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Enhancing self-efficacy improves episodic future thinking and social-decision making in combat veterans with posttraumatic stress disorder

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ABSTRACT

Posttraumatic Stress Disorder (PTSD) is associated with maladaptive changes in self-identity, including impoverished perceived self-efficacy. This study examined if enhancing perceptions of self-efficacy in combat veterans with and without symptoms of PTSD promotes cognitive strategies associated with positive mental health outcomes. Prior to completing a future thinking and social problem-solving task, sixty-two OEF/OIF veterans with and without symptoms of PTSD were randomized to either a high self-efficacy (HSE) induction in which they were asked to recall three autobiographical memories demonstrating self-efficacy or a control condition in which they recalled any three autobiographical events. An interaction between HSE and PTSD revealed that individuals with symptoms of PTSD in the HSE condition generated future events with more self-efficacious statements than those with PTSD in the control condition, whereas those without PTSD did not differ in self-efficacy content across the conditions. In addition, individuals in the HSE condition exhibited better social problem solving than those in the control condition. Increasing perceptions of self-efficacy may promote future thinking and problem solving in ways that are relevant to overcoming trauma and adversity.

1. Introduction

Posttraumatic stress disorder (PTSD) has long been associated with changes in self-identity (e.g. Brewin et al., 2011). For example, clinicians (Herman, 1992) and researchers (Berntsen et al., 2003) have proposed that traumatic events can serve as "landmarks" in the construction of self-identity, and patients with PTSD tend to nominate a traumatic episode when asked to describe their most self-defining memory (Sutherland and Bryant, 2005). Maladaptive changes in self-identity are associated with a greater risk of PTSD (Ehlers et al., 2000), poor treatment prognosis (Ehlers et al., 1998) and suicidal ideation (Brewin et al., 2011). In particular, combat appears to have a lasting impact on the identity of individuals deployed to war zones. Glover (1988) described Vietnam Veterans with PTSD as suffering from disturbances in self-identity characterized by alienation from the civilian community and adopting a survivalist mentality. Moreover, Brown et al. (2010) showed that the greater extent to which Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans viewed their combat trauma as central to their self-identity, the greater their PTSD symptom severity.

This study seeks to further elucidate the mechanisms underlying the impact of an important construct of self-identity, *self-efficacy*, on PTSD. According to self-efficacy theory (Bandura, 1997), individuals construct self-perceptions of capability that are instrumental to the goals they pursue and to the control they exercise over their environments, thoughts, emotions, and actions. In fact, Bandura (1997) proposed that behavior is often better predicted by self-efficacy beliefs rather than what a person is actually capable of accomplishing. This may be because self-perceptions help individuals determine what to do with the knowledge and skills they have. Self-efficacy has also been conceptualized as one's perceived capacity to manage stressful life events (Benight and Bandura, 2004). Relatedly, traumatic events are often characterized by their unpredictability and uncontrollability. Models of perceived self-efficacy suggest that a sense of agency in

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overcoming the impact of a trauma will enhance resilience (Benight et al., 2004). Furthermore, one's belief that they are unable to cope with post-traumatic symptoms and other negative outcomes of trauma may underlie PTSD symptom maintenance (Benight et al., 2004).

Such models are consistent with diverse accounts that show a link between low self-efficacy (and similar low-self efficacy phenomenon like perceived lack of controllability, mental defeat, and loss of autonomy), PTSD symptom severity, and poor treatment prognosis. With regards to combat, Solomon et al. (1991, 1998) reported a link between low levels of perceived self-efficacy and negative psychological reactions to combat among Israeli soldiers. Lebanese adolescents with PTSD also displayed less perceived self-efficacy across a number of domains compared to trauma-exposed groups without PTSD and non-trauma exposed groups (Saigh et al., 1995) These findings accord with models of PTSD that conceptualize lack of controllability as fundamental to the etiology and maintenance of the disorder (Foa et al., 1992).

Although numerous studies find associations between PTSD and low self-efficacy, the basic mechanisms underlying this relation are poorly understood. It has been proposed that self-efficacy is maintained, in part, through the retrieval of personal past and construction of future events that support a current self-view of one's self possesses self-efficacy (e.g. Bandura, 2001). Consistent with this notion, cognitive theories of autobiographical memory have suggested that autobiographical memories are selectively retrieved to support current self-views and future goals (e.g. self-memory-system Conway and Pleydell-Pearce, 2000) Therefore, in line with the self-memory-system (Conway and Pleydell-Pearce, 2000), recalling specific autobiographical memories in which a person remembers demonstrating self-efficacy may enhance one's current self-efficacy views and promote the construction of imagined future scenarios in which he or she exhibits self-efficacy.

The ability for individuals with PTSD to draw on the past to support self-efficacy beliefs in the present and future may be reduced due to alterations in autobiographical memory and future thinking. For example, it is now well established that individuals with PTSD tend to show difficulties in autobiographical memory retrieval. That is, when asked to recall a distinct personal memory, individuals with PTSD events that took place on a specific time and day, producing what is often referred to as “overgeneralized” autobiographical memories. The phenomenon of greater overgeneralization in PTSD has been documented across multiple trauma-exposed populations (e.g. Bryant et al., 2007; McNally, et al., 1995; McNally et al.,1994, for reviews see Moore and Zoellner, 2007; Lapidow and Brown, 2015) and a recent meta-analysis found a large effect for overgeneralized memory across PTSD studies (Ono, Devilly, and Shum, 2015).

Overgeneralization is believed to underlie symptom maintenance, in psychopathology in general, and PTSD in particular, because it limits the memories from which one can draw upon to generate effective solutions to current problems (Healy and Williams, 1999). Watkins and Moulds (2005) found that experimentally manipulating concrete rumination, which has been shown to increase specific retrieval, led to increased social problem solving. A number of studies have shown a link between reduced autobiographical memory specificity and lower performance on social-problem solving tasks (Evans et al., 1992; Goddard et al., 1996, 1997; Kaviani et al., 2004; Scott et al., 2000; Sidley et al., 1997), including studies done with individuals who have PTSD (Sutherland and Bryant, 2008a, 2008b). Additionally, experimental manipulations have found that increasing and decreasing autobiographical memory specificity corresponds with social problem solving abilities (Watkins and Moulds, 2005; Williams, 2006).

More recently, a growing body of work has shown that PTSD is also associated with overgeneralized future thinking (e.g Blix and Brennen, 2011; Brown et al., 2013, 2014; Klein et al., 2013). These findings accord with growing evidence that retrieving episodic memories involves many of the same neural and cognitive processes as projecting one's self into the future (for reviews, see Schacter, Addis, and Buckner, 2008; Szpunar, 2010). According to *the constructive episodic simulation hypothesis* (Schacter and Addis, 2007), imagining future episodic events engages a constructive memory system that facilitates the flexible recombination of elements from past episodes in order to simulate and project novel events into the future. In other words, imagining the future is constrained by our memories. Therefore, individuals with PTSD may exhibit overgeneralized future thinking because they are drawing on overgeneralized autobiographical memories.

To date, one study experimentally examined the association between perceived coping self-efficacy, autobiographical memory, future thinking, and social-problem solving (Brown et al., 2012a). Brown and colleagues (2012a) randomized healthy college students to a High Self-Efficacy (HSE) or Low Self-Efficacy (LSE) induction prior to generating autobiographical memories, imagining personal future events, and engaging in social problem-solving. Participants receiving a HSE induction recalled and imagined autobiographical events with greater episodic specificity, used more positive words and self-efficacious statements, and performed better on a social problem solving task (Brown et al., 2012a). However, studies have yet to examine whether attempting to increase perceptions of coping self-efficacy in a clinical population corresponds with similar cognitive changes in autobiographical thinking and problem-solving.

The current study examines whether increasing perceptions of self-efficacy among veterans with and without symptoms of PTSD would lead to the generation of future events with greater specificity and self-efficacy content, as well as better performance on social problem solving tasks. Specifically, we attempted to increase perceptions of self-efficacy by asking participants to selectively recall autobiographical memories in which they demonstrated self-efficacy, which we hypothesized would lead to increased levels of perceived self-efficacy. Following the induction, participants were asked to complete an episodic future-thinking task and a social problem-solving test associated with the challenges of returning from deployment to civilian life. We predicted that, compared to a control condition, the selective retrieval of self-efficacious memories would lead to an increase in current perceptions of self-efficacy, future narratives that possessed greater specificity and content reflecting self-efficacy, as well as better performance on social-problem solving tests.

2. Method

2.1. Participants

Sixty-two OIF/OEF combat veterans between 20 and 60 years of age participated in the study.

Veterans were recruited from the Mental Health Services of the Manhattan, Bronx and Brooklyn Veterans Affairs Medical Centers, other regional VA medical centers, Veterans Service Organizations, National Guard, reservist agencies and organizations and from the general community. Recruitment methods included flyers, in-person presentations, media advertisements, Internet postings (e.g. Craigslist) and referrals from clinicians. All study procedures were approved by NYU's IRB, and all participants provided written, informed consent. Participants were excluded if they had a lifetime history of psychosis, bipolar disorder, major depression with psychotic features or were less than two months stable on psychiatric medications. Participants received $50 USD for their participation.

2.2. Measures and procedure

2.2.1. Posttraumatic stress disorder checklist-military version

(PCL-M; Weathers et al., 1991). The PCL-M is a 17-item self-report checklist comprised of the DSM-IV PTSD criteria. Each response is rated on 4-point Likert scale (1=*not at all*, 4=*quite a bit*) and a probable PTSD diagnosis was determined if participants scored ≥ 44 (Blanchard et al., 1996).

2.2.2. Beck depression inventory-II

(BDI-II, Beck et al., 1996). The BDI-II is a 21 item self-report measure of depression that assesses various cognitive, behavioral, and physiological symptoms associated with depression.

2.2.3. Visual analogue scales (VAS)

for mood and self-efficacy. Visual analogue scales were used to measure on 9-point scales mood (1=*not at all*, 9=*very*; Distraction, Excitement, Positive Mood, Negative Mood) and perceived self-efficacy (Self-Confident) both before and after the self-efficacy or control induction.

2.2.4. Self-efficacy induction

Individuals randomized to the self-efficacy induction were asked to recall three autobiographical memories of success from any point in their life. After each memory was recalled the experimenter summarized the event in return, specifically emphasizing the strengths displayed by the participant during this event. Following this, the experimenter asked the participant to think about how the three events reflected his or her strengths. In the control condition, participants were asked to recall "any significant life event" without being guided to think about memories of success in particular.

2.2.5. Episodic future thinking task

Following Williams et al. (1996), participants were presented with 5 positive (e.g. "joy", "pride") and 5 negative (e.g. "blame", "sad") word cues (Bradley and Lang, 1999) preceded by the sentence "*Try to image an event in the future when you will feel…*". Participants were instructed to imagine events that would be personally relevant, occurring within a 24-hour time period, realistic, and not previously experienced, and were given 60 s to respond to each cue. A series of practice trials were completed before beginning each task (see examples in Appendix A, Addis, Wong, and Schacter, 2008). Responses were digitally recorded and later transcribed.

Responses were coded as 'specific' if they referred to an event that took place within a 24-hour time period, 'categoric' if it reflected a series of repeated events or 'extended' if it described an event that last more than one day. Each response was coded by a primary rater as well as a second independent rater who coded 20% of the responses (κ=.89).

2.2.6. Content Analyses

Content was rated as "positive" (κ=1.00). or "negative" (κ=.98) on a scale of 0–2 if the valence was apparent (2= positive or negative content, 1= no valence in the content, 0= no response/unclear). Across participants, 98% of the responses to positive cue words contained positive content, 95% contained negative content in response to negative cue words, 24% contained positive content in response to negative cue words, and 22% contained negative content in response to positive cues.

Self-efficacy was coded if statements included self-referential content in relation to influencing one' s external environment, success, achievement, and/or pursuing a goal (self-efficacy content =2, no self-efficacy content =1, no response/unclear =0, κ=.85). Across participants, 90% of the responses to positive cue words contained self-efficacy statements and 42% contained self-efficacy statements in response to negative cue words,

2.2.7. Modified means-end problem solving task (MEPS)

A modified version of the Means-End Problem Solving Task (Platt et al., 1975) was administered to measure problem-solving ability. This task was used to assess one's ability to identify the relevant and necessary steps to achieve a specific goal. As with the original MEPS, this version consisted of short vignettes with interpersonal problems issues faced by a hypothetical protagonist. In each story, the protagonist begins with a problem and ends with a resolution to that problem. Participants were then asked to provide the steps taken by the protagonist that enabled them to resolve the issue. Although responses can be scored for a number of variables, this study measured the ability to resolve the issue by the number of 'relevant means' generated by the participant. A relevant mean was defined as a discrete sequential step enabling the protagonist to effectively reach the goal described in the story. Participants were asked to solve two military-related scenarios that were read to them aloud (e.g. story began with soldier looking for a job after having been discharged from the military due to an injury and ending with him gaining employment and supporting his family (see Appendix B for the two scenarios). Participants were given two minutes to respond verbally to each scenario. Responses were audio recorded and later scored in terms of number of relevant means (i.e. number of relevant discrete steps taken to reach the stated outcome (Platt et al., 1975), on a 7-point Likert-type scale (1=*not at all effective*, 7=*very effective*). The inter-rater reliability was sound for number of means (r=0.86).

3. Results

3.1. Demographic and Self-Report Data

Participants ranged in age from 22 to 53 years of age (M=33.41, SD=7.18), were predominately male (90.3%, N=56), with 15.18 (SD=3.07) years of education. 40.6% (N=13) of individuals in the HSE condition and 40% (N=12) of individuals in the Control condition met criteria for PTSD (see Table 1). Participants did not differ by age, gender, or years of education. Veterans screening positive for PTSD higher scores on the PCL-M (F (1, 61)=120.00, p=0.000, μ=0.67) and the BDI-II (F (1, 61)=41.53, p=0.000, μ=0.42) than those without PTSD, but no interactions were observed between clinical status and condition (PCL-M: Diagnosis × Condition, F (1, 61)=1.96, p=0.17, μ=0.33; BDI-II: Diagnosis × Condition, F (1, 61)=0.73, p=0.40, μ=0.1).

Table 1.
Demographic and self-report clinical data for veterans in the high self efficacy and control conditions.

	High self efficacy		Control	
	PTSD N=13	No PTSD N=19	PTSD N=12	No PTSD N=18
Age	31.00 (4.20)	32.32 (7.07)	35.92 (6.95)	34.50 (8.68)
% Male Gender	100%	84%	100%	89%
Years of Education	14.42 (4.87)	15.50 (2.12)	15.27 (4.10)	15.06 (1.59)
PCL-M	54.08 (10.32)	30.11 (8.99)	59.17(10.99)	28.17 (8.99)
BDI-II	19.54 (10.81)	9.61 (6.66)	18.55 (4.93)	5.00 (4.86)

Note. Standard deviation in parentheses. PCL-M =Posttraumatic Stress Disorder Checklist-Military Version. BDI-II=Beck Depression Inventory-Second Edition.

Table 2.
Pre to post self-induction scores.

	High self efficacy		Control	
	Pre	Post	Pre	Post
Distracted	3.16 (2.29)	2.59 (1.78)	3.23 (2.30)	3.07 (2.20)
Excited	4.13 (2.41)	3.47 (2.13)	4.30 (2.10)	3.67 (2.44)
Positive Mood	4.84 (1.92)	5.31 (2.16)	5.73 (1.74)	5.43 (1.61)
Negative Mood	6.41 (1.98)	6.06 (1.59)	6.37 (1.92)	6.70 (1.21)
Self-Confident	6.16 (1.97)*	6.81 (1.67)*	6.80 (1.92)	6.73 (2.02)

Note. Standard deviation in parentheses.
* $p < 0.05$.

3.2. Induction checks

A series of 2 (Condition: HSE and Control) × 2 (Time: Pre-induction and Post-induction) analyses of variance (ANOVAs) on Distraction, Excitement, Positive Mood, Negative Mood, and Self-Efficacy scales revealed a non-significant trend for Time × Condition on the Self-Efficacy measure, $F(2, 59)=3.35$, $p=0.07$, $\mu=0.05$ (see Table 2). Follow up *t*-tests revealed that individuals in the HSE condition exhibited a significant increase in perceived self-efficacy ratings pre-to-post induction than individuals in the Control condition, $t(31)=2.45$, $p<0.05$, $d=.35$. No other pre to post induction main effects or interactions were observed (*Distraction*=$F(2, 59)=.80$, $p=0.46$, $\mu=0.03$; *Excitement*=$F(2, 59)=0.11$, $p=0.90$, $\mu=0.004$; *Positive Mood*=$F(2, 59)=2.06$, $p=0.14$, $\mu=0.07$; *Negative Mood*=$F(2, 59)=1.80$, $p=0.18$, $\mu=0.06$.

3.3. Episodic future thinking: autobiographical specificity

A series of 2 (HSE and Control) × 2 (PTSD and No PTSD) ANOVAs for future thinking specificity scores did not reveal any main effects or interactions (*Condition*=$F(1, 61)=0.00$, $p=0.99$; *Diagnosis*=$F(1, 61)=1.17$, $p=0.29$; Condition × Diagnosis =$F(1, 61)=0.02$, $p=0.90$).

3.4. Episodic future thinking: content ratings

A series of 2 (Condition: HSE and Control) × 2 (Diagnosis: PTSD and No PTSD) × 2 (Valence: Positive Cue and Negative Cue) ANOVAs were conducted separately for Self-Efficacy, Positive, and Negative content for positive and negative cues. In terms of self-efficacy content, main effects were observed for Valence ($F(1, 58)=98.86$, $p=0.000$, $\mu=0.63$) and Condition ($F(1, 58)=4.98$, $p<0.03$, $\mu=0.08$). In addition, interactions were observed for Valence × Diagnosis ($F(1, 58)=7.96$, $p<0.01$, $\mu=0.12$) and a non-significant trend was found for Condition × Diagnosis ($F(1, 58)=2.96$, $p=0.06$, $\mu=0.06$).

The Valence × Diagnosis interaction reflected that individuals with symptoms of PTSD generated significantly less self-efficacy content in responses to positive cue words than individuals without PTSD ($t(60)=2.64$, $p<0.05$, $d=0.64$). The Condition × Diagnosis interaction reflected that individuals with symptoms of PTSD in the HSE condition generated significantly more self-efficacy content (HSE/PTSD+: $M=5.23$, $SD=0.73$) when imagining the future compared to individuals with symptoms of PTSD in the control condition (Control/PTSD+: $M=4.54$, $SD=0.66$, $t(23)=2.49$, $p<0.05$, $d=1.00$, see Fig. 1). In contrast, the amount of self-efficacy content generated by individuals without PTSD did not differ between the HSE and control condition, $p=0.77$.

No main effect was observed for Diagnosis ($F(1, 58)=0.04$, $p=0.85$, $\mu=0.06$) or three way interaction between Condition × Diagnosis × Valence ($F(1, 58)=0.43$, $p=0.52$, $\mu=0.01$).

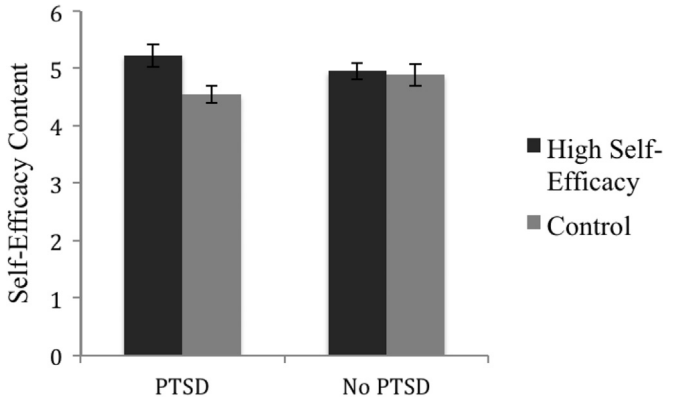

Fig. 1. Self-Efficacy content in future thinking task. *Note. Error bars denote standard error around the mean..*

3.5. Social Problem Solving

A 2 (Condition: HSE, Control) × 2 (Diagnosis: PTSD, No PTSD) univariate ANOVA was conducted to examine whether individuals in the HSE and Control condition differed in the number of steps they provided to solve the two military-related problems. The findings showed a main effect for Condition ($F(1, 59)=5.02$, $p<0.05$, $\mu=0.08$) reflecting that individuals in the HSE condition generated significantly more steps to solve these problems than individuals in the Control condition (HSE: $M=17.84$, $SD=7.37$, Control: $M=13.57$, $SD=6.69$, ($t(58)=2.35$, $p<0.05$, $d=0.98$). There was no main effect for Diagnosis ($F(1, 59)=0.99$, $p=0.32$, $\mu=0.02$) and no interaction was found for Condition × Diagnosis $F(1, 59)=0.01$, $p=0.93$, $\mu=0.000$).

4. Discussion

This study is the first to demonstrate that the selective retrieval of autobiographical memories associated with self-efficacy impacts cognitive processes and behavioral performance on tasks associated with mental health outcomes in combat veterans with and without symptoms of PTSD. That is, findings from this study showed that veterans instructed to recall autobiographical memories associated with self-efficacy generated future events that contained more self-efficacious statements and performed better on a military-related social-problem solving task.

Importantly, the non-significant trend for an interaction between Condition and Diagnosis for self-efficacy content showed that veterans with PTSD generate more self-efficacy content post-induction compared to veterans without PTSD, whereas individuals without PTSD did not differ in the generation of self-efficacy statements between conditions. Although the clinical implications of these findings needs to be explored further in future research, the effect size ($d=1.00$) suggests that this induction may offer a reliable method for increasing self-efficacy content in future thinking among those with PTSD.

Numerous theoretical models (e.g. Berntsen and Rubin, 2006, 2007; Conway, 2005; Ehlers and Clark, 2000; Foa and Riggs, 1993) and studies (e.g. Bryant and Guthrie, 2007; Karl et al., 2009; O'Donnell et al., 2007) have shown that negative self-appraisals are central to the pathogenesis of PTSD. For example, cognitive models of PTSD have posited that negative self-appraisals about the past and future help to maintain a sense of threat in the present (Ehlers and Clark, 2000) and impede recovery (e.g. Ehlers et al., 1998). Furthermore, individuals with PTSD show biases towards recalling autobiographical memories and imagining personal future events associated with trauma (e.g. Sutherland and

Bryant, 2005; Brown et al., 2013). These findings, however, suggest that when individuals with PTSD are asked to recall autobiographical memories associated with positive self-appraisals, and in particular, memories associated with self-efficacy, doing so appears to facilitate cognitive processes that may aid in recovery. Whereas previous studies often rely on methods of false-feedback to increase perceptions of self-efficacy (e.g. Brown et al., 2012b; Litt, 1988; Sanderson et al., 1989), these data suggest that perceptions of self-efficacy can be increased by drawing on one's own personal past–a method which may in fact be more effective since it draws upon the person's own beliefs.

Furthermore, the ability to increase perceptions of self-efficacy through the selective retrieval of self-efficacy-related autobiographical memories is consistent with several lines of theoretical models and empirical findings. First, there are now well-established findings that show that the neuroanatomical structures and cognitive processes involved in recalling autobiographical memories overlap considerably with the ability to imagine one's self in the future (for reviews see Schacter, Addis, Buckner, 2008; Szpunar, 2010). It has been proposed that individuals generate images of themselves in the future, in part, by recombining elements of previous personal experiences, referred to as the *flexible recombination hypothesis* (see Schacter and Addis, 2007). Consistent with this theory, veterans in the HSE condition may have been more likely to produce self-efficacy related statements when imagining the future because such cognitions were more consistent with the experimental induction.

Further, there is evidence that alterations in autobiographical memories are linked to impaired problem solving in suicidal (Evans et al., 1992), depressed (Goddard, Dritschel, and Burton, 1996) and PTSD patients (Sutherland and Bryant, 2005). It has been suggested that this occurs because people attempt to solve problems by drawing on personal experiences from one's past (McNally et al., 1995). It is possible that self-efficacy related autobiographical memories led to an increase in perceived self-efficacy, which in turn, may have increased the accessibility of problem solving exemplars. This is consistent would theoretical frameworks proposing the importance of autobiographical memory for problem-solving purposes (Bluck et al., 2005; see also Pillemer, 2003).

Inconsistent with one of our hypotheses, increasing perceptions of self-efficacy did not correspond with greater episodic specificity for imagined future events. Although previous research (Brown et al., 2012a) found that increasing perceptions of self-efficacy led to more specific autobiographical memory and imagined future events, the lack of difference in this study might be due to the fact that participants in both HSE and control conditions recalled specific autobiographical memories prior to doing the future thinking task. Given the functional and neurobiological overlap between recalling past and future personal events (e.g. Schacter et al., 2008), the process of recalling any three specific autobiographical memories (regardless of theme or emotional importance) may have facilitated the ability to generate specific episodic details in both conditions. This overlaps with research showing that when older and younger participants received a memory specificity induction, they were then more likely to generate future events with greater episodic richness (Madore, Gaesser, and Schacter, 2014). Similarly, emerging evidence shows that clinical populations are able to recall memories with greater episodic specificity with practice (Neshat-Doost et al., 2012).

These findings have a number of potential clinical implications. The selective recollection of autobiographical memories has played a central role in the treatment of PTSD. That is, exposure therapy, the current gold-standard treatment for PTSD, involves the recall of traumatic memories. There exists a strong neurobiological and cognitive basis for the benefits of recalling autobiographical memories associated with the traumatic event(s) (Foa et al., 2013). However, although Exposure Therapy has been proven to be very effective, a significant minority of individuals remain symptomatic after treatment (Foa et al., 2013). Therefore, despite important gains that have been made with exposure therapy, additional strategies to promote recovery from PTSD are needed. Our findings are perhaps most relevant to individuals that report low levels of self-efficacy, as previous work has shown that low self-efficacy predicts symptom maintenance and poor treatment outcome (e.g. Ehlers, et al., 1998). Future research would benefit from determining the extent to which targeting maladaptive cognitions of self-efficacy and controllability improve treatment outcome.

There are several limitations to this study. First, the small sample size would benefit from follow up studies. Second, although our self-efficacy measure indicated that individual self-efficacy beliefs changed after the induction, future work should aim at identifying whether other variables might have also contributed to these outcomes. We also did not assess variables such as combat exposure or personality factors that might mediate the ability of this induction to increase perceptions of self-efficacy. Additionally, although this induction appeared to benefit the performance of combat veterans, future work will need to examine whether this generalizes to other trauma-exposed individuals.

Despite these limitations we belive these findings may provide a novel strategy for facilitating adaptive cognitions and behaviors in combat veterans with and without symptoms of PTSD. Although this strategy has not yet been tested clinically, these current data provide initial evidence that increasing the accessibility of self-efficacy-related autobiographical memories may promote well-being in the wake of traumatic events.

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Appendix A

Examples from the Adapted Autobiographical Interview Adminstration Manual, Addis, Wong, and Schacter, 2008.

Example 1.

Next week I will be going to a BBQ at Gary's place by the lake. I can imagine it will be a lovely sunny day and the lake will look beautiful. We will go out on the boat and go swimming in the lake. For dinner we will have steak and vegetable kebabs, and cake for dessert. I'll help Gary clean up after dinner, and then we'll sit around the campfire.

Example 2.

Next week, I will be visiting Toronto, and I see myself doing some sightseeing around the city with my friend from Toronto, Sarah. At the end of the day, we decide to go to the CN Tower. I have seen the tower in the city before but I have never been up in the tower to see the view. We go up to the observatory deck to look at the view which is amazing, especially as the sun is setting. I take photos of the view from different windows and we stand on a glass floor looking down at the ground.

Appendix B

Modified Means-End Problem Solving Task.

Means End Problem Solving Test.

Story 1. Alex has just been transferred to a new military base where he doesn't know anyone. The people in his new unit have been working together for some time so they are very close. He would like to make friends with them. You begin the story with Alex in his home, immediately after arriving at the new base. The story ends with Alex having many good friends and feeling at home in the new base.

Story 2. Ryan loved his role as an infantryman in the military. While he was deployed he sustained an injury which meant that he could no longer serve in the army. Ryan is unemployed and needs to generate an income. The story ends with Ryan gaining employment and being able to support his family. You begin the story with Ryan deciding that he needs to find work outside of the military.

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