect of condition, $F(2, 108) = 3.36$, $p = 0.04$, $f = 0.25$. Unexpectedly, pairwise comparisons indicated a higher number of intrusions in the HSE condition compared to the LSE condition, $p = 0.02$, $d = 0.41$, and the control condition, $p = 0.04$, $d = 0.29$, with no significant difference between the latter, $p = 0.75$.

A MANCOVA with condition (HSE, LSE, control) as the independent variable, average intrusion distress, vividness, and detail as the dependent variables, and MoodQ before the film and the demand question as covariates was run. Only participants with at least one intrusion in the diary were selected for this analysis. There was no main effect of condition on any of the intrusion characteristics, $F(6, 170) = 0.76$, $p = 0.60$.

*2.2.5.2. IES.* A similar ANCOVA was run with the IES intrusion subscale as the dependent variable. There were no significant differences between the conditions, $F(2, 108) = 0.75$, $p = 0.48$. For IES avoidance, there was a significant effect of condition, $F(2,$

108) = 3.36, $p = 0.04$, $f = 0.25$. Pairwise comparisons indicated that avoidance was significantly lower in the control condition than the LSE condition, $p = 0.01$, $d = 0.59$, and marginally significantly lower than the HSE condition, $p = 0.08$, $d = 0.33$, with no significant difference between the two experimental conditions, $p = 0.53$.

*2.2.5.3. Intrusion provocation task.* There was no significant difference in the number of intrusions on the provocation task between the conditions, $F(2, 108) = 0.55$, $p = 0.58$.

### 2.2.6. Voluntary recall

According to a one-way ANOVA, there was no significant difference between the experimental conditions on participants' performance on the cued-recall task for the film, $F(2, 110) = 0.02$, $p = 0.98$.

## 2.3. Discussion

The self-efficacy manipulation was generally successful in inducing significant differences in self-confidence and belief in coping skills between the LSE condition on the one hand, and the HSE and control condition on the other. The lack of differences between the HSE and control condition indicates that recalling 'important' memories has similar effects to recalling memories of success, even though success memories on average were experienced as more positive. The experimental manipulation resulted in mood effects that lingered over time, although these were statistically controlled for. The main finding was that participants in the HSE condition reported a higher number of intrusions in the diary compared to participants in both the LSE condition and control condition. This was the opposite of our hypothesis: we expected the HSE condition to result in fewer intrusions of the trauma film. One possibility is that this was due to the timing of our manipulation. That is, success memories may be in stark contrast to the content of the trauma film, which may have made the film more salient, surprising and unexpected, and as a result may have contradicted the primed schema. This might have resulted in a higher number of intrusive memories of the film.

In order to avoid this possible contrasting effect, in Experiment II the experimental manipulation was administered after the trauma film. In addition, this timing of the experimental manipulation of self-efficacy is more clinically relevant, in that psychological interventions are delivered after a traumatic event has occurred. Given that a traumatic experience may influence cognitions about the self, others, and the world (Foa et al., 1999), recalling memories of success might potentially counteract this negative influence. We therefore expected a lower number of intrusive memories of the film in the HSE condition than the LSE and control condition.

# 3. Experiment II

This study was approved by the UNSW Human Research Ethics Advisory Panel C (HREAP— Approval No. 123-165 - Behavioural Sciences), and the Faculty of Psychology and Educational Sciences of the KU Leuven (G-2014 10 070).

## 3.1. Method

### 3.1.1. Participants

Fourteen participants were recruited from UNSW as described in section 2.1. An additional 60 participants were recruited at the KU Leuven. These were first year psychology students who participated in the study for course credit, and students from other disciplines who participated voluntarily without compensation. The average age of the total sample was $M = 20.66$ years, $SD = 3.58$. In total, 54 females and 20 males participated. Forty-four were psychology students. Fifty-seven were Belgian, two were Dutch, six were Australian, one was Slovakian, and eight participants were of Asian nationality.

### 3.1.2. Materials and procedure

Experiment II was identical to Experiment I with the following exceptions: (1) the experimental manipulation was delivered after film viewing, (2) no distracter puzzles were provided, and (3) testing took place in Dutch and at a different location for the sample recruited at the KU Leuven, although testing conditions were kept as similar as possible.

## 3.2. Results

### 3.2.1. Statistical approach

There were three multivariate outliers which were removed from the dataset. The final dataset contained 25 participants in the HSE condition, 22 participants in the LSE condition, and 24 participants in the control condition. There was one univariate outlier in the number of intrusive memories in the diary, which was changed to one unit below the highest within the 2.5 *SD* range from the mean (Tabachnick & Fidell, 1996). See Table 2 for descriptive statistics from Experiment II.

### 3.2.2. Randomization check

The experimental conditions were comparable on all demographic variables and most baseline variables (trait anxiety, depression, self-efficacy, and negative mood), all $p > 0.21$. However, there was a significant difference in Ideal-Actual self-discrepancy, $F(2, 68) = 3.60$, $p = 0.03$, with pairwise comparisons indicating significantly lower self-discrepancy in the control condition compared to both the HSE and LSE conditions, $p = 0.03$ and $p = 0.02$, respectively. There was a similar but marginally significant difference for Ought-Actual self-discrepancy, $F(2, 68) = 2.94$, $p = 0.06$. Therefore, both self-discrepancy scores were included as covariates in the experimental analysis.

### 3.2.3. Task compliance

*3.2.3.1. Experimental manipulation.* There was a marginally significant difference between conditions in the extent to which participants rated their memory as reflecting success/failure/importance, $F(2, 68) = 2.76$, $p = 0.07$. Pairwise comparisons showed that participants in the HSE condition rated their memories as more successful than participants in the LSE condition rated their memories as reflecting failure, $p = 0.02$. The control condition did not differ significantly from either experimental condition, both $p > 0.12$. However, the means indicate that participants on average recalled memories that were in accordance with their experimental instructions.

As expected, there was a significant between-condition difference in the valence of the memories recalled by participants, $F(2, 68) = 84.27$, $p < 0.001$. Memories were rated as positive by participants in the HSE condition, neutral in the control condition, and negative in the LSE condition, all $p < 0.001$.

There was no significant difference in memory age between the experimental conditions, $F(2, 68) = 2.37$, $p = 0.10$.

*3.2.3.2. Film, diary, and social desirability.* There was a significant increase in negative mood across conditions, $F(1, 68) = 174.87$, $p < 0.001$, but no main effect of condition or interaction effect, both $p > 0.64$. There was a marginally significant difference in the amount of attention that participants paid to the film between conditions, $F(2, 68) = 3.06$, $p = 0.05$. Specifically, participants in the

**Table 2**
Descriptive statistics for individual differences, experimental manipulation measures, film-related measures, intrusion measures, and other control measures from Experiment II.

| | HSE condition M (SD) | LSE condition M (SD) | Control condition M (SD) |
|---|---|---|---|
| *Individual differences* | | | |
| Age | 21.60 (5.12) | 19.73 (2.25) | 20.71 (2.54) |
| STAI-T | 38.12 (9.01) | 36.22 (7.79) | 35.21 (8.04) |
| BDI-II | 6.28 (5.53) | 5.86 (5.81) | 4.08 (4.78) |
| Ideal-Actual self-discrepancy | 6.36 (2.55) | 6.59 (2.89) | 4.83 (1.81) |
| Ought-Actual self-discrepancy | 5.16 (2.73) | 5.59 (2.02) | 4.04 (1.88) |
| GSE | 29.52 (4.45) | 30.55 (4.32) | 31.38 (4.08) |
| *Film measures* | | | |
| MoodQ pre-film | 7.32 (5.02) | 6.82 (5.53) | 7.42 (5.82) |
| MoodQ post-film | 23.08 (10.29) | 21.82 (8.74) | 24.92 (12.32) |
| Attention rating | 8.68 (1.28) | 9.23 (0.97) | 9.38 (0.77) |
| *Experimental manipulation* | | | |
| MoodQ post-manipulation | 11.84 (9.56) | 15.59 (10.12) | 13.38 (10.68) |
| Average memory age | 71.72 (13.16) | 68.71 (8.33) | 64.64 (11.89) |
| Average memory compliance[a] | 8.11 (0.97) | 7.20 (1.67) | 7.81 (1.33) |
| Average memory valence | 3.91 (1.01) | −2.56 (1.29) | 0.57 (2.46) |
| Post-recall Coping rating | 7.60 (0.91) | 6.32 (1.81) | 8.08 (1.50) |
| Self-confidence pre-recall | 4.28 (2.15) | 4.73 (2.49) | 4.29 (2.48) |
| Self-confidence post-recall | 7.16 (1.52) | 6.50 (1.82) | 7.83 (1.61) |
| *Intrusion measures* | | | |
| Diary intrusions – frequency | 3.56 (3.12) | 2.14 (1.64) | 3.46 (2.98) |
| Diary intrusions – distress | 2.91 (2.75) | 3.39 (2.54) | 3.25 (2.26) |
| Diary intrusions – vividness | 5.59 (2.68) | 4.89 (2.28) | 4.36 (2.48) |
| Diary intrusions – details | 5.58 (2.55) | 5.22 (1.78) | 4.88 (2.72) |
| Provocation task intrusions | 10.24 (5.75) | 9.00 (5.85) | 9.13 (4.61) |
| IES intrusions | 9.16 (6.20) | 7.32 (4.88) | 8.21 (5.36) |
| IES avoidance | 7.80 (6.76) | 6.82 (4.08) | 9.67 (6.84) |
| *Control measures* | | | |
| Diary compliance | 1.12 (1.45) | 1.64 (1.81) | 1.89 (2.59) |
| Voluntary memory of the film | 9.00 (2.20) | 9.05 (2.75) | 9.29 (1.99) |
| Self-continuity rating | 2.24 (1.96) | 2.14 (1.58) | 2.46 (2.40) |

[a] Level of success/failure/importance for the HSE, LSE, and control condition respectively.

HSE condition paid significantly less attention to the film than participants in the control condition, $p = 0.02$, and marginally significantly less attention than participants in the LSE condition, $p = 0.08$, with no difference between the latter, $p = 0.63$. Therefore, attention ratings were included as a covariate in the experimental analyses. Diary compliance was comparable between conditions, $F(2, 68) = 0.91$, $p = 0.41$, and overall excellent, $M = 1.54$, $SD = 2.01$ (reversed score). Self-continuity was comparable between conditions, $F(2, 68) = 0.15$, $p = 0.86$.

There were no significant differences on any of the intrusion measures depending on whether or not participants mentioned intrusion modulation as the perceived goal of the study, all $p$s $> 0.13$. There was a significant difference between participants who believed that the experimental manipulation would modulate the number of intrusions from the dairy and those who did not, $F(2, 68) = 3.78$, $p = 0.03$. Pairwise comparisons indicated that participants who expected no effect reported significantly fewer intrusions than participants who expected a fewer intrusions, $p = 0.02$, and marginally significantly fewer than participants who expected more intrusions, $p = 0.09$, with no significant difference between the latter, $p = 0.41$. There was also a significant difference on the provocation task, $F(2, 68) = 3.38$, $p = 0.04$, such that participants who expected an more intrusions reported significantly more intrusions on the provocation task than participants who expected fewer intrusions or no effect, both $p < 0.04$. Finally, there was a marginally significant difference for the IES intrusion subscale, $F(2, 68) = 2.50$, $p = 0.09$. Participants who expected no difference reported marginally significantly fewer intrusions than participants who expected fewer intrusions, $p = 0.06$, with no other significant differences, both $p > 0.16$. Therefore, this demand question was included as a covariate in the experimental analyses.

### 3.2.4. Manipulation check

*3.2.4.1. Self-confidence.* There was a significant overall increase in self-confidence from before to after the memory recall task, $F(1, 68) = 115.70$, $p < 0.001$. There was also a significant Condition × Time interaction, $F(2, 68) = 3.99$, $p = 0.02$. The increase in self-confidence was smaller in the LSE condition than the control condition, $p = 0.01$, and marginally significantly smaller than in the HSE condition, $p = 0.08$, with no significant difference between the latter, $p = 0.28$. Self-confidence after the manipulation significantly differed between conditions, $F(2, 68) = 3.77$, $p = 0.03$, with lower scores in the LSE condition than the control condition, $p = 0.01$, but no other significant differences, both $p > 0.15$.

*3.2.4.2. Coping.* There was a significant difference between conditions in participants' perceived efficacy in coping with life events, $F(2, 68) = 9.16$, $p < 0.001$. Participants in the LSE condition reported lower coping ratings than participants in the HSE and control condition, both $p < 0.01$, with no significant difference between the latter, $p = 0.24$.

*3.2.4.3. Negative mood.* Overall, negative mood decreased during memory recall, $F(1, 68) = 104.53$, $p < 0.001$. There was a significant Time × Condition interaction, $F(2, 68) = 3.20$, $p < 0.05$. Negative mood decreased significantly less in the LSE condition compared to both other conditions, both $p < 0.04$, with no significant difference between the HSE and control condition, $p = 0.90$. There was no

significant difference in negative mood after the manipulation, $F(2, 68) = 0.81$, $p = 0.45$.

*3.2.5. Intrusive memories and avoidance*

*3.2.5.1. Diary.* A one-way ANCOVA was run with condition (HSE, LSE, control) as the between-subjects condition, the (visual) intrusions in the diary as the dependent variable, and self-discrepancy scores, attention ratings, and the demand question as covariates. There was a marginally significant difference in intrusions between the conditions, $F(2, 64) = 2.81$, $p = 0.07$, $f = 0.30$. Participants in the LSE condition reported significantly fewer intrusions than participants in the HSE condition, $p = 0.04$, $d = 0.60$, and marginally significantly fewer intrusions than the control condition, $p = 0.06$, $d = 0.57$, with no significant difference between the HSE and control condition, $p = 0.86$.

A MANCOVA with condition (HSE, LSE, control) as the independent variable, average intrusion distress, vividness, and detail as the dependent variables, and both self-discrepancy scores, attention ratings, and the demand question as covariates was run. Only participants with at least one intrusion in the diary were selected for this analysis. There was no main effect of condition on any of the intrusion characteristics, $F(6, 166) = 0.78$, $p = 0.59$.

*3.2.5.2. IES.* A similar ANCOVA was run with the IES intrusion subscale as the dependent variable. There was no significant differences between the conditions, $F(2, 64) = 1.62$, $p = 0.21$. For IES avoidance, there was also no significant effect of condition, $F(2, 64) = 1.24$, $p = 0.30$.

*3.2.5.3. Intrusion provocation task.* There was no significant difference in the number of intrusions on the provocation task between the conditions, $F(2, 64) = 0.31$, $p = 0.74$.

*3.2.6. Voluntary recall*

There was no significant difference between the experimental conditions on participants' performance on the cued-recall task, $F(2, 64) = 0.16$, $p = 0.86$.

*3.3. Discussion*

Again, contrary to predictions, participants in the HSE condition reported more intrusions in the diary than participants in the LSE condition. Whereas in Experiment I intrusion frequency appeared to be higher in the HSE condition (compared to both the LSE and control conditions), intrusion frequency in Experiment II appeared to be lower in the LSE condition (compared to the HSE and control conditions). Thus, the timing of the experimental manipulation (before or after the trauma film) cannot explain the higher intrusion frequency in the HSE condition in Experiment I. Given that a similar pattern was observed in Experiment II, it appears that priming a high perceived self-efficacy schema does not protect against, and may even promote, the development of intrusive memories after a stressor.

## 4. General discussion

In contrast to our predictions, intrusion frequency (as measured with the diary) was lower in the LSE group than in the HSE group in both experiments. In order to explain these unexpected findings, we have to look more closely into the effects of the recall manipulation in the three experimental conditions.

In Experiment I, the baseline self-confidence ratings and perceived coping rating may reflect 'normal' high values (i.e., something of a ceiling effect) that would be expected in a healthy population in which there is generally a positive bias related to the self (e.g. Mezulis, Abramson, Hyde, & Hankin, 2004; Taylor & Brown, 1988). This could explain why participants in the LSE condition decreased in self-confidence and showed lower perceived coping ratings compared to participants in both the HSE condition and the control group, whereas the HSE and control conditions did not increase in self-confidence and were comparable to each other on self-confidence and perceived coping. In order to explain the differing number of intrusions we turn to the type of memories that were recalled. The main difference between the HSE and LSE condition and the control condition is that in the latter the autobiographical memories recalled were typically not related to self-efficacy. For example, participants in the control condition recalled memories of events that included going to taking communion at church, turning 18, or getting their dog when it was a puppy. Therefore, it is possible that the emotional impact of the trauma film and subsequent intrusions were in high contrast with the HSE manipulation (i.e., thinking about personal successes yet seeing a traumatic event and having intrusions), but that this contrast was less stark for participants in the LSE condition and the control group. This fits with cognitive models of PTSD that suggest that trauma information that is highly conflicting with autobiographical knowledge is more difficult to integrate and therefore remains highly accessible and vulnerable to automatic activation resulting in intrusions (e.g., Conway & Pleydell-Pearce, 2000; Ehlers & Clark, 2000).[1]

In Experiment II, the average pre-recall self-confidence ratings were generally lower than those reported by participants in Experiment I, which is likely to be the result of having just watched the trauma film. However, these low values indicate a kind of floor effect across conditions, which would explain why all three conditions increased in self-confidence after memory recall in Experiment II but not Experiment I. The control group may have simply shown a 'return to baseline' movement in a more general sense regarding self-confidence and coping, whereas participants in the HSE manipulation may have 'repaired' their self-confidence and perceived coping using memories of success experiences. This would explain why the increase in self-confidence was larger for participants in the HSE and control conditions. Notably different from Experiment I is that the memory recall in Experiment II took place directly after film viewing, i.e., in the direct aftermath of an analogue traumatic stressor. It may be that in the context of an acute stressor, thinking about adversity or failure facilitates coping processes that can help deal with the acute stressor in the longer-term. These effects may not immediately translate to large, directly visible changes in self-confidence or coping ratings, but over time may prevent the development of intrusions.

Precisely what kind of mechanisms were at play is impossible to reliably infer from the current experimental design. We offer some suggestions that could be tested in future research. For example, perhaps participants in the LSE conditions did not find the film to be as stressful as they anticipated, and thus, experienced a greater sense of mastery from the experience over time. Furthermore, the induction to recall autobiographical memories of failure may have served as a type of imaginal exposure. Similar to clinical studies, this "exposure induction" may have initially led to a decline in mood but subsequently led to better outcomes. For example, in expressive writing studies in which participants are briefly asked to write about a negative or traumatic event, people often report lower moods immediately after writing but subsequently report better mood than participants in a control condition (positive physical and psychological outcomes (e.g. Pennebaker, Kiecolt-Glaser, & Glaser, 1988). Another possibility is that

[1] We thank an anonymous reviewer for suggesting this possible interpretation.

autobiographical memories of failure may have motivated participants in the LSE condition to work harder to not find the film as distressing as participants in the other conditions. For example, research on defensive pessimism, a cognitive style in which individuals worry about underperforming, has shown that defensive pessimism can be useful for managing anxiety and lead better performance on tasks (Norem & Cantor, 1986; Showers, 1992).

Overall, the effects of our self-efficacy manipulation were not what we expected based on the findings of earlier experimental studies. One important difference is that in the current study the manipulation involved autobiographical recall rather than, e.g., a false feedback procedure (as in Brown et al., 2012). Recalling autobiographical memories triggers many other influences, including complicated and perhaps conflicting self-schemas related to successes and failures in life, or even trauma. Because of this we expected stronger effects than a manipulation that was less personal (such as false feedback), but our results reveal a picture that is far more complex.

The experiments have several limitations. The most obvious is that we used a distressing film as an analogue traumatic event which precludes generalization of the findings to actual trauma. That said, trauma films have been used with success across many studies conducted by a range of researchers, and have reliably induced intrusive memories – confirming the utility of this experimental approach in developing our understanding of traumatic intrusions. Also, the effect of the experimental manipulation on intrusion frequency was rather small, and could only be found for the diary measure and not the IES or provocation task. Future research should therefore focus on finding ways to strengthen the manipulation. For example, in-person delivery (in contrast to computer-based delivery) of the manipulation could possibly be more effective. Future work is thus needed to determine if computer-guided autobiographical recall can be modified to increase self-efficacy in order to investigate whether it leads to a reduction in intrusions. If so, such findings would be similar to the results obtained by Brown et al. (2012) using false feedback, and would also accord with the results of recent work showing that increasing self-efficacy facilitated extinction to a fear conditioning paradigm on measures of skin conductance and self-report measures (Zlomuzica, Preusser, Schneider, & Margraf, 2015). Further, because the results were in the opposite direction to our expectations it was important that we included a neutral control condition. However, participants in the control condition also experienced modulations in mood and self-confidence from memory recall, which makes this more like a third experimental condition of which the effect is unclear. Future studies could consider including a no task control in addition to the current control condition. Another possible limitation is that the samples in Experiment I and Experiment II were rather different (one being from Australia and the other from Belgium), although this could also be regarded as a strength of the study. The fact that the findings were consistent across both experiments suggests that the unexpected results were not attributable to factors associated with ethnicity or geographical location.

In sum, the results of these experiments suggest that the relation between self-efficacy and intrusions development is causal, but not straightforward. Having higher perceived coping before or after a traumatic event may increase the risk of developing intrusions, at least under some circumstances. Conversely, recalling past failure experiences may be protective by preparing individuals for adversity, and/or prompting them to search for coping strategies that have proven effective in the past. Overall, an experimental manipulation using autobiographical recall is likely to involve complex processes related to the self that could be highly useful but need to be more fully understood before applying such techniques clinically.

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