The retrieval of self-defining memories is associated with the activation of specific working selves

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Published online: 17 Feb 2014.

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The retrieval of self-defining memories is associated with the activation of specific working selves

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This article presents two studies that investigated the impact of the retrieval of self-defining memories on individuals' sense of self. Participants recalled positive and/or negative self-defining memories, rated memory characteristics and completed measures focusing on different self-aspects. Study 1 found that participants reported higher state self-esteem after recalling a positive memory than after recalling a negative one. They also reported lower negative self-consistency and higher state self-concept clarity and positive self-consistency, but this result became non-significant after controlling for state self-esteem. Study 2 found that participants reported higher state self-esteem, a marginally higher proportion of recreation/exploration, goals and a marginally lower proportion of achievement goals after recalling a positive memory than after recalling a negative one. They also reported a higher proportion of self-cognitions referring to emotional states after recalling memories from which they had not abstracted meaning than after recalling memories from which they had done this. These findings suggest that the retrieval of vivid, emotional and highly self-relevant memories may be accompanied by the activation of specific self-representations or working selves. They also suggest that the experience of memory-related intrusive images may temporarily influence individuals' sense of self. The implications of these findings for clinical practice are discussed.

Keywords: Self-defining memories; Memory dimensions; Imagery; Self; Goals.

Intrusive mental images are a characteristic of several psychological disorders, including post-traumatic stress disorder (PTSD; Grey & Holmes, 2008; Hackmann, Ehlers, Speckens, & Clark, 2004), depression (Patel et al., 2007; Reynolds & Brewin, 1999), social anxiety (Hackmann, Clark, & McManus, 2000), and health anxiety (Muse, McManus, Hackmann, Williams, & Williams, 2010; Wells & Hackmann, 1993). These images are often experienced in the presence of specific stimuli such as anxiety-provoking social situations in the case of social anxiety

(Hackmann et al., 2000). They are often related to past adverse experiences (e.g., being bullied or abused) and associated with negative beliefs (e.g., "I am bad") and emotions (e.g., fear and anxiety) (e.g., Hinrichsen, Morrison, Waller, & Schmidt, 2007; Osman, Cooper, Hackmann, & Veale, 2004; Speckens, Hackmann, Ehlers, & Cuthbert, 2007; Wells & Hackmann, 1993). In some cases, they trigger behavioural responses such as body checking or reassurance seeking in health anxiety (Muse et al., 2010) and self-induced vomiting after a bingeing episode in

bulimia nervosa (Hinrichsen et al., 2007). They may thus help maintain psychological disorders (see Brewin, Gregory, Lipton, & Burgess, 2010).

Despite the evidence that intrusive images have a negative impact on emotions and behaviour, the mechanism through which they exert this impact is still unclear. We believe that understanding this mechanism may be essential for developing new therapeutic interventions that target intrusions effectively and refining existing ones. In this article, we propose that the relationship that intrusions have with patients' memories and sense of self is a fundamental part of this underlying mechanism. Empirical evidence supports the idea that there is a close relationship between autobiographical memory and the self (e.g., Bluck, 2003; Bluck, Alea, Habermas, & Rubin, 2005; Singer & Salovey, 1993; Wilson & Ross, 2003). Not only do autobiographical memories help individuals to construct a sense of self, but they also give them a sense of stability and continuity of the self across time (Bluck, 2003; Bluck et al., 2005).

The relationship between memory and the self is important for understanding the impact of memory-related intrusions on individuals because evidence suggests that the recall of different types of autobiographical memories affects the self. It elicits emotional responses and affects mood (Beike & Wirth-Beaumont, 2005; Boals, Hathaway, & Rubin, 2011; Gillihan, Kessler, & Farah, 2007; Greenhoot, Sun, Bunnell, & Lindboe, 2013; Josephson, Singer, & Salovey, 1996; Lardi, D'Argembeau, Chanal, Ghisletta, & Van der Linden, 2010; Philippe, Koestner, Lecours, Beaulieu-Pelletier, & Bois, 2011; Philippot, Schaefer, & Herbette, 2003; Schaefer & Philippot, 2005). These emotional responses may be related to the link between memories and self-goals. Singer and Salovey (1993) found that self-defining memories (SDMs: vivid, emotional and highly accessible memories that revolve around individuals' most important concerns or unresolved conflicts) are associated with positive emotions when they are about goal achievement and with negative emotions when they are about goal thwarting. Philippe et al. (2011) found a similar result focusing on memories which may or may not have been self-defining (e.g., being treated unjustly). Their findings suggest that the emotional response is predicted by the extent to which the retrieved memory and the associated network of memories contain representations of need thwarting and the satisfaction of psychological needs. They are thus consistent with the idea that memories elicit

emotional responses because they are related to individuals' sense of self.

Early research suggests that focusing on memories related to a given dimension (e.g., introversion/extraversion) influences the type of self-concept individuals report with regard to that dimension (Fazio, Effrein, & Falender, 1981). The content of the self-concept may be temporarily influenced by the perceived desirability of attributes, which may trigger a motivated search for memories that reflect these attributes (Kunda & Sanitioso, 1989). In fact, when they are led to believe that a trait is desirable, individuals can access memories reflecting this trait more easily (Sanitioso, Kunda, & Fong, 1990). More recent research has focused on the direct influence of memory recall on different self-aspects. One study (Jennings & McLean, 2013) looked at how different strategies (including memory recall) could repair self-beliefs and self-esteem following false feedback about being prejudiced. It showed that participants resumed their beliefs about being a tolerant person and repaired state self-esteem and affect after retrieving a highly positive event or a threat-specific event which demonstrated that they were tolerant. Although these findings may not generalise to other types of self-threat, they suggest that memory recall may protect individuals against self-threat by exerting an immediate effect on their emotions and aspects of the self such as self-esteem and self-beliefs.

The link between memory recall and self-esteem has also been observed in two studies focusing on *closed* memories (memories whose affect has faded) and *open* memories (emotional memories that individuals have not come to terms with; Beike, Kleinknecht, & Wirth-Beaumont, 2004). In the first study, Beike et al. (2004) found that individuals with open memories for life events reported lower self-esteem than individuals with closed memories. In the second study, they found that participants used more positive words to describe themselves after recalling closed memories than after recalling open ones. They also described the self with more internal-referent words (i.e., words referring to thoughts and emotions) after recalling an open memory and with more external-referent words (i.e, words referring to social roles and relationships) and context words (i.e., words referring to time and place) after recalling a closed memory. These studies suggest that memory recall may influence how individuals feel about themselves. However, they do not provide robust evidence about a causal

relationship between memory recall and self-esteem. In addition, Beike et al. assessed self-esteem using the self-esteem items of the World Beliefs Scale (Janoff-Bulman, 1989) in the first study and the self-reported valence of participants' self-descriptors in the second one. It is thus not clear whether their measures assessed *trait* (i.e., global, stable) or *state* (i.e., momentary) self-esteem. As Jennings and McLean's (2013) study suggested, memory recall may be more likely to influence individuals' momentary evaluation of themselves and state measures may be more suitable for assessing this influence.

In this article, we present two studies in which we aimed to expand on the findings of existing research by investigating the impact of memory recall on different aspects of the self. In each study, participants recalled positive and/or negative SDMs and completed self measures. We focused on SDMs because these memories may exert a strong influence on the self given their characteristics (e.g., vivid imagery, intense affect) and their importance for individuals' sense of self. In addition, they may help us understand the impact that memory-related intrusions have on patients when activated. The negative or traumatic experiences that lie at the origin of intrusions are in fact likely to be self-defining. This may explain why intrusions are vivid, are associated with intense emotions and contain encapsulated negative beliefs.

In both studies, we expected the retrieval of positive and negative SDMs to influence the self in different ways. We predicted that the retrieval of a negative SDM would exert a more negative influence on the self than the retrieval of a positive SDM. In Study 2, we also predicted that this influence would vary depending on other characteristics of the retrieved SDM. More detailed hypotheses are specified later. Ethics approval for both studies was obtained from the School of Psychology at the University of Southampton.

STUDY 1

The aim of our first study was to examine the impact of SDM recall on the self. We decided to focus on three aspects of the self: self-esteem, self-concept clarity, and self-discrepancies. Self-esteem refers to individuals' evaluation of their self-worth (Rosenberg, 1965). Self-concept clarity, refers to the extent to which an individual's self-concept is "clearly and confidently defined, internally

consistent, and temporally stable" (Campbell et al., 1996, p. 141). Finally, self-discrepancies refer to the discrepancies individuals experience among three domains of the self: the actual self (who they—or others—think they are), the ideal self (who they would like—or others would like them —to be) and the ought self (who they—or others —think they should be) (Higgins, 1987). Self-concept clarity and self-discrepancies are positively and negatively correlated with self-esteem, respectively (Baumgardner, 1990; Campbell, 1990; Campbell & Lavallee, 1993; Higgins, 1987). Assessing them might thus give us a good indication of how individuals feel about themselves following memory recall.

The study used a within-subjects design and consisted of two sessions. Because depression, stress and anxiety are negatively correlated with self-esteem (e.g., Greenberg et al., 1992; Smith & Greenberg, 1981; Zuckerman, 1989) and positively correlated with self-discrepancies (Higgins, Klein, & Strauman, 1985), at the beginning of each session participants completed measures of the distress experienced in the previous week. They also completed measures of trait self-esteem and self-concept clarity. The aim was to ensure that any post-recall differences between the conditions could not be attributed to how participants felt prior to the recall. Next, participants recalled a positive or a negative SDM and rated its characteristics so we could check whether positive and negative memories were comparable in terms of their properties and exerted a similar influence on the self. Finally, participants completed measures of state self-esteem, state self-concept clarity and self-discrepancies.

We predicted that the recall of the negative SDM, which would be related to the failure to achieve one or more goals, would make participants experience lower state self-esteem than the recall of the positive SDM. Assuming that participants would display the self-positivity bias (the tendency to portray themselves in a good light), we also predicted that they would perceive a greater difference between the positive pre-recall self and the failure-related post-recall self of the negative memory condition than between the positive pre-recall self and the achievement-related post-recall self of the positive memory condition. We hypothesised that this greater difference would make participants feel less clear about the contents of their self-concept and report lower state self-concept clarity in the negative memory condition. Finally, we expected the recall

of the negative SDM to be associated with a greater discrepancy between the post-recall actual self and the ideal self than the recall of the positive SDM.

Method

Participants

Forty students (34 females, 6 males) at a local university participated in the study in return for course credits or payment. For the purposes of the study, we had to ensure that participants recalled SDMs that were strongly positive or negative and were relevant to their sense of self. We eliminated seven participants: six because their ratings of memory influence on the self or valence fell below 2 *SD*s from the sample mean and one because of incomplete data. The final sample consisted of 33 participants (28 females, 5 males). Their ages ranged from 18 to 29 years (*M* = 20.94 years, *SD* = 2.38). Four participants had received treatment for psychological problems (low mood, depression and anxiety) in the past. Only one participant was in treatment for depression and anxiety issues at the time of data collection.

Measures

Memory ratings. Participants rated the extent to which their SDMs had influenced the way they saw themselves and how clear and distressing they were on a scale from 0 (*not at all*) to 100 (*extremely*). They also rated the valence of the memories on a scale from −7 (*extremely negative*) to +7 (*extremely positive*). Finally, they answered the question "Were there any images associated with the memory?" If their answer was *yes*, they rated the vividness of the images on a scale from 0 (*not at all*) to 100 (*extremely*). No definition of images was provided.

Rosenberg's self-esteem scale. Rosenberg's self-esteem scale (RSES) was used to measure global feelings of self-worth (Rosenberg, 1965). Participants responded on a scale from 1 (*strongly agree*) to 4 (*strongly disagree*) to 10 statements such as "I feel that I have a number of good qualities". Positively phrased items were reverse scored. Responses to individual items were summed to create a global score ranging from 10 to 40. Cronbach's α was .93 in the positive memory

condition and .92 in the negative memory condition.

Self-concept clarity scale. We used the self-concept clarity scale (SCCS) to measure the clarity, consistency and temporal stability of participants' self-beliefs (Campbell et al., 1996). Participants responded on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*) to 12 items such as "My beliefs about myself seem to change very frequently". After the negatively phrased items had been reverse scored, responses to each item were summed. Total scores ranged from 12 to 60. Cronbach's α was .89 in the positive memory condition and .90 in the negative memory condition.

Depression anxiety stress scale. The depression anxiety stress scale (DASS) consists of three 14-item subscales that assess the extent to which depression, anxiety and stress have been experienced over the past week (Lovibond & Lovibond, 1995). Participants indicated how much the statements applied to them in the last week on a scale from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). Subscale scores were obtained by summing the responses to items in each subscale. They ranged from 0 to 42. In the positive memory condition, Cronbach's α was .96 for the depression subscale, .83 for the anxiety subscale and .91 for the stress subscale. In the negative memory condition, it was .95 for the depression subscale, .80 for the anxiety subscale, and .92 for the stress subscale.

State self-esteem scale. The state self-esteem scale (SSES) consists of 12 items taken from the self-esteem factors proposed by McFarland and Ross (1982). Participants rated how they felt about themselves "right now" on a scale from 1 (*not at all*) to 11 (*extremely*) with regard to items such as *inadequate*, *competent*, *ashamed* and *efficient*. Negative items were reverse scored and individual scores were summed. Total scores ranged from 12 to 132. Cronbach's α was .93 in the positive memory condition and .95 in the negative memory condition.

State self-concept clarity scale. The four items constituting this scale (SSCCS; Nezlek & Plesko, 2001) are taken from the trait self-concept clarity scale (Campbell et al., 1996) and assess self-concept clarity changes in response to daily events. Participants indicated the extent to which the

statements applied to them "right now" on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). All the items were reverse scored and the individual scores were summed. Total scores ranged from 4 to 20. Cronbach's α was .88 in the positive memory condition and .89 in the negative memory condition.

Self-discrepancy index. In the self-discrepancy index (SDI) scale, participants reported discrepancies between their actual and ideal selves by completing up to five sentences of the format "I am … but I would like …" (Dittmar, Beattie, & Friese, 1996; Halliwell & Dittmar, 2006). For each statement, they indicated the magnitude of the discrepancy (i.e., how different they were from their ideal) and its salience (i.e., how concerned they were about the difference) on a scale from 1 (*a little*) to 6 (*extremely*). Magnitude and salience ratings for each statement were multiplied and the products were summed. The total sum was divided by the number of statements to yield an SDI ranging from 1 to 36.

Me/not me task. This computer task (Markus, 1977) assessed the consistency of participants' self-descriptions (an aspect of self-concept clarity). It involved 10 practice trials and 50 experimental trials that consisted of pairs of opposite adjectives. The experimental trials included pairs such as *interesting—boring* and *confident—insecure*. There were no significant differences between positive and negative adjectives in terms of absolute valence, $t(48) = 0.95$, $p = .35$. Adjectives appeared in the centre of a computer screen individually in a randomised order. Participants indicated whether the adjectives described them or not by pressing *Y* or *N*. Each adjective remained on the screen until participants responded or 8 seconds had elapsed and was followed by an asterisk that remained on the screen for 1 second. Participants then rated how confident they were about their answer on a scale from 1 (*not at all confident*) to 7 (*extremely confident*). Response times were recorded.

The me/not me task yields three indices: consistency, confidence ratings and reaction times. In this study, we focused only on consistency. Participants are said to be consistent when they respond *yes* to one adjective and *no* to its opposite. Consistent responses are given a score of 1 and inconsistent responses a score of 0. Individual responses are summed to produce a total score ranging from 0 to 25. This score does not indicate whether participants are consistent because they

endorse positive self-descriptors or negative ones. We thus divided it into positive and negative consistency. Positive consistency indicated the number of responses in which participants said *yes* to the positive adjective and *no* to its opposite. Negative consistency indicated the number of responses in which participants said *yes* to the negative adjective and *no* to its opposite.

Procedure

Participants were tested individually in two laboratory sessions approximately 1 week apart. In Session 1, they first provided informed consent and demographic information. They then completed the DASS, RSES and SCCS. Next, they recalled and described in writing a specific positive or negative SDM (memory order was counterbalanced). The following instructions for the memory recall task were adapted from Jobson and O'Kearney (2008a) and Beike and Wirth-Beaumont (2005):

> The event you need to recall must be one that you often think about. It should be one that you do not currently understand and have not yet put behind you, but that has influenced the way in which you see yourself and that helps you to understand who you are as a person. It is an event that you would describe to someone if you wanted them to understand you on a deeper level. It is an experience that is very important to you, that you remember very clearly, that elicits strong feelings when you recall it, and that brings images to mind. Please, take some time to write down a description of this memory.

After describing their memory, participants rated its characteristics and indicated whether it involved any images. Finally, they completed the me/not me task on a laptop computer and filled in the SSES, SSCCS and SDI. Session 2 followed the same procedure as Session 1 but involved the recall of the memory of alternate valence. At the end of the study, participants were fully debriefed. The duration of the positive memory session ($M = 38.75$ minutes, $SD = 9.07$) did not differ significantly from that of the negative memory session ($M = 38.13$ minutes, $SD = 10.68$), $t(31) = 0.39$, $p = .70$.

Results

Pre-recall measures

Table 1 shows participants' DASS, RSES and SCCS scores. Participants reported experiencing low levels of depression, stress and anxiety in the

TABLE 1
Pre-recall measures and memory characteristics in the positive and negative memory conditions

Variable	Positive memory		Negative memory		$F(1, 32)$	p
	M	SD	M	SD		
DASS-depression	7.76	9.19	7.76	9.12	0.00	1.00
DASS-anxiety	5.39	5.57	5.21	5.09	0.05	.82
DASS-stress	12.85	8.49	11.61	8.34	1.54	.22
RSES	28.79	5.81	28.30	5.64	2.63	.11
SCCS	34.11	9.28	34.48	9.39	0.16	.69
Memory influence	77.88	11.18	74.70	12.87	1.51	.23
Memory valence	6.21	0.96	−4.94[a]	1.14	23.58	<.001
Memory clarity	91.82	8.08	86.06	11.64	7.86	.01
Memory distress	9.39	19.99	68.18	17.22	182.92	<.001
Image vividness	88.27	11.33	81.82	13.57	5.95	.02

Note: DASS, depression anxiety stress scale; RSES, Rosenberg's self-esteem scale; SCCS, self-concept clarity scale.
[a]The analyses were carried out taking the absolute value of the negative memory valence mean (4.94).

week prior to each session. They displayed high trait self-esteem and moderate trait self-concept clarity. There were no significant multivariate differences between conditions on the DASS subscales, $F(3, 30) = 0.73$, $p = .54$, Wilks' $λ = .93$, or on the self measures, $F(2, 31) = 1.28$, $p = .29$, Wilks' $λ = .92$. Univariate tests confirmed that the differences in terms of the individual variables were not significant.

Memory characteristics

The content of participants' SDMs varied. Examples of positive memories included being baptised, receiving the university acceptance letter and performing successfully at a concert. Examples of negative memories included being ridiculed in public, failing an assignment and experiencing a relationship breakdown. All participants indicated the presence of images in both their positive and their negative memories. As Table 1 shows, both memories had had a strong

influence on participants' self-view and were very clear and vivid. There was a significant multivariate difference between these memories in terms of their characteristics, $F(5, 28) = 45.04$, $p < .001$, Wilks' $λ = .11$. As expected, negative memories were more distressing than positive ones. They did not differ significantly from positive memories in terms of the extent to which they had influenced participants' self-view. However, they had a lower absolute valence and were less clear and less vivid than the positive memories.

Post-recall self-characteristics

Table 2 shows participants' scores on the post-recall measures. There was a significant multivariate difference between conditions, $F(5, 28) = 7.20$, $p < .001$, Wilks' $λ = .44$. Compared to the negative memory condition, in the positive memory condition participants reported lower negative self-consistency and higher positive self-consistency, state self-esteem and state self-concept clarity.

TABLE 2
Outcome measures in the two memory conditions

Variable	Positive memory		Negative memory		$F(1, 32)$	p
	M	SD	M	SD		
Positive consistency	17.61	5.78	15.27	6.21	9.47	<.01
Negative consistency	2.58	3.80	4.03	4.42	5.29	.03
SSES	100.91	16.81	77.18	24.10	37.07	<.001
SSCCS	11.91	3.96	9.91	3.95	12.21	.001
SDI	15.43	7.89	15.82	6.94	0.10	.76

Note: SSES, state self-esteem scale; SSCCS, state self-concept clarity scale; SDI, self-discrepancy index.

There were no significant differences in terms of self-discrepancies.

As self-esteem is usually correlated with self-concept clarity,[1] we conducted a series of ANCO-VAs to investigate whether differences in state self-concept clarity and self-consistency would remain after controlling for state self-esteem in both conditions. Results showed that, after controlling for state self-esteem, the differences between conditions in terms of these variables were no longer significant (state self-concept clarity: $F(1, 30) = 0.30$, $p = .59$; positive consistency: $F(1, 30) = 0.02$, $p = .89$; negative consistency: $F(1, 30) = 0.67$, $p = .42$). There were significant interactions between state self-esteem in the positive memory condition and the state self-concept clarity, $F(1, 30) = 5.60$, $p = .03$, positive self-consistency, $F(1, 30) = 5.20$, $p = .03$, and negative self-consistency, $F(1, 30) = 8.46$, $p < .01$, outcomes. The interactions between state self-esteem in the negative memory condition and the state self-concept clarity, $F(1, 30) = 5.99$, $p = .02$, positive self-consistency, $F(1, 30) = 12.41$, $p = .001$, and negative self-consistency, $F(1, 30) = 10.98$, $p < .01$, o outcomes were also significant. State self-esteem, then, significantly influenced the outcome on these variables.

Discussion

Study 1 found that positive memory recall was associated with a more positive evaluation of the self but not with greater self-discrepancies than negative memory recall. It was also associated with lower negative self-consistency and higher state self-concept clarity and positive self-consistency, but these differences became non-significant when controlling for state self-esteem. The findings are consistent with those of Beike et al. (2004) and Jennings and McLean (2013). They suggest that the retrieval of autobiographical memories may influence state self-esteem which, in turn, may influence other aspects of the self, such as self-concept clarity.

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[1] In our sample, the correlations between state self-esteem and the other variables were as follows: Positive memory condition: $r(33) = .54$, $p = .001$ for state self-concept clarity; $r(33) = .74$, $p < .001$ for positive consistency: and $r(33) = −.75$, $p < .001$ for negative consistency. Negative memory condition: $r(33) = .65$, $p < .001$ for state self-concept clarity; $r(33) = .73$, $p < .001$ for positive consistency; and $r(33) = −.70$, $p < .001$ for negative consistency.

The nature of SDMs may explain our findings. As mentioned earlier, positive SDMs are associated with positive affect and involve experiences in which individuals achieved one or more goals (Singer & Salovey, 1993). Negative SDMs, on the other hand, are associated with negative affect and involve experiences in which individuals failed to achieve their goals. Recalling positive SDMs, then, is more likely to make individuals feel good about themselves than recalling negative ones. In our study, remembering positive experiences such as being accepted at university may have activated participants' beliefs about the self as competent and successful. Remembering negative experiences such as breaking up with a partner, on the other hand, may have activated beliefs about the self as helpless or worthless. The activation of these beliefs may have then influenced participants' state self-esteem.

Our findings supported our hypothesis regarding state self-concept clarity and self-consistency. Contrary to our hypothesis, memory recall may have exerted only an indirect effect on these variables through its influence on state self-esteem. Our participants tended to be psychologically healthy and reported high-trait self-esteem, so they were likely to display the self-positivity bias (Mezulis, Abramson, Hyde, & Hankin, 2004). They may have still experienced a discrepancy between their pre-recall and their post-recall self given the activation of different self-beliefs in response to memory recall. However, our results suggest that it was not the simple activation of these self-beliefs that affected self-concept clarity/consistency: it was participants' evaluation of their self-worth on the basis of these beliefs. When they recalled the positive SDM and experienced high state self-esteem, participants may have not perceived a great discrepancy between their pre- and post-recall self. When they recalled the negative SDM and experienced low state self-esteem, on the other hand, they may have perceived a greater discrepancy and this may have triggered less consistent self-views.

We had hypothesised that the discrepancy between participants' post-recall actual self and their ideal self would be greater in the negative memory condition, in which the actual self was expected to be failure-related. Our failure to find a difference between conditions may be related to the measure we used. The SDI, with its open-ended statements, may not be sensitive enough to detect temporary changes in the actual self and may thus assess stable, global self-discrepancies.

Overall, the findings of Study 1 show that self-relevant memories may exert a temporary influence on the self upon retrieval. They suggest that state—rather than trait—self measures may be effective in capturing self-aspects that are affected by this retrieval. Although they are very encouraging, they had to be replicated and extended in order to provide a broader picture of how memory recall affects the self. We used these findings as the basis for the design of Study 2.

STUDY 2

Study 1 suggested that the recall of an SDM may influence state self-esteem and, indirectly, state self-concept clarity/consistency. The only memory characteristics participants rated in that study were valence, influence on self-views, clarity, distress, and vividness. Some of these ratings (e.g., influence on self-views) were used to ensure that the memories were self-defining. Others (e.g., vividness) were mainly used to ensure that the positive and negative SDMs were comparable in terms of their properties. Literature, however, suggests that there are other SDM characteristics that may influence the effect of memory recall on the self; namely affect, specificity, meaning and content (Blagov & Singer, 2004).

Affect refers to the valence and the intensity of the emotions experienced when the SDM is retrieved (Blagov & Singer, 2004) and is related to psychological well-being. The retrieval of SDMs characterised by positive affect is associated with psychological adjustment and indicators of well-being such as high self-esteem, whereas the retrieval of SDMs characterised by negative affect is associated with factors such as anxiety and rumination (for a review of the relationship between memory characteristics and mental health, see McKay, Singer, & Conway, 2013).

Specificity refers to the amount of sensory and spatiotemporal detail present in the memory (Blagov & Singer, 2004; Singer & Blagov, 2000). Specific SDMs describe a unique event (e.g., accident) that happened within a 24-hour period. They contain significant detail about this event (e.g., location, time, actions, emotions and thoughts experienced). Non-specific SDMs describe one or more events that happened over a long period of time (e.g., studying for a degree) or were repeated (e.g., family holidays). They contain general descriptions of the context of the event. Specific memories are associated with psychological adjustment, mainly because they provide individuals with sufficient detail about their past to help them form a continuous, coherent life and identity narrative (see McKay et al., in press). Non-specific (or over-general) memories, on the other hand, are a characteristic of psychological disorders such as depression and PTSD (McKay et al., in press).

Meaning refers to the extent to which individuals have drawn some abstract meaning and learnt lessons about the self, relationships and life from the experience depicted in the memory (Blagov & Singer, 2004; Singer & Blagov, 2000). Singer and Blagov (2000) distinguish integrative SDMs from non-integrative ones by the fact that, when describing them, individuals refer to the meaning they have attached to the experience or to lessons learnt from it. The process of meaning-making allows individuals to make links among life experiences or between life experiences and the self. These links may facilitate the integration of an SDM with an individual's life story and thus contribute to the development of his/her sense of self (Bluck & Habermas, 2000; McAdams, 2001, 2008). Evidence suggests that meaning making is associated with positive psychological adjustment, well-being and maturity (see McKay et al., in press; Singer, Blagov, Berry, & Oost, 2013). The relationship between meaning and well-being, however, is complex and is influenced by individual characteristics such as age (e.g., Alea & Bluck, 2013; McLean, Breen, & Fournier, 2010), culture (Alea & Bluck, 2013) and personality (Lilgendahl, McLean, & Mansfield, 2013); the type of memory (Lilgendahl et al., 2013); and the aspect of meaning, such as sophistication (McLean et al., 2010) or number (McLean et al., 2010) and valence (Banks & Salmon, 2013; Lilgendahl & McAdams, 2011) of self-event connections (statements about how the event connects to a stable or changed aspect of the self).

Thorne and McLean (2001) argue that the content of an SDM is the main theme emphasised in it and reflects one of the individual's primary concerns. They propose that this content can fall into one of seven categories: (1) life-threatening events; (2) exploration/recreation events; (3) relationship events; (4) achievement events; (5) guilt/shame events or doing right vs. doing wrong; (6) drug, alcohol or tobacco use; and (7) not classifiable (events that do not fit into any of the other categories).

Research on memory characteristics is relatively recent. Nevertheless, it gives important insights into how these characteristics may influence the impact

of memory retrieval. For example, positive memories are associated with positive affect, whereas negative ones are associated with negative affect (e.g., Gillihan et al., 2007). Highly positive memories are associated with greater affective and state self-esteem repair following a threat to the self than threat-specific memories (Jennings & McLean, 2013). The intensity of the emotions experienced during retrieval is positively correlated with sensory detail for negative memories, but not for positive ones (Schaefer & Philippot, 2005). The recall of specific SDMs is associated with a greater increase in negative affect than the recall of non-specific SDMs (Lardi et al., 2010). The recall of life-threatening events is associated with the greatest increase in negative affect, whereas the recall of leisure events is associated with the greatest increase in positive affect (Lardi et al., 2010). The presence of self-event connections is associated with marginally greater self-concept repair for highly positive memories and with greater self-concept and positive affect repair for threat-specific ones (Jennings & McLean, 2013). Lardi et al. (2010) found that integration is not related to affect changes, but making connections between the memory and one's personality is associated with a decrease in positive affect. Other studies (Beike, Adams, & Wirth-Beaumont, 2007; Beike & Wirth-Beaumont, 2005) have found that open memories (which may be non-integrative) elicit more intense emotions upon retrieval than closed memories (which may be integrative). Finally, individuals experience lower levels of distress while describing a traumatic or stressful memory if they express their subjective perspective or evaluation of it (Greenhoot et al., 2013).

The studies mentioned earlier suggest that the recall of different memories may influence individuals in different ways. Most of these studies focus on memories without checking whether they are self-defining or not. In addition, they focus primarily on the affective responses to memory recall. As Study 1 and previous research (e.g., Beike et al., 2004; Jennings & McLean, 2013) has shown, memory recall may also influence self-aspects such as state self-esteem. Given the role of SDMs in shaping self-perceptions and the link between these memories and goal achievement/blocking (Singer & Salovey, 1993), the self-cognitions and goals individuals report may also vary following their retrieval. As Beike et al. (2004) found, individuals report more self-cognitions referring to internal states (e.g., emotions) after recalling an open memory and more self-cognitions

referring to external factors (e.g., social roles) after recalling a closed memory. Individuals who report more trauma-related goals are more likely to recall negative or traumatic SDMs (Sutherland & Bryant, 2005). In Western cultures, individuals suffering from PTSD report more trauma-themed goals and self-cognitions than individuals without PTSD (Jobson & O'Kearney, 2008b). Finally, thinking about memories in a way that makes them feel open makes individuals engage in a greater number of memory-related behaviours, perhaps because open memories are related to thwarted goals that the individual is still striving to achieve (Beike, Adams, & Naufel, 2010).

Study 2 aimed to replicate and extend the findings of Study 1 by investigating how the valence, specificity, integration and content of SDMs influence the impact that these memories have on individuals' state self-esteem, state self-concept clarity, self-cognitions and goals. It used a between-participants design. Participants initially completed measures which ensured that they were matched in terms of characteristics that might influence results: (1) trait self-esteem, since high levels of this characteristic may protect against fluctuations in state self-esteem (Campbell, Chew, & Scratchley, 1991); (2) exposure to adverse experiences, which may affect goals (Sutherland & Bryant, 2005) and self-cognitions (Jobson & O'Kearney, 2008b): and (3) distress, which is negatively correlated with self-esteem (e.g., Greenberg et al., 1992). They recalled either a positive or a negative SDM and rated its characteristics so we could ensure that the positive and negative memories were self-defining and comparable in terms of these characteristics. They also completed measures of state self-esteem, state self-concept clarity, goals and self-cognitions. We coded memories for content, specificity and integration; goals for content; and self-cognitions for content and valence. Based on the findings of previous research and of Study 1, we predicted that:

(1) the recall of negative SDMs would be associated with lower state self-esteem and a greater proportion of negative self-cognitions than the recall of positive SDMs;

(2) the recall of specific SDMs would be associated with lower state self-esteem and a greater proportion of negative self-cognitions than the recall of non-specific SDMs; and

(3) the recall of integrative SDMs would be associated with a higher proportion of self-cognitions related to external factors such as

social identities and a lower proportion of self-cognitions related to emotional states than the recall of non-integrative SDMs.

Given the Study 1 findings on state self-concept clarity, we had no specific hypotheses regarding the impact of memory recall on this variable. Because this was the first study of its kind, we also had no hypotheses regarding the influence of memory characteristics on other self aspects (e.g., goals).

Method

Participants

One hundred and forty-eight university students (123 females, 25 males) completed the study in return for course credits. Fourteen participants were excluded because they failed to complete one or more parts of the study or described a memory that was less than one year old and thus could not be considered self-defining (see Singer & Blagov, 2000). Six participants were excluded because they rated the influence of their SDM as less than 2 SDs from the sample mean. Finally, 26 participants were excluded because their memory valence and emotion intensity ratings indicated that the memories were not clearly positive or negative.

The final sample consisted of 102 participants (91 females, 11 males). The positive memory condition comprised 53 participants (7 males) whose ages ranged from 18 to 26 years (M = 19.83 years, SD = 1.60 years). The negative memory condition comprised 49 participants (4 males) whose ages ranged from 18 to 26 years (M = 19.71 years, SD = 1.49 years). Five participants in the positive memory condition (9.4%) and eight participants in the negative memory condition (16.3%) reported receiving treatment for psychological problems (e.g., social anxiety, depression, bipolar disorder) in the past. One participant in the positive memory condition (1.9%) and four participants in the negative memory condition (8.2%) were being treated for their problem at the time of data collection. Participants in the two conditions did not differ significantly in terms of gender, $\chi^2(1)$ = 0.67, p = .41, age, $t(100)$ = 0.38, p = .71, and past, $\chi^2(1)$ = 1.09, p = .30, or present (Fisher's exact p = .57) psychological treatment.

Measures

Memory ratings. Participants rated the extent to which the SDM they recalled had influenced the way they saw themselves; how positive, negative, clear and vivid it was; and how intense the associated positive and negative emotions were on a scale from 0 (*not at all*) to 10 (*extremely*).

Depression anxiety stress scale-21. The depression anxiety stress scale-21 (DASS-21) consists of 21 items taken from the DASS (Lovibond & Lovibond, 1995). Subscale scores are multiplied by 2 to facilitate comparison with the DASS. Cronbach's α was .88 for the depression subscale, .80 for the anxiety subscale and .89 for the stress subscale.

Self-esteem and self-concept clarity measures. We used the RSES (Rosenberg, 1965) to assess trait self-esteem and the SSES (McFarland & Ross, 1982) and SSCCS (Nezlek & Plesko, 2001) to assess the post-recall self. Cronbach's α was .90 for the RSES, .91 for the SSES and .75 for the SSCCS.

Twenty-statement test. In the twenty-statement test (TST), participants provided up to 20 answers to the question "Who am I?" (Kuhn & McPartland, 1954). The self-cognitions they generated were scored in terms of content (personal characteristics, social identities, emotional states) and valence (negative vs. positive and neutral) using established coding strategies (Rhee, Uleman, Lee, & Roman, 1995; Wang, 2004).

Measure of personal goals. Participants were instructed to "List 15 goals that you feel are important for you to achieve" (Emmons, 1986; Sutherland & Bryant, 2005). We coded these goals for content using a system based on the SDM content themes described by Thorne and McLean (2001).

Questionnaire on exposure to adverse experiences. This questionnaire was adapted from the Post-traumatic Diagnostic Scale (Foa, Cashman, Jaycox, & Perry, 1997) and the Stressful Life Events Screening Questionnaire (Goodman, Corcoran, Turner, Yuan, & Green, 1998). Participants indicated which of 15 negative life events (e.g., illness, physical or emotional abuse, sexual assault) they had experienced. Next, they indicated whether the events had triggered fear, helplessness or horror; occurred more than once; or were ongoing. For the purposes of the study, we compared participants only in terms of the number of events they had experienced.

Procedure

Participants completed the study in their own time using an online research facility. Initially, they provided demographic information and completed the RSES and DASS-21. They were then randomly allocated to either the positive or the negative memory condition by the online research facility and wrote a description of their SDM. The memory recall instructions were similar to those used in Study 1 but did not describe the memory as one that the participants had not put behind them. Next, participants rated the memory's characteristics and completed the SSES, SSCCS, personal goals measure and TST. Finally, they completed the questionnaire on past adverse experiences and were debriefed. The duration of the positive memory session (*M* = 27.89 minutes, *SD* = 14.46) did not differ significantly from that of the negative memory session (*M* = 25.90 minutes, *SD* = 11.88), *t*(100) = 0.76, *p* = .45.

Scoring

The first author scored memory scripts, self-cognitions and goals while blind to the participants' condition. An undergraduate research assistant, blind to the design and hypotheses of the study, rated approximately 20% of these data. Cohen's κ (Cohen, 1960) was used to calculate inter-rater reliability. Because the values of Cohen's κ were satisfactory and in line with previous literature in those cases where established manuals were used, the first author's ratings were included in the analysis. Following is a description of the scoring process.

Memory content. Thorne and McLean's (2001) manual was used to assess this dimension. Life-threatening events (e.g., first episode of self-harming, death of a friend) involved risk to one's self or to others. Recreation/exploration events (e.g., trip to Ghana, skydiving) emphasised recreation, play and exploration. Relationship events (e.g., being bullied at school, surprise birthday party) were about "moving toward, away, or against" one or more significant persons (Thorne & McLean, 2001, p. 8). Achievement events (e.g., doing well in A-level exams, failing to get through an audition for a TV programme) emphasised successful or failed attempts to achieve goals in which participants had invested significant effort. Guilt/shame events (e.g., feeling ashamed about one's past relationships after argument with partner, guilt for leading best friend to depression)

focused on participants' sense of responsibility and emphasised right or wrong decisions. Drug, alcohol and tobacco use events focused on the use of these substances. If they emphasised more than one concern or theme, events were categorised as "unclassifiable". Cohen's κ for content was .66.

Memory specificity. Singer and Blagov's (2000) manual was used to code specificity. Memory scripts were coded as specific if they contained significant detail about the context of the event and at least one single-event statement (a sentence in which the participant focused on a unique event that happened within a 24-hour period, such as "an awards evening at the end of sixth form"). They were coded as non-specific if they did not contain any single-event statements and focused on events that lasted longer than a day or on general events that were repeated over time (e.g., parents repeatedly arguing during a difficult divorce). Cohen's κ was .86.

Memory integration. Following Singer and Blagov (2000), a memory script was coded as integrative if it contained statements about the meaning the participant had attached to it, such as lessons learnt about life (e.g., "The experience has taught me to never take anything for granted as you never know what is around the corner"), new understandings about the self (e.g., "This experience taught me that I am capable of doing anything I put my mind to"), and functional uses, of the memory (e.g., "Every time when I feel like I will not be able to graduate, I think about how [the Professor] looked at me and the things he told me and I start to believe in myself again"). It was coded as non-integrative if it contained only a description of the event, without any reference to its context or significance for the participant. Cohen's κ was .77.

Self-cognition content. We adapted Rhee et al.'s (1995) coding system to code the content of participants' responses to the TST by collapsing their content categories into three broad categories (see Table 3). Self-cognitions were categorised as referring to personal characteristics, social identities, or emotional states. Responses that did not refer to self-cognitions and/or could not be understood without a context (e.g., *finished*) were completely excluded from the analysis. Responses such as *lucky* did not fit into any of the content categories and were excluded from the content analysis only.

TABLE 3
Coding system used to assess self-cognition content

Categories and subcategories

Personal characteristics
Pure traits (e.g., friendly, honest)
Qualified traits (e.g., around certain people, sometimes)
Preferences (e.g., love shopping, hate being late)
Aspirations (e.g., become a psychologist)
Activities (e.g., play badminton)
Evaluative descriptions (e.g., good listener)
Physical descriptions (e.g., beautiful, tall, blue eyes)
Peripheral information (e.g., tired, live in Hampshire)
Global descriptions (e.g., human, me, myself)
Social identities
Name
Gender (e.g., female, boy)
Family information (e.g., daughter, brother, niece)
Ethnicity/race/nationality
Origin (e.g., from London)
Religion (e.g., Christian)
Role/status (e.g., student, employee)
Occupation (e.g., mental health worker, waitress)
Self-ascribed identities (e.g., dancer, singer)
Emotional states
General emotion (e.g., happy, scared, irritated)
Social emotion (e.g., in love)

Source: Adapted from Rhee et al. (1995, p. 145). Copyright 1995 by the American Psychological Association.

The proportion of self-cognitions in each content category was calculated by dividing the number of responses in that category with the total number of responses. Cohen's κ was .88.

Self-cognition valence. Following Wang (2004), self-cognitions were coded in terms of valence. They were divided into two groups. The first group comprised positive (e.g., *smart*, *pretty*) and neutral (e.g., *female*, *half-Italian*) self-cognitions. The second group comprised negative self-cognitions (e.g., *anxious*, *worried*). The proportion of negative self-cognitions was calculated by dividing the number of the negative self-cognitions generated by each participant with his/her total number of self-cognitions. Cohen's κ for this variable was .62.

Goal content. The content of participants' goals was scored using Thorne and McLean's (2001) content categories of SDMs as guides. Analyses revealed that these goals fell into three categories: recreation/exploration, relationship and achievement. Recreation/exploration goals were related to recreational activities such as travelling and hobbies (e.g., *travel to South America*, *go skydiving*).

Relationship goals referred to a wish to get close to or involved with others (e.g., *get married*, *be there for other people*). Achievement goals referred to an activity or state that required effort. This category comprised, for example, goals related to education and career (e.g., *graduate*, *get a Ph.D.*), goals related to behavioural changes (e.g., *give up smoking*, *become more confident*) and goals related to learning new skills (e.g., *be able to play the piano*, *learn to speak French fluently*). The proportion of goals in each category was calculated. Cohen's κ was .79.

Results

Pre-recall measures

Table 4 shows participants' scores on the DASS-21, RSES and questionnaire on past adverse experiences. There were no significant differences between participants in the two conditions in terms of trait self-esteem, $U = 1078.50$, $p = .14$, or exposure to adverse experiences, $U = 1131.50$, $p = .26$. A MANOVA with condition as fixed factor showed that there was no significant multivariate difference between conditions in terms of the DASS-21 subscales, $F(3, 98) = 1.47$, $p = .23$, Wilks' $\lambda = .96$. Univariate tests showed that the differences between participants in terms of the subscale scores were not significant, either (all ps > .06).

TABLE 4
Participant pre-recall characteristics and exposure to traumatic experiences

Descriptive measure	Positive memory condition		Negative memory condition	
	M	SD	M	SD
DASS-depression	9.81	8.02	12.20	9.08
DASS-anxiety	7.06	5.85	9.55	7.61
DASS-stress	13.28	8.88	16.73	9.31
Trait self-esteem	29.38	3.90	27.78	6.11
Number of traumas	3.25	2.19	3.49	1.60

Note: DASS, depression anxiety stress scale.

Memory characteristics

Table 5 shows participants' memory ratings. Participants rated the SDMs as being very emotional, clear, vivid and relevant for their self-view. There was a significant multivariate difference between positive and negative memories in terms of their characteristics, $F(7, 79) = 365.36$, $p < .001$,

TABLE 5
Characteristics of the memories of participants in the two conditions

Memory characteristic	Positive memory		Negative memory		F (1, 85)	p
	M	SD	M	SD		
Influence on self	8.00	1.21	7.57	1.53	1.17	.28
Clarity	8.91	1.06	8.73	1.06	1.20	.28
Image vividness	7.64	1.44	7.57	1.45	0.09	.76
Positive valence	9.38	0.82	1.45	0.71	2227.18	<.001
Negative valence	1.49	0.72	8.96	1.04	1783.65	<.001
Positive emotion	8.48	1.11	1.61	1.04	893.25	<.001
Negative emotion	1.47	0.72	8.61	1.27	1299.06	<.001

Wilks' λ = .03. They did not differ significantly in terms of their influence on the self, clarity, or vividness. As expected, positive memories were characterised by significantly higher positive valence, lower negative valence, more intense positive emotions and less intense negative emotions than negative memories. A separate MANOVA showed that there was a significant multivariate difference between the memories in terms of absolute valence and absolute emotion intensity, $F(2, 97) = 4.76$, $p = .01$, Wilks' λ = .91. Positive memories were more positive than the

negative memories were negative, $F(1, 98) = 5.33$, $p = .02$, but the positive emotions associated with them were as intense as the negative emotions associated with the negative memories, $F(1, 98) = 0.46$, $p = .50$. It can be concluded that the memories recalled by the participants in the two conditions were clearly positive or negative and comparable in terms of all their properties except absolute valence.

Figure 1 shows the frequencies of the memory content themes. When considering the whole sample, the most common themes were relationships (36.3%) and achievement (35.3%). They were followed by life-threatening events (15.7%), recreation/exploration (5.9%), unclassifiable events (3.9%) and guilt/shame (2.9%). No participants described memories related to drug, alcohol or tobacco use.

Forty-four positive memories (83.0%) and 40 negative memories (81.6%) were specific. Thirty-six positive memories (67.9%) and 27 negative memories (55.1%) were integrative. The positive and negative SDMs did not differ significantly in terms of specificity, $\chi^2(1) = 0.03$, $p = .85$, or integration, $\chi^2(1) = 1.77$, $p = .18$. There was no relationship between memory content and specificity (Fisher's exact $p = .38$) or between content and integration (Fisher's exact $p = .66$).
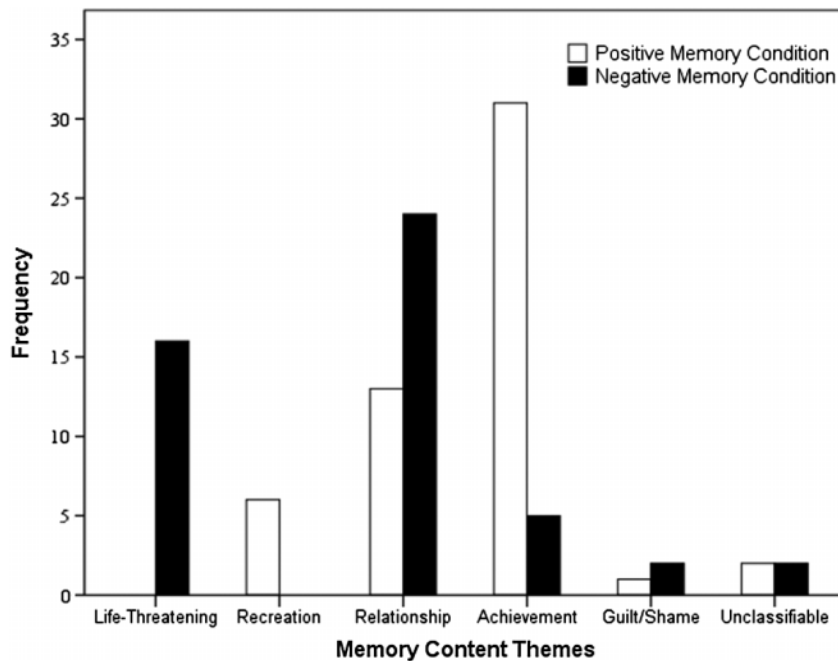

Figure 1. Frequencies of content themes present in the SDMs recalled by participants in the two memory conditions. No participants in the positive memory condition recalled life-threatening events. No participants in the negative memory condition recalled recreation/exploration events.

Post-recall self-characteristics

Table 6 presents the post-recall scores. Participants reported moderate levels of state self-esteem and self-concept clarity. Their self-cognitions referred mainly to personal characteristics, whereas goals were mostly achievement related. There were no significant differences between the participants in the positive memory condition (M = 18.56, SD = 3.47) and those in the negative memory condition (M = 18.39, SD = 3.53) in terms of the number of self-cognitions they generated, $t(99)$ = 0.24, p = .81. Similarly, there were no significant differences between the participants in the positive memory condition (M = 13.92, SD = 2.47) and those in the negative memory condition (M = 13.73, SD = 2.48) in terms of the number of goals they listed, $t(100)$ = 0.39, p = .70. In order to test our hypotheses, we conducted multiple regression analyses entering memory valence, specificity and integration as predictors simultaneously into the model. It was not possible to include memory content into the model due to the low frequency of memories in each content category. A one-way ANOVA showed that content did not have a significant effect on any of the post-recall measures (all ps > .19).

TABLE 6
Post-recall self measures in the two memory conditions

Variable	Positive memory condition		Negative memory condition	
	M	SD	M	SD
State self-esteem	94.49	16.52	83.49	17.35
State self-concept clarity	11.98	3.18	11.27	3.67
TST negative self-cognitions	.18	.13	.23	.20
TST personal characteristics	.80	.19	.82	.18
TST social identities	.16	.19	.15	.19
TST emotional states	.03	.04	.03	.04
Achievement goals	.59	.13	.65	.16
Relationship goals	.28	.12	.26	.13
Recreation/exploration goals	.13	.09	.09	.10

Note: TST, twenty-statement test. The values shown for the valence and/or content categories of self-cognitions and goals represent the proportion of self-cognitions and goals in each category.

The multiple regression analyses showed that our model significantly predicted 10.3% of the variance in state self-esteem, $F(3, 98)$ = 3.76, p = .01 and 9.2% of the variance in the proportion of self-cognitions referring to emotional states, $F(3, 97)$ = 3.26, p = .03. Within the model, memory valence significantly predicted state self-esteem (β = −.30, p < .01), whereas integration significantly predicted the proportion of emotional self-cognitions (β = .29, p < .01). Recalling negative SDMs was associated with lower state self-esteem than recalling positive ones and recalling non-integrative SDMs was associated with a higher proportion of emotional self-cognitions than recalling integrative ones. Specificity and integration did not have an effect on state self-esteem (ps > .54), whereas valence and specificity did not have an effect on the proportion of emotional self-cognitions (ps > .24).

Our model did not significantly predict the level of state self-concept clarity; the proportion of negative self-cognitions; the proportion of self-cognitions referring to personal characteristics and social identities; and the proportion of achievement, relationship and recreation/exploration goals (all ps > .21). However, there was a trend for an effect of valence on the proportion of achievement goals (β = .20, p = .05) and that of recreation/exploration goals (β = −.19, p = .06). The retrieval of negative SDMs was associated with a marginally higher proportion of achievement goals and a lower proportion of recreation/exploration goals than the retrieval of positive SDMs. Memory characteristics did not independently predict any of the other outcome variables (all ps > .22).

Because there was a marginal difference between conditions in terms of the stress participants had experienced in the week prior to data collection, $F(1, 100)$ = 3.68, p = .06, we repeated the multiple regression analyses for state self-esteem and emotional self-cognitions entering stress as a first step in our model and subsequently entering memory characteristics. Stress significantly predicted 15.4% of the variance in state self-esteem, $F(1, 100)$ = 18.23, p < .001, but it did not predict the proportion of emotional self-cognitions, R^2 = .02, $F(1, 99)$ = 1.76, p = .19. Despite the effect of stress, valence still predicted state self-esteem significantly (β = −.24, p = .01).

Discussion

The results of Study 2 showed that the recall of positive SDMs is associated with higher state self-esteem than the recall of negative SDMs. It is also associated with a marginally higher proportion of recreation/exploration goals and a marginally lower proportion of achievement goals. The extent to which individuals have drawn meaning from the

SDM influences self-cognitions. Individuals are more likely to describe themselves by referring to emotional states after recalling non-integrative SDMs than after recalling integrative ones.

These findings suggest that the recall of negative and non-integrative SDMs may have a particularly negative impact on the self. They also suggest that, in addition to state self-esteem, memory recall affects the type of goals and self-cognitions that individuals report. Although they suggest that these self-aspects may be affected in the immediate aftermath of the recall, our findings are in line with previous research showing that there is a close link between SDMs and goals and self-cognitions (Beike et al., 2010; Jobson & O'Kearney, 2008b; Sutherland & Bryant, 2005). They are also in line with Jennings and McLean's (2013) finding on state self-esteem and self-beliefs changing following memory retrieval. They suggest that, after recalling negative events related to blocked goals, individuals may be more likely to evaluate themselves negatively and to focus on goals about desired activities/states that require effort—perhaps in an attempt to compensate for those blocked goals. After recalling past achievements, on the other hand, individuals may be more likely to evaluate themselves positively and to focus on other priorities, such as recreation. Although our finding concerns memory valence rather than closure, it fits with Beike et al.'s argument that individuals engage in memory-related behaviours when they think of memories related to thwarted goals because they want to make up for these goals and then move on to others (Beike et al., 2007, 2010).

The failure to find significant differences between participants in the two memory conditions in terms of state self-concept clarity may indicate that SDM recall does not directly influence how clear individuals are about who they are, thus supporting the findings of Study 1. It is also likely that methodological issues affected the results. First, we did not assess trait self-concept clarity, so any differences between participants in the two conditions on this variable may have affected the extent to which they were influenced by memory recall. Second, the fact that negative memories were less negative than positive memories were positive may mean that they exerted a weaker influence on state self-concept clarity than the positive ones. This, however, does not explain the state self-esteem differences between participants in the two conditions. In addition, despite the difference in absolute valence, positive and negative memories were associated with equally intense emotions.

Our finding that the recall of non-integrative SDMs was associated with a greater use of emotional states to describe the self than the recall of integrative SDMs supports Beike et al.'s (2004) finding that the recall of open memories is associated with a greater use of internal-referent self-descriptors than the recall of closed memories. It is also in line with the finding that open memories elicit more intense emotional responses than closed ones (Beike et al., 2007; Beike & Wirth-Beaumont, 2005). Because of the open-ended nature of the TST, we could not determine whether participants experienced the emotional states following recall or generally in their life. Nevertheless, our finding suggests that recalling memories one has not come to terms with may trigger an emotional response or direct individuals' attention to their emotions. It contradicts Lardi et al.'s (2010) finding that integration is unrelated to the affective response to SDM recall, although this difference may be due to methodological issues. First, we did not measure affect directly, although we did ask participants about the intensity of the emotions associated with their memory. Second, unlike Lardi et al., we took strict measures to ensure that participants had followed the instructions and recalled SDMs.

Despite the evidence that their attention turned inward to their emotions after they recalled a non-integrative memory, participants did not report fewer internal-referent self-cognitions (i.e., personal characteristics) or more external-referent self-cognitions (i.e., social identities) after recalling an integrative memory. The proportion of negative self-cognitions and relationship goals they reported was also unaffected by memory characteristics. This may be related to the measures we used. The TST and the personal goals measure ask individuals to describe themselves and their goals without specifying a time frame, as state self measures do. Participants may have provided a global description of themselves and of goals they wish to achieve in the long run, thus reporting stable aspects of the self. Most of the self-cognitions they generated, in fact, referred to relatively stable personal characteristics (e.g., *honest*, *tall*) and social identities (e.g., *female*, *dancer*). Finally, the self-positivity bias may have exerted a greater influence on participants' responses to the TST—which is an open-ended measure—than on their responses to the state self-esteem scale. This may explain why they reported higher state self-esteem but not a lower proportion of negative self-cognitions after recalling a positive SDM.

Problems with the measures we used may have been the reason why we failed to find evidence for an effect of memory integration, content, or specificity on any other post-recall self-characteristics. Another explanation for this finding is that memory integration does not affect aspects other than emotion, and that specificity and content do not affect the impact that the memory has on the self when retrieved. Although the research reviewed by McKay et al. (in press) suggests that specificity facilitates psychological adjustment and the formation of a continuous life and identity narrative, it may affect the self in a more permanent way instead of having temporary effects at the moment of memory retrieval. With regard to meaning, our assessment may have influenced results. As mentioned earlier, individual characteristics, the type of memory and the conceptualisation of meaning have important implications for the relationship between meaning and psychological well-being (see Greenhoot & McLean, 2013). The research on this relationship has often focused on indicators of long-term well-being (e.g., depression, self-esteem). However, Greenhoot and McLean (2013) argue that individuals' responses to measures of long-lasting feelings or traits may be influenced by how they are feeling at the moment. If that is the case, the factors influencing the relationship of meaning with long-term well-being may also influence its relationship with current feelings or self-perceptions. In this study, we focused only on integrative meaning (Singer & Blagov, 2000) and did not take into consideration participant characteristics such as personality or culture. Had we assessed other aspects of meaning and taken other factors into consideration, we might have found a connection between meaning and the self in the immediate aftermath of the memory recall.

GENERAL DISCUSSION

The two studies presented in this article showed that the retrieval of emotional, highly rehearsed, self-relevant memories influences individuals' sense of self temporarily. Depending on memory characteristics such as valence and integrative meaning, following retrieval individuals report specific goals, self-cognitions and evaluations about their self-worth. They report higher state self-esteem, marginally more positive goals related to recreation or exploration activities, and marginally fewer goals related to effortful achievements

following the retrieval of a positive SDM than after the retrieval of a negative SDM. If they have abstracted meaning from the SDM, they report fewer self-cognitions referring to emotional states.

A theoretical framework that may explain our findings is the self-memory system (SMS) model (Conway, 2005; Conway, Meares, & Standart, 2004; Conway & Pleydell-Pearce, 2000; Conway, Singer, & Tagini, 2004). According to this model, in addition to a stable long-term self, individuals also possess a working self that is active at any one time. The primary components of this working self are self-images and goals. When there is a change in environmental demands, an emotional response is elicited and a past SDM and an associated working self are activated to help the individual respond adequately to the change (Conway, Singer, et al., 2004). The goals of the working self are involved in positive and negative feedback loops which generate plans to regulate behaviour by respectively increasing or decreasing the discrepancy between the individual's actual state and a standard (Conway, Meares, et al., 2004). The images related to negative or traumatic experiences become a standard that the self has to avoid in positive feedback loops.

It may be argued that, in our studies, memory recall was associated with the activation of a working self that was related to or congruent with the memory. Because working selves are believed to modulate cognition, affect and behaviour (Conway, Singer, et al., 2004), they may have been reflected in participants' responses to the post-recall measures. The state self-esteem and self-cognition measures, for example, may have captured the self-images making up the working self and participants' cognitive and emotional response to its activation. Similarly, the personal goals measure may have captured its goals. Our findings suggest that negative working selves may have had preferential access in the negative memory condition and remained latent in the positive memory condition. In addition to more negative self-images, these working selves may have contained more achievement-related goals and fewer recreation/exploration goals than the positive working selves associated with the positive SDM (although this was a non-significant trend). The aim of this achievement-focused goal hierarchy may have been to increase the discrepancy between the individual's actual state and the failure-related standard represented in the self-images related to the negative SDM.

In our studies, we did not ask participants to indicate whether any of the memory-related images came to mind involuntarily. Similarly, although we asked about memory-related emotions in Study 2, we did not directly assess participants' emotional state following recall. However, the memories participants described contained vivid images and were highly important for the self, so they may still help us understand the impact of intrusions on patients suffering from psychological disorders. Based on our findings and on the SMS model, we propose that intrusions may be part of a working self which is related to the negative or traumatic experience from which they originated. As the SMS model suggests, negative/traumatic memories which threaten self-goals are highly accessible because the SMS cannot guide their processing and cannot integrate them with the individual's autobiographical knowledge (Conway, Meares, et al., 2004; Conway & Pleydell-Pearce, 2000). When patients encounter shifts in environmental demands (e.g., trauma reminders), these memories and associated working selves may be activated (Conway, Meares, et al., 2004). As a result, patients experience negative self-images or beliefs (e.g., "I am a failure") which may produce low state self-esteem. They may also experience the activation of goals that were blocked by the negative/traumatic event and this, as Philippe et al. (2011) suggest, may elicit negative affect (e.g., fear, helplessness). These goals may then lead patients to engage in maladaptive behaviours in an attempt to distance themselves from the standard that is represented in the activated self-images. Patients suffering from bulimia nervosa, for example, may engage in self-induced vomiting after a bingeing episode because the spontaneously-generated images of the self as overweight or unattractive (Hinrichsen et al., 2007) activate goals designed to achieve the opposite of what is represented in them.

At the beginning of this article, we argued that understanding the way in which intrusions affect individuals may help us identify effective ways of targeting them in therapy. Our findings suggest that valence and integrative meaning are characteristics of SDMs that influence the impact of their recall on the self. An implication of these findings is that interventions targeting intrusions may need to reduce the negative valence of the memory associated with them and promote integrative meaning. Therapists can, for example, help patients to reappraise the experience and place it in the context of their life story. Memory reappraisal and integration may already occur as a result of specific cognitive-behavioural interventions. Imagery rescripting (Arntz & Weertman, 1999; Smucker, Dancu, Foa, & Niederee, 1995), for example, helps individuals reappraise the memory and perceive it as less negative (e.g., Çili, Pettit, & Stopa, 2014; Dibbets, Poort, & Arntz, 2012; Wild, Hackmann, & Clark, 2007, 2008) and less relevant for their sense of self (Çili et al., 2014). When such changes in valence and meaning do not occur spontaneously, we propose that explicit attempts to achieve them may be beneficial. They may reduce the impact that the memory retrieval has on the self, help patients to achieve a coherent sense of self and alleviate symptoms.

Another implication of our findings is that interventions targeting intrusive images may benefit from addressing the working selves containing these images and from attempting to reduce their accessibility. Preliminary results from Çili et al. (2014) show that individuals report more positive self-aspects (e.g., higher state self-esteem and positive affect) following the retrieval of a rescripted memory, suggesting that they may access a more positive post-recall working self as a result of imagery rescripting. Such changes may occur spontaneously once the negative memory has been reappraised and its accessibility (and that of the associated working selves) has been reduced. However, therapists can train patients to *deliberately* access more positive working selves when negative memories are activated. Patients with social phobia, for example, may be helped to access benign, realistic self-images formed as a result of video feedback when they enter anxiety-provoking social situations (e.g., Clark, 2001).

Our studies present a series of limitations. First, in both studies the positive and negative memories were not entirely comparable in terms of their properties and this may have influenced the results. Second, the design of both studies does not allow us to draw any conclusions regarding causality. Designs involving a control condition (e.g., neutral memory) or state self measures administered both before and after memory recall might have facilitated such conclusions. Third, little control of factors that could influence the results was exercised. Trait or state anxiety, for example, may have affected participants' mood, whereas factors such as participants' culture and personality may have affected our findings on meaning in Study 2. Fourth, our samples consisted primarily of psychologically healthy young adults whose self-perceptions and goals may differ from

those of individuals at other life stages (Erikson, 1950). The findings, therefore, may not generalise to the population at large or to clinical populations. Fifth, the findings regarding the role of meaning need to be treated with caution. Greenhoot et al. (2013) found little overlap between the coded characteristics of narratives (including meaning making) and participants' ratings of memory qualities. These authors suggest that assessments of meaning from narratives may capture "on-the-spot sense-making attempts" (p. 10) triggered by negative affect rather than prior processing. Including other measures of meaning (e.g., questionnaires) might have helped us check whether this was the case in Study 2. Finally, some of the self measures we used may not have been suitable or sensitive enough to detect changes in the working self and may have therefore provided only a patchy picture of how participants felt following memory recall.

Despite their limitations, to our knowledge these studies represent the first attempt to date to investigate the impact of SDM recall on individuals' online representation of the self. The fact that some of their hypotheses were supported is very encouraging. Future research needs to replicate these studies exercising greater control over potentially confounding variables such as anxiety, taking into consideration factors such as participants' personality and culture, and including control conditions (e.g., neutral memory recall). It also needs to consider different aspects of meaning to see how they are related to the characteristics of the post-recall working self. If our and Conway's (e.g., Conway, Singer, et al., 2004) theory about memory recall leading to the activation of a related working self is correct, future research may also benefit from providing a more accurate operationalisation of the working self and from identifying or developing better ways of assessing this construct.

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