

On the advantage of autobiographical memory pliability: implantation of positive self-defining memories reduces trait anxiety

Veronika V. Nourkova & Darya A. Vasilenko

To cite this article: Veronika V. Nourkova & Darya A. Vasilenko (2017): On the advantage of autobiographical memory pliability: implantation of positive self-defining memories reduces trait anxiety, *Memory*, DOI: [10.1080/09658211.2017.1420195](https://doi.org/10.1080/09658211.2017.1420195)

To link to this article: <https://doi.org/10.1080/09658211.2017.1420195>



Published online: 28 Dec 2017.



Submit your article to this journal [↗](#)



Article views: 23



View related articles [↗](#)



View Crossmark data [↗](#)



On the advantage of autobiographical memory pliability: implantation of positive self-defining memories reduces trait anxiety

Veronika V. Nourkova and Darya A. Vasilenko

Department of General Psychology, Lomonosov Moscow State University, Moscow, Russia

ABSTRACT

This paper is devoted to the mechanism of the positive construction of autobiographical memory. Positive construction consists of the spontaneous transformation of memories in the direction of the subjective enhancement of self-competence in past activities to anticipate improvement over time. We speculated that trait anxiety may indicate a failure to exhibit this mechanism that results in a deficit of affirmative self-esteem. We hypothesised that the implantation of positive self-defining memories in anxiety-evoking domains would decrease trait anxiety. One hundred twenty adults recollected three negative self-defining memories. Then, half of the participants imagined episodes of desired behaviour that differed from the originally recollected ones either in discussion or in hypnosis. Thirty participants experienced a hypnotic state without any references to memories, and the rest formed the control group. Subjects from the “Memory Implantation in Hypnosis” group became unable to distinguish the originally reported memories from the imagined ones, exhibited decreased trait anxiety scores after a 4-month delay, and reported enhanced self-esteem. In contrast, the participants from the “Hypnosis with no reference to the past” group exhibited decreased scores at a short delay but later returned to their original scores. These findings highlight the power of cured episodic-like autobiographical memory for updating the self.

ARTICLE HISTORY

Received 25 May 2016
Accepted 10 December 2017

KEYWORDS

Autobiographical memory; positive construction; false memories; self-defining memories; trait anxiety

Theoretical framework

From a functional perspective, autobiographical memory plays a crucial role in the unique human ability to be subjectively responsible for actions in the distant past and to be guided by goals addressed to a distant future, i.e., to resist situational needs in favour of a large time scale perspective. First, autobiographical memory supports this ability by keeping a sense of personal consistency across long periods of time, which is termed self-coherence (Conway, Singer, & Tagini, 2004), self-continuity (Bluck & Alea, 2008), narrative identity (Habermas & Köber, 2015) or diachronic unity (Eakin, 2008). Second, autobiographical memory makes prospective goal setting possible by establishing adequate self-concept and self-esteem that is rooted in remembered experiences. Addressing autobiographical memory is essential for answering questions of the type, “Who am I?” and “What am I able to achieve?” It is worth noting that ontogenetically autobiographical memory precedes self-concept and emerges through verbal interaction between a child and close adults (Nelson, 1993). In autobiographical dialogues, parents assist a child in the acquisition of a proper format of autobiographical recall that marks significant and socially desirable personal characteristics, values and goals (Fivush, 2011; Wang, 2016). According to the relevant literature, a normal self-concept should be rooted in an available set of autobiographical memories;

therefore, the construction of meaningful relations between significant autobiographical memories and self is a fundamental aspect of human development (McLean, Pasupathi, & Pals, 2007; Pasupathi, Mansour, & Brubaker, 2007). In addition, autobiographical memory is aimed at achieving a strong sense of authorship of one’s own life (McAdams, 2013) that helps to resist obstacles and to retain an optimistic style of future thinking (D’Argembeau, 2012).

Taken together, these functions imply that any adequate explanation of autobiographical memory should be linked to a theory of self. The most prominent model proposed by M. Conway and colleagues emphasises a reciprocal relationship between autobiographical memory and self (Conway, 2005; Conway & Pleydell-Pearce, 2000; Conway et al., 2004). In this model, autobiographical memory is viewed as a component of the self-memory system (SMS), in which the self (at least in adults) dominates over memory. This system operates so that “autobiographical memory and central aspects of the self form a coherent system in which, in the healthy individual, beliefs about, and knowledge of, the self are confirmed and supported by memories of specific experiences” (Conway, 2005, p. 595).

Positive construction in autobiographical memory

Hypothetically, autobiographical memory should be designed to allow people to make progress in their lives.

To accomplish this, people must believe that they are able to achieve in the future what they did not achieve in the past. If this is the case, the best strategy for the functioning of autobiographical memory might be the spontaneous transformation of memories in the direction of the subjective enhancement of self-competence in past activities to anticipate improvement over time (McKay & Dennett, 2009; Ross & Wilson, 2003). At the same time, people must be highly confident in personal memories with no doubts that their memories reflect their original experiences. In accordance with these assumptions, the most common way of autobiographical memory distortion is a positive bias (Walker, Skowronski, & Thompson, 2003).

A wide range of psychological mechanisms make both spontaneous and directed positive constructive remembering possible. First, both encoding and retrieval follow positive selectivity. Diary studies have revealed that memories of pleasant events outnumber memories of unpleasant events by at least 2-fold (Berntsen, 1996; Thompson, Skowronski, Larsen, & Betz, 1996). Second, it has been demonstrated that the intensity of emotions associated with unpleasant events fades faster than the intensity of emotions associated with pleasant events (i.e., the fading affect bias (FAB), Walker, Vogl, & Thompson, 1997). Moreover, the emotional intensity of positive memories may increase over time (Ritchie et al., 2006). Third, negative memories may be reinterpreted through associations with positive consequences for later life and meaning-making (McLean & Pratt, 2006). Fourth, the content of memories may be spontaneously aligned along a more positive direction (Schlagman, Schulz, & Kvavilashvili, 2006), and finally, the entire set of memories may be implanted or self-implanted to the extent that the person will take false positive memories as true memories (Frenda, Nichols, & Loftus, 2011; Loftus, 2005). Thus, we can conclude that the positive transformation of autobiographical memories, in general, reflects a highly adaptive and healthy strategy of autobiographical memory functioning.

However, in our opinion, there is an important omission in the literature that needs to be analysed more precisely. Namely, the division of memories into negative and positive seems to be an inappropriate simplification because it ignores their reference to self-continuity, self-competence and self-esteem. Notably, in a correlational study involving more than 700 participants, Philippe, Koestner, Beaulieu-Pelletier, and Lecours (2011) provided evidence that self-competence and emotional valence are orthogonal characteristics of autobiographical memories.

Trait anxiety as a failure in positive construction

Trait anxiety may be denoted as a stable personal characteristic that consists of a constant and intensive worry of being unsuccessful in a wide range of situations that interferes with daily life. A meta-analysis of 18 longitudinal studies of anxiety and self-esteem revealed their

bidirectional relationships. It was demonstrated that low self-esteem constitutes a causal risk of anxiety, and reciprocally, low self-esteem is a consequence of anxiety (Sowislo & Orth, 2013). Van Tuijl, de Jong, Sportel, de Hullu, and Nauta (2014) empirically demonstrated that low self-esteem in a non-clinical sample of adolescents predicted social anxiety symptoms two years later. Following the mnemonic model of posttraumatic stress disorder that postulates that memories of a traumatic event and not the event itself cause pathological symptoms (Rubin, Berntsen, & Bohni, 2008), by extension, we can speculate that negative bias in autobiographical remembering affects anxiety. As autobiographical memory is considered to be a database for self-esteem and operates normally under the influence of positive construction, it is likely that positive construction deficits diminish positive self-esteem to provoke trait anxiety. In turn, episodes of incompetence and behavioural fiascos may be encoded and retrieved selectively due to their congruency with existing low self-esteem, which enhances the anxiety. In line with this notion, it has been demonstrated that the loss of self-competence over a month interval uniquely promotes more frequent and more emotionally intensive recalls of achievement-related personally significant negative events (Tafarodi, Marshall, & Milne, 2003). Agreeably, the fact that positive autobiographical memories strengthen self-esteem, whereas negative autobiographical memories weaken self-esteem was recently examined directly, and the results provided additional support for the FAB effect in healthy participants (Ritchie, Sedikides, & Skowronski, 2016).

A negatively biased autobiographical recall in anxious subjects has been reported as a core feature of pathology in anxiety disorder (Morgan, 2010). Anxious individuals systematically retrieve a larger number of negative, threatening and anxiety-related autobiographical memories in response to various instructions (Burke & Mathews, 1992; Herrera, Montorio, & Cabrera, 2015; Pinto Gouveia & Matos, 2011). These individuals also report more goals related to overcoming anxiety and have larger self-discrepancies than non-anxious participants (Krans, deBree, & Bryant, 2014). Again, in our opinion, this effect may not be attributed exclusively to selectivity at encoding and retrieval but is at least in part, due to a failure in spontaneous positive construction. In line with this assumption, it has been demonstrated that individuals with high trait anxiety reported lower decreases in the emotional intensity of negative memories over time than individuals with low trait anxiety (Walker, Yancu, & Skowronski, 2014). It is worth emphasising that differences between low and high anxious individuals were detected not only in retrospective comparisons of initial and current affect associated with the event recollected from their distant past but also at a week delay after the event occurrence. However, there is some inconsistency in the results. A meta-analysis provided only modest support for implicit negative memory bias across anxiety disorders

(approximately 40% of the reviewed studies) and no effect on explicit memories (Coles & Heimberg, 2002).

The picture may be more unambiguous if we do not address all autobiographical memories but focus on self-defining memories, i.e., memories of the highest subjective relevance to self-assessment. Such memories disclose the type that a person is and how one has become that person (Singer & Blagov, 2004; Wood & Conway, 2006).

Berntsen and Rubin (2007) demonstrated that if the content of self-defining memories threatens positive self-esteem, for example, induces shame, the memories make unique and independent contributions to depression, anxiety and stress prediction. In Sutin and Gillath's model, the negative affective content of self-defining memories mediates the association between attachment anxiety and depressive symptoms (Sutin & Gillath, 2009). Recently, mild but significant inverse correlations were found between phenomenological measures of self-defining memories (i.e., vividness, sensory details, accessibility, coherence, etc.) and trait anxiety in a large student sample (Luchetti & Sutin, 2016). The results of this study revealed that less anxious students root their self-esteems in more subjectively accessible, vivid, detailed and coherent self-defining memories. Taken together, the data reported above indicate the possibility of making a causal linkage between autobiographical memories, self-competence and anxiety.

Memories of self-competence decrease state anxiety in relevant activity

Although it is quite clear that anxiety is associated with self-deprecating autobiographical memories, almost nothing is known about the inverse causal relationship. However, there are a few papers proving that the promotion of the retrieval of specific positive memories during psychotherapy influences symptom reduction in depressed patients (Neshat-Doost et al., 2013; Serrano, Latorre, Gatz, & Montanes, 2004). Werner-Seidler and Moulds' (2014) research focused directly on the emotional outcomes of the recall of positive self-defining autobiographical memories in depressed and non-depressed individuals. These authors found that the voluntary recall of positive self-defining memories sustains "mood repair" after the induction of a sad mood by mournful video only in non-depressed participants.

To the best of our knowledge, there is only one study that has directly tested the hypothesis that activating true success memories that are relevant to the future situation the person is worrying about leads to better performance and decreases anxiety. Pezdek and Salim (2011) asked student participants to recall as vividly as possible an autobiographical memory pertaining to a positive public-speaking experience before the age of 10. The participants were then involved in a life-like stressful task that evoked public-speaking anxiety. The authors observed physiological, psychological and behavioural changes after activating

positive relevant autobiographical memories. These changes included a decrease in salivary cortisol, a decrease in self-reported anxiety and better performance in the assessment of video data.

These results are highly important because they link the empirical retrieval of autobiographical memories, self-esteem, self-competence and performance such that autobiographical memories serve as a "tool" for the activation of specific aspects of self-esteem. Consequently, positive memories evoke optimistic expectations towards self-competence in relevant future activity and, hence, decrease anxiety and improve performance.

Whereas Pezdek and Salim considered state anxiety and true autobiographical memories, we shall concentrate on trait anxiety and false implanted memories. The present empirical study examines the possibility of eliminating trait anxiety by directed positive construction of false self-defining memories that express the most vulnerable aspects of self-concept. In this study, special emphasis is placed on the duration of the proposed effect.

The present research

The starting point of our experimental study was a reciprocal view of the interdependence between self-defining autobiographical memories and self-esteem. Because people rely on their memories to understand who they are and formulate where they are going, the fact that anxious individuals have memories that deprecate their feeling of self-competence allows us to hypothesise that trait anxiety arises as a result of a deficit in the positive construction of autobiographical memory. In this vein, we speculated that the construction of new memories about successful resolutions of past situations in which anxiety was evoked would promote higher self-competence in these domains for the future and hence decrease trait anxiety. Thus, the main goal of the experimental intervention was to equip the participants with objectively artificial but subjectively true positive self-defining memories with the expectation that the exercise would affect trait anxiety.

Controversy in memory implantation techniques: does hypnosis boost the effect?

In recent decades, numerous techniques have been employed to implant rich false memories of events that did not occur (Loftus & Davis, 2006). All successful techniques known today combine four common features as follows: general plausibility, personal suitability, imaginability, and confusion in the distinction between perceived events and imagined events (Nourkova, Bernstein, & Loftus, 2004; Pezdek, Blandon-Gitlin, & Gabbay, 2006; Scoboria, Mazzoni, Kirsch, & Releyea, 2004). Hypnosis allows for these characteristics to be enhanced to a greater extent. During hypnosis, people reduce criticism towards the plausibility and suitability of events, develop vivid images of the events that are full of perceptual details and

frequently mistake events that were only imagined for reality. Many studies suggest that hypnosis makes people more prone to memory distortion (Cox & Bryant, 2012; Lynn, Matthews, & Barnes, 2009; Mazzoni, Laurence, & Heap, 2014). It should be stressed that there is evidence that hypnotically induced memories do not permanently overlay original memories (McCann & Sheehan, 1988) except in cases with specific suggestions to do so (Baker & Boaz, 1983). In our opinion, the aforementioned fact directly resolves a legitimate ethical concern of implanting an altered version of a negative event that occurred in the past. We insist that having both original and altered versions of memories releases a person from being under the compulsion of a traumatic experience and allows the self-concept to function more consciously.

In contrast, while Scoboria, Mazzoni, Kirsch, and Milling (2002) observed an additive effect of hypnosis and misleading questions in producing memory errors, other researchers have insisted that even if hypnosis somehow facilitates memory alteration, the effect is relatively small (Kirsch, Mazzoni, & Montgomery, 2007). Consistent with this assumption, detailed and coherent memories of events that never occurred were created in waking people by employing the “imagination inflation” paradigm or just by misleading suggestions (see for review Loftus, 2005; Pezdek & Lam, 2007; Scoboria et al., 2017). For instance, in our previous study (Nourkova et al., 2004), we used a strong suggestion to plant a false memory of having witnessed a wounded animal as part of a truly traumatic event. A significant minority of participants produced false memories full of sensory details (e.g., “a bleeding cat lying in the dust” or “a lost parrot in a cage”). The problem becomes far more complicated when we account for the possibility that any imaginative suggestions that are essential for implanting artificial memories enter a subject through a type of altered state of consciousness.

At the same time, we were aware that anxiety can have various causes, and therefore, treatments may also vary. Recently, Rotaru and Rusu (2016) conducted a systematic review of the efficacy of hypnosis in relieving anxiety and found that the results reported in six papers reflected a positive influence of hypnosis on the long-term reduction of symptoms. Hence, hypnosis itself may cause a decrease in anxiety without memory implantation.

Due to the controversy described above, all three possibilities were tested in our study, i.e., memory implantation through imagination in a non-hypnotic state, memory implantation through imagination in a hypnotic state, and hypnosis were all tested.

Method

Participants

A total of 120 adult volunteers were recruited for the study through an Internet advertisement in Moscow, Russia ($M = 38.42$ years, $SD = 11.6$, range = 20–65 years; 73 females and

47 males). The advertisement called for people to probe a novel method of anxiety management. Candidate participants contacted researchers via email and were then run through six separate individual sessions as described below.

Measures

The trait anxiety was assessed three times using Taylor’s Manifest Anxiety Scale (TMAS, Taylor, 1953). This scale consists of 50 statements and evaluates relatively stable aspects of “anxiety proneness”, including general states of calmness, confidence and security (Levitt, 2015). This instrument was chosen because it has been translated and adapted to the Russian population with good psychometric properties (Nemtchine, 1966). The total score ranges from 0 to 50, and a cut-off point of 21 has been suggested to detect clinically significant symptoms of anxiety as derived from a Russian standardised sample.

To measure the extent of the acquisition of implanted memories, at the sixth session, each participant from the “Discussion” and “Memory Implantation in Hypnosis” received an individual list with short descriptions of 24 plausible past events. The list included six target episodes, three that were originally reported in Session 1, and three that were created during the experimental sessions. To avoid direct recognition, the exact wording varied slightly for each pair (e.g., “At the matinee when you were in the second grade, you were so confused while speaking in public that you forgot the words of the poem and felt that you had disappointed your father” vs “You enjoyed the event at the school concert where you recited the poem and noticed how your father was happy and proud of your brilliant performance”). The remaining 18 descriptions served as fillers. The participants were asked to rate their subjective confidence that those episodes occurred in their personal past from 1 to 4. The distinction between a pure false memory as a highly elaborated mental image of the past episode and false belief in a fictitious experience has been the subject of much debate (Pezdek & Lam, 2007; Wade et al., 2007). Nevertheless, we limited the testing procedure to statements of remembering without a more focused interview due to three reasons. First, we generally ascertain that “verbal statements of remembering may be a starting point for identifying false memories, but alone they are not adequate for determining that an event is remembered” (Scoboria et al., 2017, p. 150). However, because we acquired descriptions of “original” memories that were full of perceptual details, cross-modal imagery and emotional content in Session 1, we determined that their subsequent ratings may be considered as a criterion for attributing memories with similar scores to recollection and not to belief. Second, it may be argued that, after passing through the intensive mental simulation of altered versions of past events, the participants from both groups definitely possessed a perceptual imagery for these doctored events. Thus, our current concern was whether the misattribution of imagined

scenes to memory had occurred taken place. Lastly, the reason for not asking initially anxious individuals to narrate a comprehensive recollection or to complete a type of memory characteristic questionnaire was the ethical concern of provoking source-monitoring of accepted positive memories, which is known to demolish subjective confidence (Dodson, Koutstaal, & Schacter, 2000; Sharman, Garry, & Hunt, 2005). Conversely, in doing so, we could have been able to improve the credibility of our results but may have disrupted a positive effect of the intervention.

Additionally, self-reports about the consequences of interventions in daily lives were collected from the participants at the final session.

Experimental manipulations

For the reasons described above, we isolated variables of interest with respect to the presence/absence of addressing autobiographical memories and with respect to the presence/absence of a hypnotic state. Therefore, the experiment was designed as a 2×2 factorial experiment involving the task of imagining an episode that consisted of proper and successful behaviour in anxiety-evoking situations that were recollected in Session 1 or the performance of a task with no reference to personal past as administered in or out of hypnosis. Thus, four conditions were investigated as follows: imagining episodes in hypnosis, imagining episodes without hypnosis, performing a neutral task in hypnosis and performing a neutral task out of hypnosis as a control condition. The design included three repeated measures (TMAS 1, TMAS 2, TMAS 3) of the dependent variable (TMAS scores).

Procedure

Volunteers individually participated in six successive sessions. Each session lasted from 35 minutes to 1 hour.

In Session 1, the volunteers completed the TMAS. Next, the experimenter asked each participant to recollect three self-defining memories specific to domains that routinely made them anxious about their own self-competence. The exact instructions were as follows: "Recollect, in as much detail as possible, three episodes from your past that represent to the maximum degree your personal traits that force you to be worried and anxious." We considered this instruction sufficient due to the direct addressment of "an important unresolved theme or enduring concern" (Singer & Salovey, 1993, p. 13).

Upon arrival to Session 2, for the main manipulation, the participants were randomly assigned to one of four groups ($N = 30$ for each group). Each group then participated in three consecutive experimental sessions according to the group type.

The participants assigned to the "Discussion" group received the following instructions:

Let us talk about an episode that might have occurred but did not occur in the past. This situation refers to your personal trait

X (from the list collected at Session 1) that forces you to be anxious. Close your eyes and then imagine the beginning of the situation. Now, step-by-step, visualize your proper actions in this situation and describe what you do, what you see, what you hear, what you smell, etc. in every detail.

Participants assigned to the "Hypnosis" group were placed in a hypnotic state, but no suggestion concerning memory was given. The employed procedure was a type of Ericksonian conversational hypnosis (Lankton, 2012; Matthews, Conti, & Starr, 1998) and was based on cooperation between the participant and the hypnotist, who guided and supervised the process while encouraging the participant to generate his/her own images and allowing the subjects to maintain their authorship towards the products of imagination. Subjects who entered a trance state were first suggested to focus attention on bodily sensations (breathing, heart rate, eye movements); they were then asked to imagine various pleasant landscapes, such as a "sandy beach" or a "morning forest" with directed concentration on multi-modal sensations, for instance, hearing the sound of the surf or smelling blossoming flowers. After the hypnotist (DV) considered the state to be sufficiently deep by catalepsy of the dominant hand probe, the participants listened to an audio recording of sounds of nature for 5 minutes.

Participants assigned to the "Memory Implantation in Hypnosis" group entered a hypnotic state as described above and were asked to imagine themselves in the originally reported situation while behaving in line with their preferences without being anxious (similarly to the "Discussion" group).

The fourth group served as a control group with no references to autobiographical memories or an altered state of consciousness. These participants listened to audio recordings of sounds of nature for 35 minutes.

The cycle of manipulation was repeated in three consecutive experimental sessions that occurred at intervals of approximately 1 week. The participants in the "Discussion" and "Memory Implantation in Hypnosis" groups elaborated one different episode per session (three in total).

Approximately 3 days (Session 5, test 2) and 4 months (Session 6, test 3) later, the participants completed the TMAS scale again. At session 6, the participants in the "Discussion" and "Memory Implantation in Hypnosis" groups also performed a test to measure the extent of the acquisition of the implanted memories. Self-reports on changes after the participation in the study were also collected at Session 6.

Results

Three hundred sixty self-defining memories related to the domain of anxiety were collected. All of these memories appeared to be older than one year. Below, we provide two samples of narratives reported in Session 1. Participant ZL, a 45-year-old man who complained of destructive

reactions to any criticism, said the following when asked about an anxiety-evoking self-defining memory:

Six years ago, I was invited to rehearse the role in opera. I was invited by a director personally. And there was another singer who was rehearsing the same role in parallel with me. I sacrificed so much effort to make my best, to be part of the premiere. After all, the uncertainty remained until the last day. The cast composition was not announced. This, perhaps, was the moment when I insisted on looking at the schedule and realized that I was assigned to being a cover. I felt crushed; I couldn't cope with being rejected. I trudged to my make-up room almost crying. Five minutes later the director came in smiling and enthusiastic about the premiere. I was not able to control myself. I jumped up and pushed the director out the door. In a moment, I lost not only my part in the premiere but everything else, too.

Participant AS, a 41-year-old female, reported this self-deprecating story:

I was in my second grade. There was a kind of concert at the school. All parents were there. Children stood in a circle and performed one after the other. I wanted to make my father proud of me. I wanted it so much. I was absolutely sure that I'd learned a poem by heart. I felt as if all stared at me ... and suddenly I was speechless. I opened and closed my mouth and I could not say anything. I did not live up to expectations. I had to perform well. Dad in such a case would be proud of me. But I did not succeed. It seemed to me that my father was very unhappy with me.

Due to the design of the study, only half of the participants were involved in the procedure of the construction of positive versions of anxiety-evoking self-defining memories. One hundred eighty protocols of altered stories (the "Discussion" and "Memory Implantation in Hypnosis" groups) were collected in Sessions 2, 3 and 4. Participant ZL was randomly assigned to the "Discussion" group. When describing the manner he preferred to behave in the situation portrayed at Session 1, he said the following:

It would have been better if I'd understood that the director did not want to insult me, but in fact, he worried about the success of the performance. Being the cover was not actually such a disaster. I should have politely thanked him for his advice and guidance. I should have endured the indignity. And then, perhaps, later, I would have been transferred to the main cast ... Even now I could clearly see the surprised face of the director.

Participant AS went through the procedure of memory implantation in hypnosis. We present below an excerpt from the text of the dialogue between AS and the experimenter:

DV: Could you see the place? Who is there? What do you see around you?
 AS: It is loud and hot, and stuffy. Many people around. Parents, teachers ... My dad gently pushed me into the circle.
 DV: Are you dressed in a uniform?
 AS: Yes, a brown dress and a white apron. All girls are festively dressed. I can't recognize anybody except Vicky. She starts telling a poem. Everybody is applauding. It is my turn now. I get up and start speaking loudly and boldly. About friends ... Words are forgotten.

DV: How would you like to behave from this moment? Try to live through the situation doing your best.
 AS: Ok. I am starting "friends, friends". I cannot remember how to proceed. I'm looking around and make curtsy. I feel mischief and fun. I say "Dear all, I am so sorry I forgot the poem. I can tell you the story in prose".
 DV: How do people react? Your Dad? How are you feeling?
 AS: Everyone is smiling and laughing. Dad is laughing, too. I take my place. Dad leans toward me and whispers "Honey, recite the poem for me at home".

Short-term decrease in trait anxiety in the "Hypnosis" group vs. long-term decrease in trait anxiety in the "Memory Implantation in Hypnosis" group

We first examined whether the distribution of TMAS scores was approximately normal across all three measures in all four groups. Such was the case, as indicated by Kolmogorov–Smirnov tests with p values that varied between .57 and .99. This fitness to a normal distribution allowed us to employ parametric tests for later comparison of means.

A 4 (Group) \times 3 (Test) mixed ANOVA indicated no group effect ($F(3, 118) = 1.665, p = .178, \eta^2 = .042$), significant test effect ($F(2, 118) = 10.871, p = .001, \eta^2 = .086$), and reliable "group \times test" interactions ($F(6, 118) = 19.808, p = .001, \eta^2 = .341$). Thus, we can assume that the participants from different groups but with identical scores at test 1 reacted to manipulations dissimilarly at tests 2 and 3.

To clarify the meaning of these effects, two types of statistical analyses were performed. First, differences between groups within each test were examined by ANOVA followed, where appropriate, by Tukey post hoc test. Second, within group differences between the tests were evaluated by paired-sample t -tests for dependent samples, and Cohen's weighted d effect sizes were estimated (Cohen, 1988).

A one-way ANOVA revealed no differences in TMAS scores in Session 1 before the main manipulation ($F(3, 118) = 0.816, p = .488$). Participants in all groups in Session 1 demonstrated a medium to high propensity for trait anxiety: the "Discussion" group ($M = 23.083, SD = 7.268$), "Hypnosis" group ($M = 19.766, SD = 9.147$), "Memory Implantation in Hypnosis" group ($M = 20.655, SD = 6.831$) and "Control" group ($M = 20.966, SD = 10.305$).

Differences between groups arose 2–4 days after the manipulations at test 2 ($F(3, 118) = 4.065, p = .009$). The "Hypnosis" group demonstrated a decrease in trait anxiety compared with the "Discussion" group ($p = .007$), "Memory Implantation in Hypnosis" group ($p = .042$) and "Control" group ($p = .048$).

With respect to test 3, there was also no equivalence between groups ($F(3, 118) = 3.781, p = .012$). However, unlike the previous test, 4 months after manipulations, the "Memory Implantation in Hypnosis" group became

significantly lower on TMAS scores in comparison with the "Discussion" group ($p = .011$), "Hypnosis" group ($p = .037$) and "Control" group ($p = .050$).

Follow-up paired-sample t -tests revealed no significant differences between tests in control participants ($p > .470$). Similarly, there were no major differences between tests in the "Discussion" group ($p > .300$).

In contrast, for the "Hypnosis" group we detected a decrease in trait anxiety from test 1 to test 2 ($t(29) = 5.84$, $p < .00$, Cohen's $d = 0.524$, $M = 19.766$, $SD = 9.147$ vs. $M = 15.300$, $SD = 7.824$), then returned to their initial values after 4 months ($t(29) = 0.586$, $p = .563$, $M = 20.283$, $SD = 8.408$).

The most important results of the study are the dynamics of the TMAS scores observed in the target "Memory Implantation in Hypnosis" group. There was no significant effect of intervention between test 1 and test 2 ($t(29) = 0.136$, $p = .893$), but a robust decrease occurred at test 3 after 4 months ($t(29) = 7.594$, $p < .00$, Cohen's $d = 0.79$). According to Cohen's suggestions, the effect size for the anxiety decrease at test 3 can be considered as large.

The findings of major interest are described in Figure 1, which depicts the groups' mean scores on trait anxiety on the three tests.

The initial level of trait anxiety and sensitivity to interventions

The data presented in the previous section took into account all shifts in scores after manipulation regardless of the initial level of trait anxiety. An important question

is whether the level of anxiety before intervention may affect participants' scores on the following tests.

In order to determine the role of the initial level of trait anxiety in the sensitivity to manipulations we first computed correlations between these variables for the groups where the main effect was detected. The analysis indicated significant correlations between TMAS 1 and shift in scores at test 2 ($r = -.522$, $p = .003$) and at test 3 ($r = -.410$, $p = .024$) in the "Hypnosis" group. There was a significant correlation between TMAS 1 and shift in scores on test 3 only ($r = -.452$, $p = .014$) in the "Memory Implantation in Hypnosis" group.

We then conducted a regression analysis with curve fitting for both groups separately. The regression analysis showed that initial level of trait anxiety was a significant predictor for variance of shift scores observed later, i.e. the higher the initial level of trait anxiety participants displayed at test 1, the larger the positive effect they showed after manipulations in the "Hypnosis" group at test 2 [$R^2 = .273$, $F(1, 28) = 10.493$, $p = .003$, $\beta = -.522$, $b = -.239$, const $B = 0.26$, $pns = .873$, equation $y = -.239x + e$] and in the "Memory Implantation in Hypnosis" group on test 3 [$R^2 = .204$, $F(1, 28) = 6.938$, $p = .014$, $\beta = -.452$, $b = -.244$, const $B = -.159$, $pns = .938$, equation $y = -.244x + e$].

The remarkable result was identified in the "Hypnosis" group on test 3. We obtained an equation with significant absolute term b [$R^2 = .169$, $F(1, 28) = 5.69$, $p = .024$, $\beta = -.411$, $b = -.217$, const $b = 4.808$, $p = .022$, equation $y = -.217x + 4.808 + e$]. These results

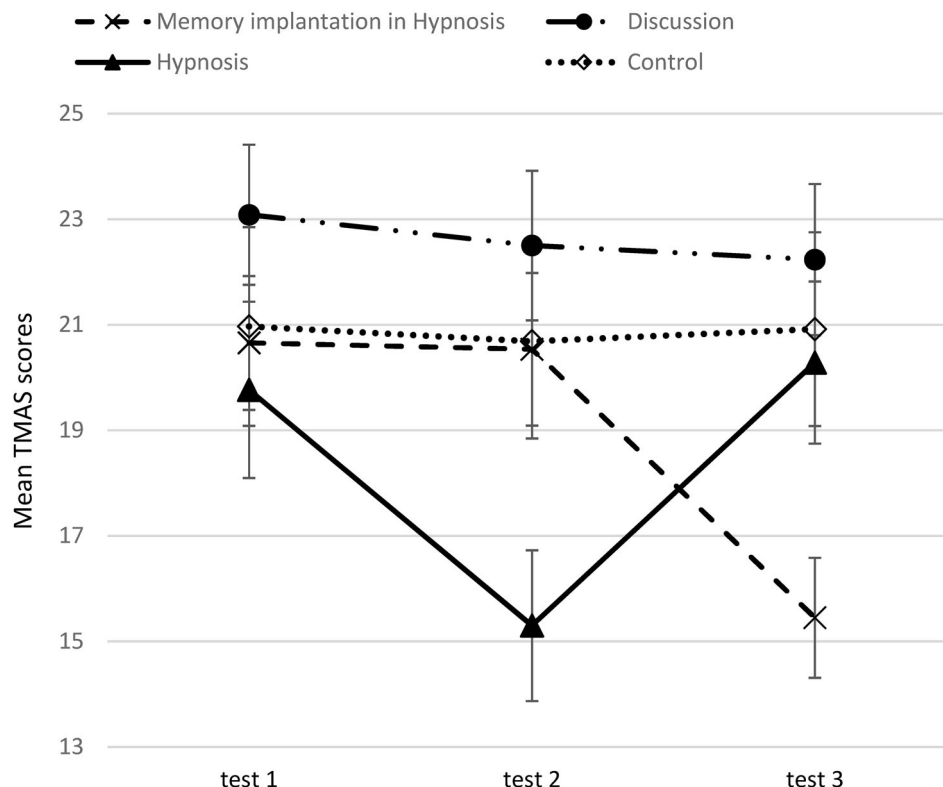


Figure 1. Mean TMAS scores per experimental condition and test. Bars show standard errors of the mean.

demonstrated that, at times, participants assigned to this group not only returned to their starting point 4 months after experiencing three consecutive hypnotic sessions but also sometimes became more anxious (see Figure 2). Hence, the security and neutrality of such manipulation may be questioned.

The acquisition of fabricated positive self-defining autobiographical memories in the "Discussion" and "Implanted Memory in Hypnosis" groups

We examined whether the results might be attributed to the acquisition of new positive self-defining memories. To this end, we compared the mean participants' confidence in 3 originally reported episodes and in 3 episodes constructed in discussion or in hypnosis. The confidence scores did not fit a normal distribution, but considering that dispersion analysis is fairly robust to violations of normality, we performed a two-factor ANOVA 2 (Group) \times 2 (Type of memory: originally reported, imagined), which indicated a significant effect of memory type ($F(1, 58) = 52.625, p < .000, \eta^2 = .476$), group ($F(1, 58) = 33.811, p < .000, \eta^2 = .368$) and reliable interactions between groups and types of memories ($F(1, 58) = 68.912, p < .000, \eta^2 = .543$). It suggests that the participants were more confident about originally reported memories than about the memories created through imagination ($F(1, 58) = 24.465, p < .000, M = 2.716, SD = 0.437$ vs. $M = 2.177, SD = 0.687$, respectively), but this differences obtained were due to the "Discussion" group. Participants from the "Discussion" group distinguished originally reported episodes from episodes of how they would have preferred to behave in past episodes that they had discussed in detail ($F(1, 28) = 128.340, p < .000, \eta^2 = .816, M = 2.788, SD = 0.475$ vs. $M = 1.633, SD = 0.364$, respectively). At the same time, participants from the "Memory Implantation in Hypnosis" group did not distinguish between episodes at all ($F(1, 28) = 0.518, p = .477, \eta^2 = .018, M = 2.644, SD = 0.390$ vs. $M = 2.722, SD = 0.463$, respectively).

Figure 3 shows the medians of subjective confidence in originally reported memories and imagined episodes in two groups.

Self-reports of changes after the participation in the study

In the last Session, all participants were asked to report whether they have noticed any changes over the past four months. There were no negative responses, so all self-reports were divided into three categories. The first category "no changes" included such self-reports as "I learned a lot about hypnosis," "It was a great experience," "Joining the program distracted me from depressing domestic conflicts, allowed me to feel myself at the centre of attention." The second category "positive changes with no reference to self-esteem" had self-reports focused on emotional and behavioural improvements such as "I stopped getting so angry when I'm criticized. I learned to take a minute before reacting the way I would definitely feel sorry afterwards," "I noticed that I began to defend my point in conversations with husband and colleagues more persistently. I'm not afraid to become an object of ridicule," "Since I started visiting the program I have nightmares less frequently. In the morning I wake up rested and refreshed." The third category "positive changes of self-esteem" contained self-reports with direct addressing alteration of self-esteem: "Now I trust my intuition more. If there is a difficult situation, it seems to me that my decision is not worse than the ones offered by other people. I don't feel as Dunno, as I felt before ... too often, may be," "Now, I believe that my failures in the past were not only my fault. Now the circumstances are much more favourable and perhaps I have enough perseverance to take a worthy place in my department," "I met a man a month ago ... Possibly I met the man of my dreams. Isn't it a miracle? I thought that I was not able to attract people, but actually I can do it now."

The majority of participants reported emotional, behavioural or self-esteem changes after taking part in the "anxiety management program" (86/72.5%). The lowest number of participants that did not report changes was observed in the "Memory Implantation in Hypnosis" group (3/10%, $\chi^2 = 8.777, p = .032$). There were no significant group differences in the number of the participants that reported emotional or behavioural changes ($\chi^2 =$

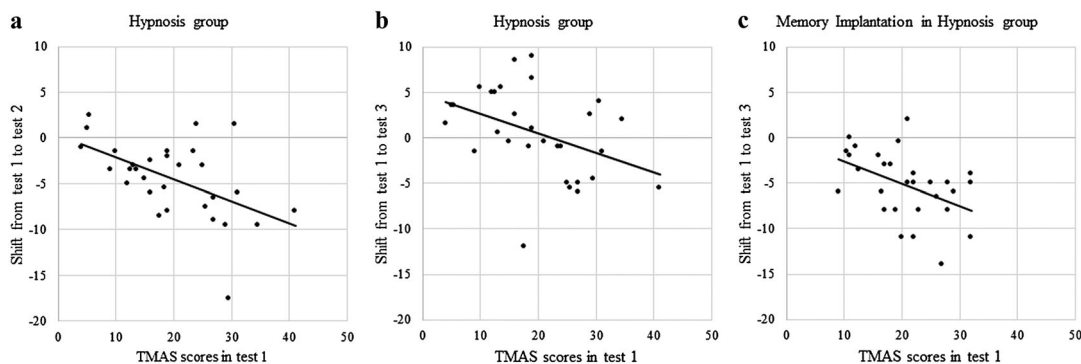


Figure 2. Shift in TMAS scores as a function of initial TMAS scores, (a) represents shift from test 1 to test 2 in the "Hypnosis" group, (b) represents shift from test 1 to test 3 in the "Hypnosis" group and (c) represents shift from test 1 to test 3 in the "Memory Implantation in Hypnosis" group.

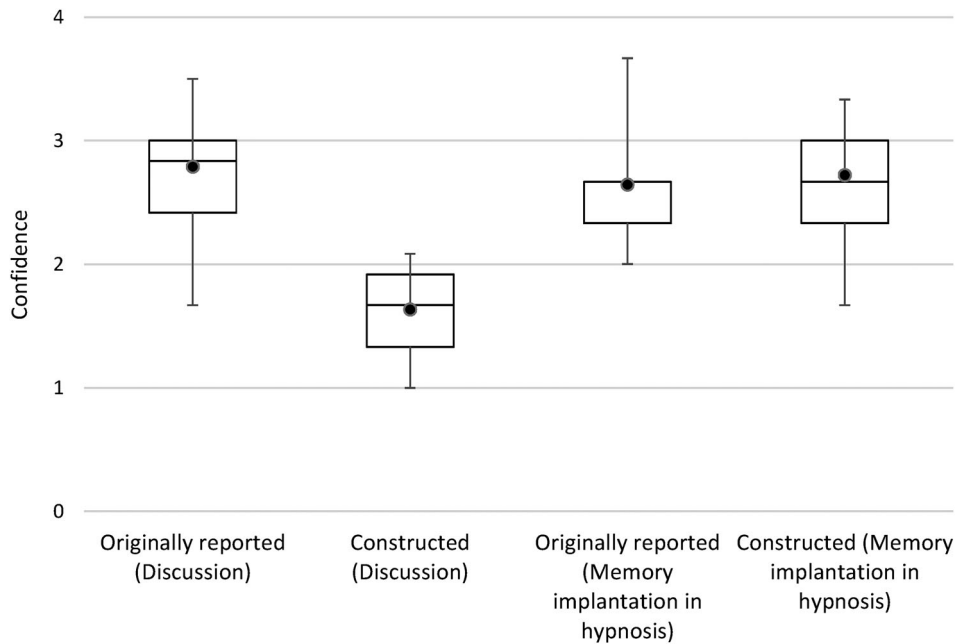


Figure 3. Descriptive statistics for confidence scores of originally reported and constructed self-defining memories. The width of the box represents the interquartile range. The whiskers represent the highest and lowest values. Points represent the averages.

3.318, $p = .345$). Finally, the highest ratio of self-reported changes in self-esteem was revealed in the “Memory Implantation in Hypnosis” group (17/60%) in comparison with the “Discussion” group (8/26.7%), “Hypnosis” group (7/23.3%) and “Control” group (6/20%), $\chi^2 = 12.872$, $p = .005$. Thus, the “Memory Implantation in Hypnosis” experimental group in a final Session demonstrated a pattern of data bringing together a high extent of acquiring implanted memories, an increase in self-esteem and a significant decrease in trait anxiety.

Discussion

The design of our current study adopted the assumption that self-esteem and self-defining memories reciprocally influence each other. We also speculated that, from a functional perspective, the optimal strategy of autobiographical memory functioning is a positive construction, i.e., people spontaneously recollect themselves in the past as more effective and successful. Considering trait anxiety as a case of positive construction failure, we hypothesised that updating autobiographical memory with inaccurate but positive self-defining memories would enhance self-esteem and hence decrease trait anxiety. In line with this presupposition, it has been documented that anxious individuals, on the one hand, have low self-esteem as well as low perceived self-efficacy; on the other hand, these individuals recall negative personal experiences to exemplify and ground their self-esteem.

In this empirical study, we asked 120 participants to recollect three anxiety-evoking self-defining memories and then attempted to intensify the positive construction by imagining episodes different from the originally

recollected ones in the direction of the desired behaviour. This process was performed during discussion or in hypnosis. We succeeded to a higher degree in the latter procedure such that the participants became unable to distinguish the originally reported memories from those created in hypnosis. These results differ from the previous research that proved imagination in discussion to be a relatively powerful strategy of acquiring fabricated episodes (Garry & Polaschek, 2000). This difference may be explained by accounting for the specific features of the anxious participants. One important predictor of fabricated memory acquisition is personal suitability, i.e., the evaluation of an episode as highly coherent with previous experiences. Clearly, episodes of the successful overcoming of an anxiety-evoking situation were not subjectively plausible for our anxious participants; therefore, it was necessary to enhance the multi-modal sensory intensity of images to make them more realistic by employing a hypnotic procedure.

The shift in self-reported trait anxiety measured by the Taylor MAS scale was, as predicted, not observed in the participants who performed a neutral task when awake. The participants assigned to the “Discussion” group also did not change their scores on the TMAS scale. Not surprisingly, the participants placed in hypnotic state without any references to autobiographical memories exhibited a decrease in trait anxiety after a short-term delay, but they later returned to their initial scores. In our opinion, the latter result is in agreement with the assumption that various techniques associated with altered states of mind should be practised on a regular basis to aid the reduction of anxiety symptoms (Craciun, Holdevici, & Craciun, 2012; Epley, Abrams, & Shear, 1989).

In contrast, participants assigned to the “Memory Implantation in Hypnosis” group retained anxiety scores equal to their initial values after a short-term delay but exhibited significant decreases after a long-term delay of 4 months. This result allowed us to associate the acquisition of fabricated memories with a long-term decrease in anxiety. In other words, the empirical results of the study confirmed that artificial positive self-defining memories with episodic-like qualities full of sensory details affect self-esteem.

The speculation on the causal relationship between the acquisition of positive self-defining memories, the upsurge of self-esteem and anxiety reduction may be supported at least in part by self-reports. Despite a well-documented tendency to exaggerate the effect of undertaking any improvement programme (Conway & Ross, 1984), significant differences between groups may serve as an argument. We obtained data indicating that as many as 60% of the participants from the “Memory Implantation in Hypnosis” group reported an increase in self-esteem that coincided with the acceptance of implanted memories and a decrease in trait anxiety. In the groups with no prolonged decrease in trait anxiety, fewer than 27% of the participants reported a similar development.

In our opinion, the theoretical interpretation of the results may be based on the recent version of Conway’s model of the SMS (Conway, 2005; Conway et al., 2004; Conway & Loveday, 2015). From this perspective, the SMS combines three interrelated structures: the working self that unites the conceptual self-system and goals system, autobiographical memory and episodic memory, i.e., a track of fragmentary sensory-perceptual episodes (Conway, 2009). From our perspective, as we insist on a dissociation of the episodic and autobiographical memory systems, it would be more reasonable to consider a type of episodic-like buffer in autobiographical memory rather than a “pure” episodic memory according to Tulving’s or Markowitsch’s meaning of the term (Markowitsch & Staniloiu, 2011).

The SMS model has a bidirectional organisation such that the working self-governs both behavioural responses and recollective experiences while underlying autobiographical/episodic structure shape and supporting the conceptual self and goal setting. Conway postulated that the SMS serves the following two orthogonal functions: adaptive correspondence (with the aim of keeping in touch with reality and therefore preserving memories as close to the experienced event as possible) and self-coherence (with the aim of keeping the conceptual self intact and, therefore, selecting memories that are consistent with it). Certainly, a focus on self-coherence often contradicts adaptive correspondence and inhibits adequate responses to reality. Moreover, it is necessary to emphasise that the conceptual self requires permanent updating, and there is no other way to achieve this than to capture and transfer into an episodic store of autobiographical memory representations of events that do not fit the current self-image. Wagenaar (1992) argued that the gradual development of the conceptual self occurs through the

accumulation of a sufficient number of relevant examples that are later abstracted into the updated self. In the SMS model, the process is mediated by the generation of a new general event that in turn affects self-image. Wagenaar also considered the case in which a new event reflects an extreme deviation from the current self. His empirical diary data indicated that experiences of this type are highly accessible, retain exceptions and strengthen the existing self-image. For instance, let us assume that my conceptual self featured a self-view of a sociable, friendly and outgoing person. However, once I was so tired that I slept through an entire Sunday, ignoring phone calls, and then the next week, I decided not to attend a party and finally went for vacation alone. Consequently, the general event of “having leisure alone” may have been abstracted and may have gradually transformed my self-image into more stand-offish, shut-in, introverted person. In contrast, a highly unusual event (e.g., I had a quarrel with my old friend) would be well remembered as an exception and serve to protect my old “sociable” self-image. The distinction described above gives reason to advance the autobiographical knowledge system in the SMS model with a mechanism for storing unique non-schematised memories to mark atypical experiences of acting “not like me”.

In our study, the anxious participants had negative conceptual selves that were characterised by a discrepancy between the ideal and the actual self (Higgins, 1987). During the intervention, we implanted three episodic-like, self-defining positive memories that challenged both the existing conceptual self and the autobiographical knowledge base but were at the same time congruent with the desirable ideal self. Three acts of imagination in a hypnotic state that occurred place once a week created an illusion of repeated experiences that was sufficient for generating a general event that could compete with a long-lasting theme of “being incompetent in personally important situations” and overcoming the resistance of autobiographical knowledge abstracted from repeated previous experiences. This new general event of “being competent in personally important situations” in turn shifted the conceptual self towards a higher self-esteem that coincided with the anticipation of goal achievement and, hence, reduced trait anxiety. We propose that the acquisition of fabricated memories did not alter the conceptual self directly. This change was mediated by the generation of a new general event because the decrease in trait anxiety was deferred. We identified the effect 4 months after the experimental manipulation, and the effect was in line with the participants’ self-reports of gradual progress in their behaviours.

Limitations

Several limitations of the present study should be noted. First, the attribution of the reduced trait anxiety effect to increased self-esteem mediated by a set of implanted positive self-defining memories was based upon theoretical speculations and the data from self-reports. Future

studies would clearly benefit from the inclusion of a more formal assessment of self-esteem. Second, it might be helpful to employ a type of memory experience questionnaire (Luchetti & Sutin, 2016) to compare the initial and constructed memories. Future research should be directed towards examination of the adequacy of generalising these findings to other populations (e.g., those with body dysmorphic disorder, different types of phobias, etc.).

Conclusion

For many reasons, it would be beneficial to possess more positive self-esteem than suggested by real past achievements (Baumeister, Campbell, Krueger, & Vohs, 2003). Due to principal veracity and transience, episodic memory is an inappropriate source for relatively stable and continual notions of the conceptual self. A direct response to the flow of contradictory events would defeat the status of the conceptual self as a core of personality, making it situational and harmfully realistic. In contrast, the reliance of the conceptual self solely on “known” abstract beliefs about one’s own characteristics would lead to petrification and the loss of contact with reality. The optimistic and secure development of the conceptual self is achievable by the selective copying of self-relevant episodic memories into an episodic buffer of autobiographical memory. These episodic-like but highly pliable memories should then be submitted to a mechanism of positive construction. Being reformed but still trustworthy in origin, episodic-like memories become suitable mediators for coordination between the goal system, the conceptual self and the autobiographical knowledge system. This functional mechanism supports the realistically optimistic conceptual self to motivate a goal achievement orientation with respect to monitoring acceptable levels of adaptive correspondence.

The failure of the positive construction mechanism detracts from the normal process of goal setting based on an optimistic conceptual self and results in trait anxiety. We empirically demonstrated that the intensification of positive construction may decrease trait anxiety in the long term by affecting the autobiographical knowledge base and thereby the working self.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by Russian Humanitarian Foundation [grant number 15-36-01045].

References

Baker, S. R., & Boaz, D. (1983). The partial reformulation of a traumatic memory of a dental phobia during trance: A case study.

- International Journal of Clinical & Experimental Hypnosis*, 31(1), 14–18. doi:10.1080/00207148308407177
- Baumeister, R. F., Campbell, J. D., Krueger, J. L., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest*, 4(1), 1–44. doi:10.1111/1529-1006.01431
- Berntsen, D. (1996). Involuntary autobiographical memories. *Applied Cognitive Psychology*, 10, 435–454. doi:10.1002/acp.1776
- Berntsen, D., & Rubin, D. C. (2007). When a trauma becomes a key to identity: Enhanced integration of trauma memories predicts post-traumatic stress disorder symptoms. *Applied Cognitive Psychology*, 21(4), 417–431. doi:10.1002/acp.1290
- Bluck, S., & Alea, N. (2008). Remembering being me: The self-continuity function of autobiographical memory in younger and older adults. In F. Sani (Ed.), *Self continuity: Individual and collective perspectives* (pp. 55–70). New York, NY: Psychology Press. doi:10.1080/09658211.2011.590500
- Burke, V., & Mathews, A. (1992). Autobiographical memory and clinical anxiety. *Cognition & Emotion*, 6(1), 23–35. doi:10.1080/02699939208411056
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Coles, M. E., & Heimberg, R. G. (2002). Memory biases in the anxiety disorders: Current status. *Clinical Psychology Review*, 22(4), 587–627. doi:10.1016/S0272-7358(01)00113-1
- Conway, M. A. (2005). Memory and the self. *Journal of Memory & Language*, 53, 594–628. doi:10.1016/j.jml.2005.08.005
- Conway, M. A. (2009). Episodic memories. *Neuropsychologia*, 47(11), 2305–2313. doi:10.1016/j.neuropsychologia.2009.02.003
- Conway, M. A., & Loveday, C. (2015). Remembering, imagining, false memories & personal meanings. *Conscious & Cognition*, 33, 574–581. doi:10.1016/j.concog.2014.12.002
- Conway, M. A., & Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review*, 107(2), 261–288. doi:10.1037/0033-295X.107.2.261
- Conway, M., & Ross, M. (1984). Getting what you want by revising what you had. *Journal of Personality and Social Psychology*, 47(4), 738–748. doi:10.1037/0022-3514.47.4.738
- Conway, M. A., Singer, J. A., & Tagini, A. (2004). The self and autobiographical memory: Correspondence and coherence. *Social Cognition*, 22, 491–529. doi:10.1521/soco.22.5.491.50768
- Cox, R. E., & Bryant, R. A. (2012). Advances in hypnosis research: Methods, designs and contributions of intrinsic and instrumental hypnosis. In M. R. Nash & A. J. Barnier (Eds.), *The Oxford handbook of hypnosis: Theory, research, and practice* (pp. 311–337). Oxford: Oxford University Press.
- Craciun, B., Holdevici, I., & Craciun, A. (2012). The efficiency of Ericksonian hypnosis in diminishing stress and procrastination in patients with generalized anxiety disorder. *European Psychiatry*, 27, 1. doi:10.1016/S0924-9338(12)75303-8
- D’Argembeau, A. (2012). Autobiographical memory and future thinking. In D. Berntsen, & D. C. Rubin (Eds.), *Understanding autobiographical memory: Theories and approaches* (pp. 311–330). New York: Cambridge University Press.
- Dodson, C. S., Koutstaal, W., & Schacter, D. L. (2000). Escape from illusion: Reducing false memories. *Trends in Cognitive Sciences*, 4(10), 391–397. doi:10.1016/S1364-6613(00)01534-5
- Eakin, P. J. (2008). *Living autobiographically: How we create identity in narrative*. Ithaca, NY: Cornell University Press.
- Eppley, K., Abrams, A. I., & Shear, J. (1989). Differential effects of relaxation techniques on trait anxiety: A meta-analysis. *Journal of Clinical Psychology*, 45(6), 957–974. doi:10.1002/1097-4679(198911)45:6<957::AID-JCLP2270450622>3.0.CO;2-Q
- Fivush, R. (2011). The development of autobiographical memory. *Annual Review Psychology*, 62, 559–582. doi:10.1146/annurev.psych.121208.131702

- Frenda, S. J., Nichols, R. M., & Loftus, E. F. (2011). Current issues and advances in misinformation research. *Current Directions in Psychological Science*, 20, 20–23. doi:10.1177/0963721410396620
- Garry, M., & Polaschek, D. L. L. (2000). Imagination and memory. *Current Directions in Psychological Science*, 9(1), 6–10. doi:10.1111/1467-8721.00048
- Habermas, T., & Köber, C. (2015). Autobiographical reasoning is constitutive for narrative identity: The role of the life story for personal continuity. In K. C. McLean & M. Syed (Eds.), *The Oxford handbook of identity development* (pp. 149–165). Oxford: Oxford University Press.
- Herrera, S., Montorio, I., & Cabrera, I. (2015). Effect of anxiety on memory for emotional information in older adults. *Aging & Mental Health*, 13, 1–7. Epub ahead of print. doi:10.1080/13607863.2015.1093601
- Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, 94, 319–340. doi:10.1037/0033-295X.94.3.319
- Kirsch, I., Mazzoni, G., & Montgomery, G. (2007). Remembrance of hypnosis past. *American Journal of Clinical Hypnosis*, 49(3), 171–178. doi:10.1080/00029157.2007.10401574
- Krans, J., deBree, J., & Bryant, R. A. (2014). Autobiographical memory bias in social anxiety. *Memory*, 22(8), 890–897. doi:10.1080/09658211
- Lankton, S. (2012). An Ericksonian approach to clinical hypnosis. In M. R. Nash & A. J. Barnier (Eds.), *The Oxford handbook of hypnosis: Theory, research, and practice* (pp. 467–486). Oxford university press. doi:10.1093/oxfordhb/9780198570097.013.0018
- Levitt, E. E. (2015). *The psychology of anxiety*. London: Routledge.
- Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. *Learning and Memory*, 12, 361–366. doi:10.1101/lm.94705
- Loftus, E. F., & Davis, D. (2006). Recovered memories. *Annual Review of Clinical Psychology*, 2, 469–498. doi:10.1146/annurev.clinpsy.2.022305.095315
- Luchetti, M., & Sutin, A. R. (2016). Measuring the phenomenology of autobiographical memory: A short form of the memory experience questionnaire. *Memory*, 24(5), 592–602. doi:10.1080/09658211.205.1031679
- Lynn, S. J., Matthews, A., & Barnes, S. (2009). Hypnosis and memory: From Bernheim to the present. In K. D. Markman, W. M. P. Klein, & J. A. Suhr (Eds.), *Handbook of imagination and mental simulation* (pp. 103–118). Danvers, MA: CRC Press.
- Markowitsch, H. J., & Staniloiu, A. (2011). Memory, auto-noetic consciousness, and the self. *Consciousness and Cognition*, 20, 16–39. doi:10.1016/j.concog.2010.09.005
- Matthews, W. J., Conti, J., & Starr, L. (1998). Ericksonian hypnosis: A review of the empirical data. In W. J. Matthews, & J. H. Edgette (Eds.), *Current thinking and research in brief therapy. Solutions, strategies, narratives* (Vol. 2, pp. 239–264). Philadelphia, PA: Taylor & Francis.
- Mazzoni, G., Laurence, J., & Heap, M. (2014). Hypnosis and memory: Two hundred years of adventures and still going! *Psychology of Consciousness: Theory, Research, and Practice*, 1(2), 153–167. doi:10.1037/cns0000016
- McAdams, D. P. (2013). Life authorship: A psychological challenge for emerging adulthood, as illustrated in two notable case studies. *Emerging Adulthood*, 1(2), 151–158. doi:10.1177/2167696813481774
- McCann, T., & Sheehan, P. W. (1988). Hypnotically induced pseudo-memories: Sampling their conditions among hypnotizable subjects. *Journal of Personality and Social Psychology*, 54(2), 339. doi:10.1037/0022-3514.54.2.339
- McKay, R. T., & Dennett, D. C. (2009). The evolution of misbelief. *Behavioral and Brain Sciences*, 32(6), 493–561. doi:10.1017/S0140525X09990975
- McLean, K. C., Pasupathi, M., & Pals, J. L. (2007). Selves creating stories creating selves: A process model of self-development. *Personality and Social Psychology Review*, 11(3), 262–278. doi:10.1177/1088868307301034
- McLean, K. C., & Pratt, M. W. (2006). Life's little (and big) lessons: Identity statuses and meaning-making in the turning point narratives of emerging adults. *Developmental Psychology*, 42(4), 714–722. doi:10.1037/0012-1649.42.4.714
- Morgan, J. (2010). Autobiographical memory biases in social anxiety. *Clinical Psychology Review*, 30, 288–297. doi:10.1016/j.cpr.2009.12.003
- Nelson, K. (1993). The psychological and social origins of autobiographical memory. *Psychological Science*, 4, 7–14. doi:10.1111/j.1467-9280.1993.tb00548.x
- Nemtschine, T. A. (1966). Изучение состояний тревоги у больных неврозами при помощи опросника [Questionnaire for anxiety in neurotic individuals]. *Вопросы современной неврологии in Russian*, 38, 17–28.
- Neshat-Doost, H. T., Dalgleish, T., Yule, W., Kalantari, M., Ahmadi, S. J., Dyregov, A., & Jobson, L. (2013). Enhancing autobiographical memory specificity through cognitive training: An intervention for depression translated from basic science. *Clinical Psychological Science*, 1, 84–92. doi:10.1177/2167702612454613
- Nourkova, V., Bernstein, D. M., & Loftus, E. F. (2004). Altering traumatic memory. *Cognition and Emotion*, 18, 575–585. doi:10.1080/02699930341000455
- Pasupathi, M., Mansour, E., & Brubaker, J. R. (2007). Developing a life story: Constructing relations between self and experience in autobiographical narratives. *Human Development*, 50(2–3), 85–110. doi:10.1159/000100939
- Pezdek, K., Blandon-Gitlin, I., & Gabbay, P. (2006). Imagination and memory: Does imagining implausible events lead to false autobiographical memories? *Psychonomic Bulletin & Review*, 13(5), 764–769. doi:10.3758/BF03193994
- Pezdek, K., & Lam, S. (2007). What research paradigms have cognitive psychologists used to study “false memory”, and what are the implications of these choices? *Consciousness and Cognition*, 16, 2–17. doi:10.1016/j.concog.2005.06.006
- Pezdek, K., & Salim, R. (2011). Physiological, psychological and behavioral consequences of activating autobiographical memories. *Journal of Experimental Social Psychology*, 47, 1214–1218. doi:10.1016/j.jesp.2011.05.004
- Philippe, F. L., Koestner, R., Beaulieu-Pelletier, G., & Lecours, S. (2011). The role of need satisfaction as a distinct and basic psychological component of autobiographical memories: A look at well-being. *Journal of Personality*, 79(5), 905–938. doi:10.1111/j.1467-6494.2010.00710.x
- Pinto Gouveia, J., & Matos, M. (2011). Can shame memories become a key to identity? The centrality of shame memories predicts psychopathology. *Applied Cognitive Psychology*, 25(2), 281–290. doi:10.1002/acp.1689
- Ritchie, T. D., Sedikides, C., & Skowronski, J. J. (2016). Emotions experienced at event recall and the self: Implications for the regulation of self-esteem, self-continuity and meaningfulness. *Memory*, 24(5), 577–591. doi:10.1080/09658211.2015.1031678
- Ritchie, T. D., Skowronski, J. J., Wood, S. E., Walker, W. R., Vogl, R. J., & Gibbons, J. A. (2006). Event self-importance, event rehearsal, and the fading affect bias in autobiographical memory. *Self and Identity*, 5(2), 172–195. doi:10.1080/15298860600591222
- Ross, M., & Wilson, A. E. (2003). Autobiographical memory and conceptions of self: Getting better all the time. *Current Directions in Psychological Science*, 12(2), 66–69. doi:10.1111/1467-8721.01228
- Rotaru, T.-S., & Rusu, A. (2016). A meta-analysis for the efficacy of hypnotherapy in alleviating PTSD symptoms. *International Journal of Clinical and Experimental Hypnosis*, 64(1), 116–136. doi:10.1080/00207144.2015.1099406
- Rubin, D. C., Berntsen, D., & Bohni, M. K. (2008). A memory-based model of posttraumatic stress disorder: Evaluating basic assumptions underlying the PTSD diagnosis. *Psychological Review*, 115(4), 985–1011. doi:10.1037/a0013397
- Schlagman, S., Schulz, J., & Kvavilashvili, L. (2006). A content analysis of involuntary autobiographical memories: Examining the positivity

- effect in old age. *Memory*, 14(2), 161–175. doi:10.1080/09658210544000024
- Scoboria, A., Mazzoni, G., Kirsch, I., & Milling, L. S. (2002). Immediate and persisting effects of misleading questions and hypnosis on memory reports. *Journal of Experimental Psychology: Applied*, 8, 26–32. doi:10.1037/1076-898X.8.1.26
- Scoboria, A., Mazzoni, G., Kirsch, I., & Releyea, M. (2004). Plausibility and belief in autobiographical memory. *Applied Cognitive Psychology*, 18, 791–807. doi:10.1002/acp.1062
- Scoboria, A., Wade, K. A., Lindsay, D. S., Azad, T., Strange, D., Ost, J., & Hyman, I. E. (2017). A mega-analysis of memory reports from eight peer-reviewed false memory implantation studies. *Memory*, 25(2), 146–163. doi:10.1080/09658211.2016.1260747
- Serrano, J. P., Latorre, J. M., Gatz, M., & Montanes, J. (2004). Life review therapy using autobiographical retrieval practice for older adults with depressive symptomatology. *Psychology of Aging*, 19, 270–277. doi:10.1037/0882-7974.19.2.272
- Sharman, S. J., Garry, M., & Hunt, M. (2005). Using source cues and familiarity cues to resist imagination inflation. *Acta Psychologica*, 120(3), 227–242. doi:10.1016/j.actpsy.2005.04.002
- Singer, J. A., & Blagov, P. (2004). Self-defining memories, narrative identity, and psychotherapy: A conceptual model, empirical investigation, and case report. In L. E. Angus & J. McLeod (Eds.), *Handbook of narrative and psychotherapy: Practice, theory and research* (pp. 229–246). Thousand Oaks, CA: Sage.
- Singer, J. A., & Salovey, P. (1993). *The remembered self: Emotion and memory in personality*. New York: Free Press.
- Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. *Psychological Bulletin*, 139(1), 213. doi:10.1037/a0028931
- Sutin, A. R., & Gillath, O. (2009). Autobiographical memory phenomenology and content mediate attachment style and psychological distress. *Journal of Counseling Psychology*, 56(3), 351–364. doi:10.1037/a0014917
- Tafarodi, R. W., Marshall, T. C., & Milne, A. B. (2003). Self-esteem and memory. *Journal of Personality and Social Psychology*, 84(1), 29–45. doi:10.1037/0022-3514.84.1.29
- Taylor, J. (1953). A personality scale of manifest anxiety. *The Journal of Abnormal and Social Psychology*, 48(2), 285–290. doi:10.1037/h0056264
- Thompson, C. P., Skowronski, J. J., Larsen, S., & Betz, A. (1996). *Autobiographical memory: Remembering what and remembering when*. Mahwah, NJ: Lawrence Erlbaum Associates.
- van Tuijl, L. A., de Jong, P. J., Sportel, B. E., de Hullu, E., & Nauta, M. H. (2014). Implicit and explicit self-esteem and their reciprocal relationship with symptoms of depression and social anxiety: A longitudinal study in adolescents. *Journal of Behavior Therapy and Experimental Psychiatry*, 45(1), 113–121. doi:10.1016/j.jbtep.2013.09.007
- Wade, K., Sharman, S. J., Garry, M., Memon, A., Mazzoni, G., Merckelbach, H., & Loftus, E. F. (2007). False claims about false memory research. *Consciousness and Cognition*, 16, 18–28. doi:10.1016/j.concog.2006.07.001
- Wagenaar, W. A. (1992). Remembering my worst sins: How autobiographical memory serves the updating of conceptual self. In M. A. Conway, D. C. Rubin, H. Spinnler, & W. A. Wagenaar (Eds.), *Theoretical perspectives on autobiographical memory* (pp. 263–274). Norwell, MA: Kluwer Academic.
- Walker, W. R., Skowronski, J. J., & Thompson, C. P. (2003). Life is pleasant – and memory helps to keep it that way! *Review of General Psychology*, 7(2), 203–210. doi:10.1037/1089-2680.7.2.203
- Walker, W. R., Vogl, R. J., & Thompson, C. P. (1997). Autobiographical memory: Unpleasantness fades faster than pleasantness over time. *Applied Cognitive Psychology*, 11(5), 399–413. doi:10.1002/(SICI)1099-0720(199710)11:5<399::AID-ACP462>3.0.CO;2-E
- Walker, W. R., Yancu, C. N., & Skowronski, J. J. (2014). Trait anxiety reduces affective fading for both positive and negative autobiographical memories. *Advances in Cognitive Psychology*, 10(3), 81. doi:10.5709/acp-0159-0
- Wang, Q. (2016). Remembering the self in cultural contexts: A cultural dynamic theory of autobiographical memory. *Memory Studies*, 9(3), 295–304. doi:10.1177/1750698016645238
- Werner-Seidler, A., & Moulds, M. L. (2014). Recalling positive self-defining memories in depression: The impact of processing mode. *Memory*, 22(5), 525–535. doi:10.1080/09658211.2013.801494
- Wood, W.-J., & Conway, M. (2006). Subjective impact, meaning making, and current and recalled emotions for self-defining memories. *Journal of Personality*, 74, 811–846. doi:10.1111/j.1467-6494.2006.00393.x