The Role of Autobiographical Memory in Competence Need Satisfaction

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Abstract

The present investigation examined whether autobiographical memory can function to regulate competence need satisfaction. Across two experiments, we examined how autobiographical memories affected perceived competence after competence was threatened or satisfied in a previous task. Experiment 1 results from an undergraduate student sample (N = 150) indicated that reflecting on a competence-satisfying memory increased perceived competence for all participants, but this increase was particularly large for participants whose competence was previously threatened. Experiment 2 results using an undergraduate student sample (N = 245) indicated that participants were not more likely to select a competence-satisfying autobiographical memory over a relatedness-satisfying memory after experiencing a competence threat in a previous task; however, those who selected a competence-satisfying memory reported greater competence need satisfaction and more positive affect than those who selected a relatedness-satisfying memory. Moreover, degree of competence need satisfaction predicted positive affect which in turn predicted self-esteem and optimism. The present experiments highlight the powerful role of reflecting on important autobiographical experiences on need fulfillment and general psychological well-being.

Keywords: Autobiographical memory, self-determination theory, competence, need satisfaction

The Role of Autobiographical Memory in Competence Need Satisfaction

Autobiographical memory functions to guide current thoughts and behaviors, maintain a coherent sense of self over time, and promote social connections (Bluck, Alea, Habermas, & Rubin, 2005). The present investigation extends the functional understanding of autobiographical memory to examine whether autobiographical memory could serve to satisfy basic psychological needs when they are not currently being met.

Self-Determination Theory (SDT) is a macro-theory of human motivation and personality development that proposes that the achievement of psychological well-being (i.e., feelings of self-acceptance, purpose in life, and personal growth; Ryff, 1995) is best understood through the satisfaction of three basic psychological needs: the need for competence (i.e., need for mastery of the environment and to acquire new skills), the need for relatedness (i.e., need for social connectedness and care for others), and the need for autonomy (i.e., need to feel volitional in one's actions; Chen et al., 2015; Deci & Ryan, 2000). As the satisfaction of these basic psychological needs is considered fundamental for human functioning and well-being (Deci & Ryan, 2000), it is critical to investigate factors that can contribute to need-regulation. Work on autobiographical memory indicates that when individuals are asked to select significant episodes from their lives, the selected episodes tend to reflect themes relating to the basic needs of competence, relatedness, and autonomy (Philippe, Koestner, Beaulieu-Pelletier, & Lecours, 2011; Sheldon, Elliot, Kim, & Kasser, 2001). Accordingly, the present investigation builds on existing evidence to investigate whether autobiographical memory has a functional capability to increase perceived competence when need for competence is threatened.

Self-Determination Theory

Self-Determination Theory (SDT) argues that individuals actively pursue the fulfillment of the need for competence, the need for relatedness, and the need for autonomy (Deci & Ryan,

2000). Satisfaction of these needs (e.g., feeling competent after achieving a good grade in a class) promotes healthy psychological growth, satisfaction with life, and self-acceptance (Chen et al., 2015; Deci & Ryan, 2000; Lekes et al., 2014; Vansteenkiste & Ryan, 2013), and has been found to be important across cultures (although needs can be expressed differently in different cultures; Chen et al., 2015). Low need fulfillment may reduce one's ability to thrive and flourish, and the active thwarting or frustration of these needs has been found to reduce well-being as a result of unhealthy self-protective response mechanisms, such as defensiveness and maladaptive behavior patterns (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). In particular, need frustration has been linked to serious ill-being outcomes, such as physiological stress, disordered eating and depression (Bartholomew et al., 2011). Deci and Ryan (2000) suggest that individuals work to address a basic need when it is lacking (e.g., become more skillful at a job to feel more competent), whereas a high level of need frustration can lead to the pursuit of need substitutes or engagement in compensatory behaviors (Chen et al., 2015; Vansteenkiste & Ryan, 2013). However, when the needs are satisfied, one's behavior will reflect one's inherent interests.

Competence need satisfaction. Although all three basic needs are equally important to the study of human motivation (Chen et al., 2015; Deci & Ryan, 2000), as the initial investigation into the role of autobiographical memory as a source for need regulation, the present experiments focused on competence need satisfaction given the existing literature on competence autobiographical memories and the self-concept. Reflecting on positive memories with themes of personal competence has been shown to increase self-esteem and optimism for the future (Abele & Wojciszke, 2007; Austin & Costabile, 2017; Pillemer, Ivcevic, Gooze, & Collins, 2007), and this effect was greater for memories with competence themes than for those

with relationship themes (Austin & Costabile, 2017). Likewise, Wojciszke and Sobiczewska (2013) demonstrated that recalling memories of personal successes or failures influenced self-esteem, whereas recalling memories with relationship themes had no impact on self-esteem, suggesting a strong connection between competence-relevant memories and the self-concept.

Competence need satisfaction refers to the degree to which an individual feels effective and capable at achieving their desired outcomes (Deci 1975; Ryan 1995). Competence frustration, on the other hand, refers to the degree to which an individual feels ineffective and unable to achieve their goals. Individuals tend to construe their own behavior in terms of competence because self-perceptions of competence or incompetence directly and immediately benefit or harm the self (Wojciszke, 2005). Reflecting on our own competence influences emotions and self-evaluations to a greater degree than reflecting on other important self-related characteristics, such as morality (Wojciszke, 2005). Feelings of competence, such as feeling masterful when encountering difficult challenges, can boost motivation for learning, achievement, and other behaviors that are intrinsic in nature (Deci & Ryan, 1985; Marsh, Martin, Seeshing Yeung, & Craven, 2017; White, 1959).

Need Satisfaction in Autobiographical Memory

Given that these basic psychological needs are considered fundamental to human experiences and behavior, it is not surprising that they are a central aspect of remembered life events (Philippe et al., 2011; Philippe et al., 2012; Ryan & Deci, 2008). Life experiences of personal success, social connections, and actions as individual agents contribute to human growth and development and, some research suggests, provide the foundation of one's identity (Deci & Ryan, 2000; McAdams & Olson, 2010; Philippe et al., 2011). Using memories to serve specific psychosocial functions has been observed across cultures (e.g., Alea & Wang, 2015; Kulkofsky et al., 2009; Maki, Kawasaki, Demiray, & Janssen, 2015; Wang, Koh, Song, & Hou,

2015) and in both young and older adults (Bluck & Alea, 2009). For instance, young adults have been shown to use their memories to solve current problems (e.g., boredom, issues related to identity development) and to anticipate future plans, whereas older adults use their memories for generative functions (e.g., to educate others) and to feel socially connected (Bluck & Alea, 2009; Webster, 1995).

Similar to other experiential components of memory, such as emotion or valence (Conway, 2009; Philippe & Bernard-Desrosiers, 2017), memories tend to retain representations of the degree of need satisfaction experienced during the original event (Philippe et al., 2011; Philippe et al., 2012). Moreover, consistent reflection on need-satisfying memories is predictive of improved well-being over time (e.g., increases in life satisfaction and feelings of happiness), even after controlling for dispositional traits and mental health (O'Rourke, Cappeliez, & Claxton, 2011; Philippe et al., 2012), suggesting that need satisfaction may be a key to explaining the relationship between recalling personal experiences from the past and positive life outcomes (Hofer, Busch, Šolcová, & Tavel, 2017; O'Rourke, Cappeliez, & Claxton, 2011).

Need Restoration

The "needs-as-motives" hypothesis argues that if something is in fact a need, and it is frustrated, a desire to satisfy that particular need should be elicited (Baumeister & Leary, 1995; Sheldon & Gunz, 2009). This generates a restoration process, which involves active attempts by individuals to increase need satisfaction in response to need frustration (Fang, He, Fu, & Meng, 2017). Sheldon and Gunz (2009) examined whether frustrated needs for competence, autonomy, and relatedness would elicit need-relevant motivations (e.g., a frustrated need for competence would elicit a desire for competence). Results indicated that each unmet need predicted a desire to increase experiences corresponding to that specific need. For example, when need satisfaction

was manipulated by giving participants feedback that they had low levels of competence, participants reported a subsequent desire to experience an increase in feelings of competence (but they did not report desiring an increase in the other two needs). This work suggests that experiencing a threat to competence would motivate competence need restoration via recalling autobiographical episodes that depict themselves as a competent individual.

There is some evidence from the threat appraisal literature to suggest that need restoration can be a broader, non-specific process. Threat appraisal refers to perceiving a situation as threatening or harmful as a result of situational demands exceeding existing resources (Lazarus & Folkman, 1984) and is theorized to be an outcome of low need satisfaction (Ntoumanis, Edmunds, & Duda, 2009). In Kunda's (1990) model of motivated reasoning, a self-concept threat would generate a directional goal (e.g., disconfirm negative self-view) which in turn would result in a biased memory search and belief construction. As such, the desire to disconfirm a negative self-view would result in biased content of reported memories (e.g., recalled memories would position self in positive light), and increased speed of biased memory recall (Sanitioso, Kunda, & Fong, 1990). In turn, this highly accessible and salient goal-related information (e.g., memories that disconfirm negative self-view) then influences construal of one's own characteristics. In this way, autobiographical memories can be recruited to satisfy a frustrated need (Kunda & Sanitioso, 1989; Sanitioso, Kunda, & Fong, 1990). Similarly, recent experimental work conducted by Waterschoot and colleagues (2020) reported that participants high in resilience exhibited an attentional bias for competence-related words after receiving negative feedback on a puzzle task. The attentional bias to competence cues functioned to restore competence need satisfaction over time.

The Present Research

The present investigation conducted two experiments to examine whether autobiographical memory can function to regulate feelings of competence when competence need satisfaction is frustrated and whether individuals use autobiographical memory to regulate perceived competence when given an opportunity to do so. In Experiment 1, we examined whether reflecting on a competence need-satisfying memory (i.e., a time where someone demonstrated competence) would restore participant competence need satisfaction after they performed poorly on an analytic reasoning task. In Experiment 2, we examined whether participants whose competence need satisfaction was experimentally threatened would choose to reflect on a need-relevant memory (i.e., competence) or need-irrelevant memory (i.e., relatedness), and whether need-relevance of the memory would enhance competence need satisfaction and in turn, enhance positive affect, self-esteem, and optimism.

Experiment 1

Experiment 1 investigated whether reflecting on a memory of competence success would improve competence need satisfaction following a threat to competence. It was hypothesized that participants who had their competence need satisfaction threatened by an analytic reasoning task would demonstrate increased competence need satisfaction after reflecting on a competence need-satisfying memory, and that this increase would be greater than for those who did not previously have their competence need threatened.

We used the entire basic psychological need satisfaction scale (Chen et al., 2015) to allow us to examine the relationships among the three needs in response to competence success and failure. Accordingly, the present experiment was able to examine whether experiencing a competence failure would affect only competence need satisfaction or whether it would affect all three basic psychological needs. In turn, by assessing all three needs, we can examine whether

reflecting on a competence success memory would be specific to competence need satisfaction,

or whether the recall experience would enhance satisfaction of relational and autonomy needs as

well. Research indicates that the needs for competence, autonomy, and relatedness are

interrelated (Bialobrzeska et al., 2018; Radel, Pelletier, & Sarrazin, 2013), yet each is

independently related to psychological well-being (Van den Broeck, Ferris, Chang, & Rosen,

2016). Less is known about whether the satisfaction or frustration of one need might spillover to

the other needs. It is possible that satisfaction or frustration of one need would *not* affect the

perceived satisfaction of other needs as each need is distinct (Sheldon & Gunz, 2009). On the

other hand, research indicates that a single event can satisfy or frustrate multiple needs

simultaneously (e.g., participating in a volunteer event with friends, Sheldon et al., 2001),

suggesting that the satisfaction or frustration of one need (e.g., competence) may also affect

another. Experiment 1 will examine these possibilities.

Participants

To estimate the required sample size, a power analysis was performed using G*Power

(Faul, Erdfelder, Lang, & Buchner, 2007). Previous work that has used the Remote Associates

Test in conjunction with memory and positive psychological outcomes has reported medium

effect sizes (e.g., Vess, Arndt, Routledge, Sedikides, & Wildschut, 2012). A total sample size

required to detect effects in an ANCOVA was calculated with 4 groups and 2 covariates at an

effect size of $f = 0.25$ and an observed power of 0.80. Additionally, a mixed design analysis of

variance (ANOVA) was calculated with 4 groups and 2 measurements at an effect size of $f =$

0.25 and an observed power of 0.80. Based on the results of these power analyses,

recommended sample sizes ranged from 125 to 136 participants. Experiment 1 recruited 150

Iowa State University undergraduate students from introductory psychology and communication

studies courses who received course credit for participation. The sample consisted of 70 males and 80 females, with the majority (74.7%) identifying as Caucasian (8% Latino/Hispanic, 6% Asian/Pacific Islander, 2.7 % African American, and 8.8% Other), with a mean age of 18.99 years (*SD*=.47)

Design

Participants were randomly assigned to one of three conditions: competence failure task, competence success task, or neutral task. All participants completed measures of need satisfaction before and after writing about a memory of competence success.

Procedure

Participants came to the laboratory and completed the study consent and all other measures using Qualtrics software (Qualtrics, Provo, UT). To manipulate competence need satisfaction, participants were randomly assigned to complete a difficult or easy version of the Remote Associates Test, or a neutral dot counting task. After completing their assigned task, participants completed measures of need satisfaction. Participants then reported a memory of an event where they experienced personal success. Participants again completed measures of need satisfaction and were asked questions regarding their perceptions of the first task. Full measures and manipulations are presented on the Open Science Framework at:

https://osf.io/ezjgh/?view_only=9fc3381a35d149bfa0bb1e4a91fee132.[1]

Measures and Manipulations

Competence satisfaction manipulation. To manipulate competence satisfaction, items from the Remote Associates Test (RAT, Mednick, 1962) were administered to participants on the computer. Consistent with previous research (McFarlin & Blascovich, 1984; Thompson,

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[1] Positive and negative affect were also measured in this study. Results related to these variables are reported in the supplemental materials.

1993), participants were randomly assigned to complete a difficult set of items from the RAT (failure feedback), an easy set of items from the RAT (success feedback), or a dot counting task (no feedback). Participants assigned to the difficult and easy conditions of the RAT read a description that the test is a measure of general intelligence and that they would be presented with 10 sets of three words. They were instructed that the objective is to type in one word that best links the three presented words together and that they would have 20 seconds to complete each set. They were provided with an example (i.e., Head, Street, Dark) with the correct answer (i.e., Light), and an explanation of why the answer was correct (i.e., headlight, street light, the opposite of dark is light). After completing the task, they received their total score of correct answers out of a possible 10. Based on McFarlin and Blascovich (1984), it was expected that participants assigned to difficult sets would receive low scores (failure feedback) and participants assigned to easy sets would receive high scores (success feedback). For the neutral condition, participants completed a dot counting task where they were instructed to count and enter the number of dots they saw on the computer screen (Speelman & Shadbolt, 2018). Participants in this condition received 10 sets of randomly placed dots and were not given any information regarding their performance. Similar to other counting tasks (e.g., Speelman & Shadbolt, 2018), this task was not intended to be competence-frustrating nor competence-satisfying.

Need satisfaction. Based on the basic psychological need satisfaction and frustration scale (Chen et al., 2015), the present project assessed satisfaction with need for competence, relatedness, and autonomy with the stem, "*Currently I feel*," on a 5-point scale, 1 = *completely disagree* to 5 = *completely agree*. The measure included a total of 24 items, with eight items averaged for each of the three subscales. A reliability analysis indicated a Cronbach's alpha of .90 (time 1) and .88 (time 2) for the competence subscale (e.g., *"I feel confident I can do things*

well"), .86 (time 1) and .88 (time 2) for the relatedness subscale (e.g., *"I feel that the people I care about also care about me"*), and .85 (time 1) and .88 (time 2) for the autonomy subscale (e.g., *"I feel a sense of choice and freedom in the things I undertake"*).[2]

Memory recall. Based on memory prompts used in previous research (Austin & Costabile, 2017; McAdams et al., 1996), participants were asked to write a description of a positive memory that was focused on a time where they achieved personal success in something important to them. Participants were asked to focus on one specific event and report why it remained important to them.

Task perceptions. To ensure that tasks were perceived as designed, participants were asked to indicate the degree of difficulty of their first task (RAT or dot counting task) on a 7-point scale, 1 = *extremely easy* to 7 = *extremely difficult*. Additionally, participants who were assigned to the RAT were asked to indicate the degree to which their score was surprising on a 7-point scale, 1 = *not at all* to 7 = *extremely*.

Experiment 1 Results

Descriptive statistics and correlation matrices for Experiments 1 and 2 are provided in supplemental materials.

Task perceptions. As expected, participants in the difficult RAT condition ($M = .46$, $SD = .65$) solved fewer problem sets than those in the easy RAT condition ($M = 8.08$, $SD = 2.21$), $t(97) = 23.34$, $p < .001$, $d = 4.66$, 95% CI [3.93, 5.46]. However, there were no differences in the

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[2] Vansteenkiste and Ryan (2013) indicate that need satisfaction may operate independently from need frustration. To examine this possibility in the present investigation, we also created two subscales for each need, one subscale with need satisfaction items (e.g., I feel capable at what I do) and one subscale with need frustration items (e.g., I feel like a failure because of the mistakes I make). In the present experiment, results did not vary by subscale so results are combined into a composite measure to simplify presentation of results. Analyses of separate subscales can be found in the supplemental materials.

amount of score surprise between the difficult condition ($M = 2.56$, $SD = 2.09$) and the easy

condition ($M = 3.00$, $SD = 1.80$), $t(97) = 1.12$, $p = .265$, $d = .22$, 95% CI [-.17, .62].

A univariate Analysis of Variance (ANOVA) of competence manipulation conditions

(difficult RAT, easy RAT, and dot counting task) on ratings of task difficulty indicated a main

effect of condition, $F(2, 147) = 132.06$, $p < .001$, $\eta_p^2 = .64$, 95% CI [.55, .70]. As expected,

participants assigned to the difficult RAT condition ($M = 5.58$, $SD = 1.73$) rated the task as more

difficult than participants assigned to the easy RAT condition ($M = 1.96$, $SD = 1.15$), $p < .001$, d

$= 2.44$, 95% CI [1.93, 2.98] and the neutral dot counting task ($M = 1.73$, $SD = 1.00$), $p < .001$, d

$= 2.70$, 95% CI [2.17, 3.27]. There were no differences in participant perceptions of task

difficulty between the easy RAT condition and the neutral dot counting task, $p = .381$, $d = .21$,

95% CI [-.18, .61].

Need satisfaction. A series of mixed design ANOVAs were conducted separately on

measures of competence, relatedness, and autonomy, see Table 1 for means and standard

deviations. Time (pre- and post-memory need satisfaction) was entered as a within-subjects

factor and task condition (difficult RAT, easy RAT, dot counting task) was entered as a between-

subjects factor. Results of analyses examining the subscales of need satisfaction and need

frustration separately are reported in the supplemental analyses document.

Competence. A mixed design ANOVA on **competence need satisfaction** indicated main

effects of time, $F(1, 147) = 81.94$, $p < .001$, $\eta_p^2 = .36$, 95% CI [.24, .46] and of task condition

$F(2, 147) = 19.66$, $p < .001$, $\eta_p^2 = .21$, 95% CI [.10, .31]; however, these main effects were

qualified by a significant Time × Task Condition interaction, $F(2, 147) = 6.17$, $p = .003$, $\eta_p^2 =$

$.08$, 95% CI [.01, .16], see Table 1. Competence need satisfaction increased from pre-memory to

post-memory reflection for participants in the easy RAT condition, $F(1, 147) = 17.77$, $p < .001$,

$\eta_p^2 = .11$, 95% CI [.03, .21], and for participants in the dot counting task condition, $F(1, 147) =$ 11.65, $p = .001$, $\eta_p^2 = .07$, 95% CI [.01, .16]. However, as predicted, this increase was substantially larger for those in the difficult RAT condition, $F(1, 147) = 64.70$, $p < .001$, $\eta_p^2 = .31$, 95% CI [.19, .41]..

To examine whether autobiographical memory restored competence need satisfaction, we also conducted a univariate ANCOVA on post-memory ratings of **competence need satisfaction**, with pre-memory competence need satisfaction entered as a covariate. Results indicated that the covariate, the first measure of competence need satisfaction, was a significant predictor of competence need satisfaction after reporting a memory, $F(1, 146) = 69.90$, $p < .001$, $\eta_p^2 = .32$, 95% CI [.20, .43]. However, there was no main effect of task condition after controlling for pre-memory scores of competence need satisfaction, $F(2, 146) = .12$, $p = .883$, $\eta_p^2 = .002$, 95% CI [0, .02], suggesting reflecting on a competence-related memory had competence satisfaction-restoring capabilities.

Table 1

Descriptive Mean Ratings of Pre- and Post-Memory Need Satisfaction for Task Conditions in Experiment 1

Need Satisfaction	Difficult RAT		Dot Task		Easy RAT	
	Pre-Memory	Post-Memory	Pre-Memory	Post-Memory	Pre-Memory	Post-Memory
Competence	3.23 (.74)[a]	3.90 (.58)[b]	4.10 (.56)[a]	4.38 (.48)[b]	3.86 (.68)[a]	4.21 (.69)[b]
Relatedness	3.89 (.63)[a]	4.19 (.64)[b]	4.15 (.63)[a]	4.39 (.53)[b]	4.23 (.64)[a]	4.41 (.64)[b]
Autonomy	3.29 (.70)[a]	3.63 (.72)[b]	3.65 (.66)[a]	4.01 (.66)[b]	3.54 (.71)[a]	3.91 (.78)[b]

Note. Standard deviations are provided in parentheses. Subscripts indicate a significant difference ($p < .01$) from pre-memory to post-memory within each task condition.

Relatedness. A mixed design ANOVA on **relatedness need satisfaction** indicated main effects of time, $F(1, 147) = 83.72$, $p < .001$, $\eta_p^2 = .36$, 95% CI [.24, .46] and of task condition $F(2, 147) = 3.09$, $p = .048$, $\eta_p^2 = .04$, 95% CI [.00, .11]; and there was not a significant Time $\times$ Task Condition interaction, $F(2, 147) = 1.58$, $p = .209$, $\eta_p^2 = .02$, 95% CI [0, .08]. Relatedness need satisfaction was greater across conditions post-memory reflection ($M = 4.33$, $SE = .05$) than pre-memory reflection ($M = 4.09$, $SE = .05$), $p < .001$, $d = .39$, 95% CI [.32, .46]. Additionally, participants assigned to the difficult RAT ($M = 4.04$, $SE = .09$) reported significantly lower relatedness need satisfaction than participants assigned to the easy RAT ($M = 4.32$, $SE = .09$), $p = .022$, $d = .44$, 95% CI [.32, .57], and marginally lower relatedness need satisfaction than participants assigned to the dot counting task ($M = 4.27$, $SE = .08$), $p = .052$, $d = .40$, 95% CI [.28, .51]. There were no differences between the easy RAT and the dot counting task conditions, $p = .71$.

Autonomy. A mixed design ANOVA on **autonomy need satisfaction** indicated main effects of time, $F(1, 147) = 101.48$, $p < .001$, $\eta_p^2 = .41$, 95% CI [.29, .51] and of task condition $F(2, 147) = 3.98$, $p = .021$, $\eta_p^2 = .05$, 95% CI [.001, .13]; and there was not a significant Time $\times$ Task Condition interaction, $F(2, 147) = .10$, $p = .91$, $\eta_p^2 = .001$, 95% CI [0, .02]. Autonomy need satisfaction was greater post-memory reflection ($M = 3.85$, $SE = .06$) than pre-memory reflection ($M = 3.49$, $SE = .06$), $p < .001$, $d = .51$, 95% CI [.42, .59]. Additionally, participants assigned to the difficult RAT ($M = 3.46$, $SE = .10$) reported marginally lower autonomy need satisfaction than participants assigned to the easy RAT ($M = 3.72$, $SE = .10$), $p = .053$, $d = .35$, 95% CI [.20, .50], and significantly lower autonomy need satisfaction than participants assigned to the dot counting task ($M = 3.83$, $SE = .09$), $p = .007$, $d = .54$, 95% CI [.41, .68]. There were no differences between the easy RAT and the dot counting task conditions, $p = .447$.

Experiment 1 Discussion

Experiment 1 examined the impact of autobiographical memory on competence need satisfaction. We hypothesized that individuals who were assigned to a difficult task meant to reduce competence need satisfaction would report increases in competence need satisfaction after reflecting on a time of competence success. Results indicated that participant competence need satisfaction increased for all participants who reflected on a competence success, and this increase was especially large for participants who had previously had their competence threatened, supporting the prediction that reflecting on a memory related to competence success has competence satisfaction-improving capabilities. Additional analyses reported in supplemental analyses indicate that this pattern was observed when examining both need satisfaction and need frustration subscales. We would also like to note that even individuals who had just completed a competence-satisfying task (i.e., easy RAT) reported increases in all three basic psychological needs after the recall task, an unpredicted finding that underscores the importance of reflecting on positive life experiences on maintaining a positive self-concept.

Although satisfaction with all needs (i.e., competence, relatedness, and autonomy) increased from pre- to post-memory reflection, the interaction of time and competence need salience (i.e., prior task either threatened, satisfied, or was presumably unrelated to competence need) was only found for competence, which suggests that the three basic psychological needs are both interconnected and distinct. Reflecting on a memory of competence success was shown to be beneficial for competence need satisfaction, as expected, but also for relatedness and autonomy need satisfaction as well. This is consistent with previous work demonstrating that reflecting on memories with intrinsic concerns (i.e., self-development, growth) positively impacted all three psychological needs (Lekes et al., 2014).

Results also indicated that the task designed to induce a competence threat (the difficult RAT condition) also reduced both relatedness and autonomy need satisfaction. This finding suggests the possibility of spillover of both need frustration and of need satisfaction such that just as the satisfaction of one need can bolster the others, the frustration of one need might similarly attenuate the others. Future work should further examine the interrelations among the three basic psychological needs as well as explore whether the findings of Experiment 1 might point to a broader process of self-perception in which need satisfaction (or frustration) influences positive and negative affect which would in turn drive other self-related perceptions and cognitions.

Experiment 2

Given that previous research has indicated that individuals are motivated to restore specific needs that are frustrated (Sheldon & Gunz, 2009) and that autobiographical memory recollection may be one way in which frustrated needs can be satisfied (Sanitioso, Kunda, & Fong, 1990), Experiment 2 examined whether participants whose competence need satisfaction was threatened would choose to reflect on a need-relevant memory when given the opportunity to do so. We hypothesized that participants who had their competence need threatened would be more likely to select a "competence success" memory topic (i.e., academic or non-academic success) over a "relationship success" topic (i.e., family bonding, friend/romantic partner bonding) or a neutral topic (i.e., open-ended neutral event) than participants assigned to competence need satisfaction or baseline conditions.

Some research suggests that the three basic psychological needs of competence, relationships, and autonomy are not substitutable – a frustrated need for competence cannot be resolved by satisfying the need for relatedness (Sheldon & Gunz, 2009); however, other research

suggests that individuals do pursue and benefit from need substitutes, suggesting that need restoration can be a broader, non-specific process (Bialobrzeska et al., 2018; Knowles et al., 2010). Experiment 2 examined these factors by comparing the effects of competence-satisfying and relationship-satisfying memories selected by participants on competence need satisfaction following a threat to competence. If basic psychological needs are *not* substitutable, then the increase of competence need satisfaction from pre- to post-memory reflection should be greater for participants who elect to write about a competence success memory than for participants who elect to write about a memory of relationship success or a neutral event. However, if the needs are substitutable, the increase of competence need satisfaction from pre- to post-memory reflection would be similar for participants who elected to write about a memory of competence success and those who elected to write about a relationship success, and that these participants should illustrate greater gains than those participants who elected to write about a neutral event.[3]

Experiment 2 also examined downstream consequences of need satisfaction on affect and well-being. Sheldon and colleagues (2001) reported that recalling autobiographical events that satisfied basic psychological needs increased positive affect. Other research indicates that increases in positive affect as a result of need satisfaction following autobiographical memory recall contribute to increases in self-esteem and psychological well-being (Houle & Philippe, 2017). Thus, for Experiment 2, we conducted mediation analyses to test the prediction that competence success memories would predict positive affect and in turn, psychological well-being, which we assessed using measures of self-esteem and optimism.

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[3] Bauer & McAdams (2000) argue that autonomy is less often represented in a single, episodic event in autobiographical memory than in the desire to integrate the various aspects of one's experiences into a coherent whole. Although we believe that individuals likely do hold clear episodic memories centered on personal autonomy, we did not include autonomy as a memory prompt in this study to increase the ease with which specific events could be recalled by participants in this study.

We also included exploratory analyses to examine whether memory prompt selection would vary as a function of participants' pre-memory competence satisfaction and positive affect levels. Threats to one's self-concept can be mitigated by compensatory strategies in which one affirms the self in the domain of the threat (Brannon, 2019) or in which one affirms the self in a new domain to buffer against the impact of the negative threat (Aronson, Blanton, & Cooper, 1995). We examined whether degree of perceived threat (as indicated by lower pre-memory competence satisfaction scores and lower pre-memory positive affect) was associated with the strategy selected by participants who failed the cognitive task.

Experiment 2 Method

Power Analysis and Participants

To estimate the required sample size, a power analysis was performed using G*Power (Faul et al., 2007). Previous work with the RAT and memory has reported medium effect sizes (e.g., Vess et al., 2012). A total sample size required to detect effects in a chi-square analysis was calculated with a medium effect size, an alpha of .05, and observed power of 0.80. Recommended sample sizes ranged from 60 to 70 participants per group. Experiment 2 recruited a minimum of 80 participants per group (245 participants total).

Participants included 245 undergraduate students from Iowa State University who were recruited from introductory psychology and communication studies courses and received course credit for participation (M_{Age} = 19.26; SD = 1.53). The sample consisted of 63 males and 182 females, with the majority (79.6%) identifying as Caucasian (6.9% Latino/Hispanic, 5.3% Asian/Pacific Islander, 3.7 % African American, 4.5% Other).

Procedure

Participants came to the laboratory and completed the study consent and all other measures using Qualtrics software (Qualtrics, Provo, UT). Participants were randomly assigned

to one of three task conditions (competence failure task vs. competence success task vs. no task). In the competence failure and success conditions, participants completed difficult and easy problem sets on the Remote Associates Test (RAT) and received failure and success feedback, respectively and then completed measures of need satisfaction and affect. Given that the dot counting task in Experiment 1 did not appear to be sufficiently neutral with regard to need satisfaction, participants in the "no task" condition completed only baseline measures of need satisfaction and affect upon entering the lab. All participants were then asked to select a writing topic of their choice from among 5 options. After writing their essay, participants completed measures assessing need satisfaction, affect, self-esteem, optimism (measures were presented in this order to reflect our model of the psychological processes), and participants assigned to one of the two RAT conditions answered questions assessing perceptions of the RAT task. Need satisfaction measures were the same as used in Experiment 1.[4]

Memory selection task. Based on a similar paradigm from Knowles et al. (2010), participants were asked to select one writing topic from a list of five choices (counterbalanced presentation order) on which to write an essay. The memory choices included two prompts that focused on competence success (academic versus non-academic), two prompts that focused on relationship success (family bonding versus friend/romantic partner bonding), and an open-ended neutral event unrelated to competence or relatedness needs.

Memory coding procedures. To ensure that participant essays were responsive to the different memory prompts, all essays were coded using the Linguistic Inquiry and Word Count program (LIWC; Pennebaker, Boyd, Jordan, & Blackburn, 2015). The LIWC program analyzes

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[4] Due to space constraints, presentation of results pertaining to relatedness and autonomy are provided in the supplemental analyses document. As in Experiment 1, results indicated a general increase on relatedness and autonomy over time, a pattern that did not interact with task condition.

words in a text by comparing them with dictionaries that tap a specific domain (e.g., achievement

and affiliation drives). The output of each LIWC variable is presented as a percentage of total

words used in the analyzed text that correspond to a particular category. Examples of

"achievement" words counted in LIWC include *win*, *success*, and *better*; examples of

"affiliation" words include *ally*, *friend*, and *social* (Pennebaker, Boyd, Jordan, & Blackburn,

2015).

      Positive affect. To assess affect, participants completed 20 items from the Positive and

Negative Affective Schedule (PANAS), with 10 items assessing positive affect and 10 items

assessing negative affect (Watson, Clark, & Tellegen, 1988). Participants rated the extent to

which they felt each emotion "*right now*" on a 5-point scale, 1 = *very slightly or not at all* to 5 =

extremely. Each subscale was averaged, and a reliability analysis indicated a Cronbach's alpha

of .89 (time 1) and .91 (time 2) for positive affect (e.g., attentive, interested, and alert). Due to

space constraints, results related to negative affect are provided in supplemental materials.

      Self-esteem. Adapting measures used by Cheung et al. (2013), a measure of state self-

esteem was used to examine self-esteem after reflecting on a memory on a 5-point scale, 1 =

strongly disagree to 5 = *strongly agree*. The measure included 5 items (e.g., "I feel good about

myself" and "I have many positive qualities") and all items were averaged. A reliability analysis

indicated a Cronbach's alpha of 0.82.

      Optimism. Based on the measure from Cheung et al. (2013), all participants were asked

to indicate their level of optimism after reflecting on a memory on a 6-point scale, 1 = *strongly*

disagree to 6 = *strongly agree*. The measure consists of five items total (e.g., "I feel ready to

take on new challenges," and "I feel optimistic about my future) and all items were averaged,

Cronbach's α = .82.

Experiment 2 Results

Competence Need Satisfaction Manipulation Outcomes

RAT outcomes. First, to examine performance outcomes on the Remote Associates Test (RAT), a non-parametric Mann-Whitney U test was conducted for the difficult and easy RAT conditions, as the assumption of homogeneity of variance had been violated. As expected, participants in the difficult RAT condition (mean rank = 43.39) solved fewer problem sets than those in the easy RAT condition (mean rank = 122.58), $U = 115$, $p = .001$, $r = -.86$. Participants assigned to the difficult condition perceived the task to be more difficult ($M = 6.14$, $SD = 1.28$) than participants assigned to the easy condition ($M = 2.11$, $SD = 1.25$), $t(162) = 1.12$, $p < .001$, $d = 3.17$, 95% CI [2.72, 3.65], and there were no differences in the amount of score surprise between the difficult condition ($M = 2.64$, $SD = 2.16$) and the easy condition ($M = 2.51$, $SD = 1.65$), $t(153) = .44$, $p = .66$, $d = .07$, 95% CI [-.24, .37].

Pre-memory competence need satisfaction. To examine the influence of the manipulation of competence need satisfaction, a univariate ANOVA was conducted for all competence satisfaction conditions (difficult RAT, easy RAT, and no task) and pre-memory ratings of competence need satisfaction. The results indicated a main effect of condition on pre-memory competence need satisfaction $F(2, 242) = 24.46$, $p < .001$, $\eta_p^2 = .17$, 95% CI .09, .25. Participants assigned to the difficult RAT condition ($M = 3.27$, $SD = .75$) reported lower pre-memory competence need satisfaction than participants assigned to the easy RAT condition ($M = 3.96$, $SD = .64$), $p < .001$, $d = .98$, 95% CI [.66, 1.32] and the no task condition ($M = 3.92$, $SD = .73$), $p < .001$, $d = .87$, 95% CI [.56, 1.20]. There were no differences in pre-memory competence need satisfaction between the easy RAT condition and the no task condition, $p = .936$.

Pre-memory positive affect. A univariate ANOVA was conducted were to assess the effect of competence satisfaction manipulation conditions (difficult RAT, easy RAT, and no task condition) on pre-memory ratings of positive affect. The results indicated a main effect of condition on positive affect $F(2, 242) = 8.52$, $p < .001$, $\eta_p^2 = .07$, 95% CI [.02, .13]. As expected, participants assigned to the difficult RAT condition ($M = 2.86$, $SD = .74$) reported lower positive affect than participants assigned to the easy RAT condition ($M = 3.36$, $SD = .76$), $p < .001$, $d = .66$, 95% CI [.35, .99]; and marginally lower positive affect than participants assigned to the no task condition ($M = 3.14$, $SD = .80$), $p = .06$, $d = .36$, 95% CI [.05, .68]. There were no differences in positive affect between the easy RAT condition and the no task condition, $p = .165$.

Memory Selection

A Pearson chi-square test was performed to examine the association between task condition (difficult RAT, easy RAT, no task) and memory selection topic (academic success, non-academic success, past family bonding, past friend or romantic partner bonding, open-ended neutral). The results indicated no association between task conditions and memory selection, χ^2 (8, $n = 245$) = 4.63, $p = .797$, $V = .097$, see Table 2. Given that only 8 participants (3% of the sample) selected the open-ended neutral topic, this group was excluded from further analyses. Additionally, the academic and non-academic topics were combined to form a memory group focused on "competence success," and the friend/romantic and family topics were combined to form a memory group focused on "relationship success." A chi-square test revealed no significant association between task conditions (difficult RAT, easy RAT, and no task) and memory focus (i.e., competence success memory and relationship success memory), χ^2 (2, $n = 237$) = .3, $p = .858$, $V = .036$, see Table 2.

Table 2

Crosstabulation of Memory Topics and Task Conditions, and Memory Focus and Task Conditions in Experiment 2

	Task Conditions				Pearson chi-square results	
	Difficult RAT	Easy RAT	No Task	Total	χ^2 (df)	*p*
Memory Topics					4.63 (8, *n* = 245)	.797
Academic Topic	14	15	17	46		
Non-Academic Topic	25	20	20	65		
Friend/Romantic Topic	23	31	24	78		
Family Topic	19	13	16	48		
Open-Ended Neutral	2	2	4	8		
Memory Focus					.31 (2, *n* = 237)	.858
Competence Success	39	35	37	111		
Relationship Success	42	44	40	126		

Note. RAT refers to Remote Associates Test.

LIWC achievement and affiliation memory content. A one-way ANOVA of memory prompt on **LIWC achievement** memory content was performed and indicated that competence success memories contained greater achievement content (*M* = 4.59, *SD* = 2.07) than did relationship success memories (*M* = 1.29, *SD* = .90), $F(1, 235) = 263.25$, $p < .001$, $\eta_p^2 = .53$, 95% CI [.44, .60]. And, a one-way ANOVA of memory prompt on **LIWC affiliation** memory content was performed and indicated that relationship success memories contained greater affiliation content (*M* = 5.83, *SD* = 2.64) than did competence success memories (*M* = 2.44, *SD* = 2.60), $F(1, 235) = 98.54$, $p < .001$, $\eta_p^2 = .30$, 95% CI [.20, .38].

Need satisfaction and positive affect

     Competence need satisfaction. A 3-way mixed design ANOVA on **competence need satisfaction** specified time (pre- and post-memory need satisfaction) was a within-subjects factor, and task condition (difficult RAT vs. easy RAT vs. no task) and memory focus (competence success vs. relationship success) were entered as between-subjects factors.[5] Results indicated main effects of time, $F(1, 231) = 211.47$, $p < .001$, $\eta_p^2 = .48$, 95% CI [.39, .55] and of task condition, $F(2, 231) = 20.27$, $p < .001$, $\eta_p^2 = .15$, 95% CI [.07, .23]; however, these main effects were qualified by a significant Time × Task Condition interaction, $F(2, 231) = 13.62$, $p < .001$, $\eta_p^2 = .11$, 95% CI [.04, .18]. Consistent with Experiment 1, competence need satisfaction increased for participants in the easy RAT condition and in the no task condition, Fs > 30.00, ps < .001; however, this difference was significantly greater for participants in the difficult RAT condition, $F(1, 231) = 163.88$, $p < .001$, $\eta_p^2 = .42$, 95% CI [.32, .49], see Table 3.

     Further examination of simple effects indicated that participants assigned to the difficult RAT condition reported greater post-memory competence need satisfaction when they selected a competence memory than when they selected a relationship memory, an effect that approached statistical significance, $F(1, 231) = 3.24$, $p = .079$, $\eta_p^2 = .01$, 95% CI [0, .06].

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[5] Given research on gender and memory themes (Boytos et al., 2020), analyses related to competence need satisfaction and positive affect were also conducted with gender entered as a covariate. Results indicated that the inclusion of gender did not meaningfully change observed effects. Analyses related to relatedness, autonomy, and need satisfaction and need frustration subscales are presented in supplemental materials. Subscale findings are similar to those reported here with the exception of the mediational analyses which found that need satisfaction, but not need frustration, mediated the association between memory and self-esteem and optimism.

Table 3

Descriptive Means of Pre- and Post-Memory Need Satisfaction and Affect for Task Conditions and Memory Focus

Variables	Difficult RAT		No Task		Easy RAT	
	Competence Success	Relationship Success	Competence Success	Relationship Success	Competence Success	Relationship Success
Competence T1	3.46 (.76)	3.09 (.71)	4.19 (.57)	3.75 (.76)	4.01 (.65)	3.92 (.64)
Competence T2	4.26 (.60)	4.04 (.42)	4.59 (.39)	4.18 (.68)	4.51 (.53)	4.32 (.57)
Positive Affect T1	3.10 (.73)	2.64 (.70)	3.51 (.77)	2.86 (.73)	3.31 (.85)	3.38 (.68)
Positive Affect T2	3.77 (.74)	3.33 (.86)	4.03 (.81)	3.40 (.77)	4.06 (.80)	3.79 (.72)

Note. Standard deviations provided in parentheses; Competence Success and Relationship Success refer to whether the participant elected to write an autobiographical memory essay related to competence success or to relationship success, respectively; T1 and T2 refer to pre-memory and post-memory, respectively.

This effect was also observed for participants assigned to no task, $F(1, 231) = 10.96$, $p = .001$, $\eta_p^2 = .05$, 95% CI [.01, .11]. However, this effect was not observed for those assigned to the easy RAT, $F(1, 231) = 2.54$, $p = .112$, $\eta_p^2 = .01$, 95% CI [0, .05]. This general pattern of results was also observed when examining pre-memory competence need satisfaction (difficult RAT and no-task conditions indicated that participants who selected competence memories also reported greater pre-memory competence need satisfaction, $Fs > 5.50$, $ps < .02$; a difference that was not observed among those in the easy RAT condition, $F = .31$, $p = .577$), suggesting that memory selection may operate as a function of perceived threat.[6]

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[6] Pairwise comparisons indicated that among participants who were assigned to the difficult RAT task, those who selected competence memories had similar correctness scores on the RAT ($M = .44$, $SD = .79$) as those who selected relationship memories ($M = .71$, $SD = .86$), $F(1, 231) = 1.06$, $p = .305$, $\eta_p^2 = .005$.

Results also indicated a main effect of memory focus, with post-memory competence need

satisfaction greater for participants whose memories focused on competence ($M = 4.17$, $SE =$

.05) than for participants whose memories focused on relationships ($M = 3.88$, $SE = .05$), $F(1,$

$231) = 16.56$, $p < .001$, $\eta_p^2 = .07$, 95% CI [.02, .14].

      Positive affect. A mixed design ANOVA on **positive affect** indicated main effects of

time, $F(1, 231) = 255.15$, $p < .001$, $\eta_p^2 = .53$, 95% CI [.44, .59] with positive affect increasing

over time, and of task condition, $F(2, 231) = 7.08$, $p = .004$, $\eta_p^2 = .06$, 95% CI [.01, .12], with

participants in the difficult RAT condition reporting lower positive affect than those in the other

conditions,(ps $< .05$, ds $> .20$). There was not a significant Time × Task Condition interaction,

$F(2, 231) = 1.49$, $p = .227$, $\eta_p^2 = .01$, 95% CI [0, .05], see Table 3.

      Results also indicated a significant main effect of memory focus, with participants who

selected a competence memory reporting greater positive affect ($M = 3.63$, $SE = .07$) than

participants who selected a relationship memory ($M = 3.24$, $SE = .06$), $F(1, 231) = 18.38$, $p <$

.001, $\eta_p^2 = .07$, 95% CI [.02, .14]. There was not a significant Time × Memory Focus

interaction, $F(1, 231) = 1.65$, $p = .20$, $\eta_p^2 = .01$, 95% CI [0, .04]; however, there was a marginal

Task Condition × Memory Focus interaction, $F(2, 231) = 2.92$, $p = .056$, $\eta_p^2 = .03$, 95% CI [0,

.07]. Participants who were assigned to the difficult RAT and selected the competence memory

reported greater post-memory positive affect than those who selected a relationship memory,

$F(1, 231) = 6.23$, $p = .013$, $\eta_p^2 = .03$, 95% CI [.001, .08]. Additionally, participants who were

assigned to the "no–task" control condition and selected the competence memory reported

greater post-memory positive affect than those who selected a relationship memory, $F(1, 231) =$

12.55, $p < .001$, $\eta_p^2 = .05$, 95% CI [.01, .12]. However, participants who were assigned to the

easy RAT showed no differences in positive affect when reporting a competence memory versus

a relationship memory, $F(1, 231) = 2.23$, $p = .137$, $\eta_p^2 = .01$, 95% CI [0, .05]. The same pattern

was observed when examining pre-memory positive affect (difficult RAT and no task Fs > 7.50,

ps < .01; easy RAT F=.17, p=.685), suggesting that memory selection may operate as a function

of perceived threat.

Mediational Analyses

To test the prediction that a competence success memory enhances positive affect and in

turn self-esteem and optimism through competence need satisfaction, two mediation analyses

with a multicategorical independent variable were performed using a bootstrapping analysis

(Model 6; 10,000 resamples) in PROCESS Macro (Hayes, 2013). According to Hayes and

Preacher (2014), this approach mimics an analysis of (co)variance and provides observed and

adjusted group means, but also maintains simple interpretations of effects. For the independent

variable (memory focus: competence success vs. relationship success), simple indicator coding

was selected (relationship success memory coded as 0, competence success memory coded as 1).

Post-memory competence need satisfaction was entered as the first mediator, positive affect was

entered as the second mediator, pre-memory competence need satisfaction was entered as a

covariate, and self-esteem and optimism were each entered separately as dependent variables.

The results of each analysis are provided below.

Self-esteem. There were significant effects on self-esteem of both post-memory

competence need satisfaction, $b = .32$, $t(233) = 4.54$, $p < .001$, 95% CI [.18, .46], and positive

affect, $b = .30$, $t(233) = 7.17$, $p < .001$, 95% CI [.22, .39], see Figure 1. There was not a direct

effect of memory focus on self-esteem, $b = -.02$, $t(233) = -.64$, $p = .524$, 95% CI [-.07, .04]. The

bootstrapped unstandardized indirect effect through competence need satisfaction for

competence memory vs. relationship memory was .03, 95% CI [.003, .05]; the bootstrapped

unstandardized indirect effect through positive affect for competence memory vs. relationship

memory was .04, 95% CI [.010, .07]; and the bootstrapped unstandardized indirect effect through

competence need satisfaction and then positive affect for self-esteem was .02, 95% CI [.004,

.03], the suggesting that the indirect effects of post-memory competence need satisfaction was

significant for participants who selected a competence success memory relative to participants

who selected a relationship success memory. These results are consistent with mediation effects

and provide support for the hypothesis that reflecting on a competence success memory leads to

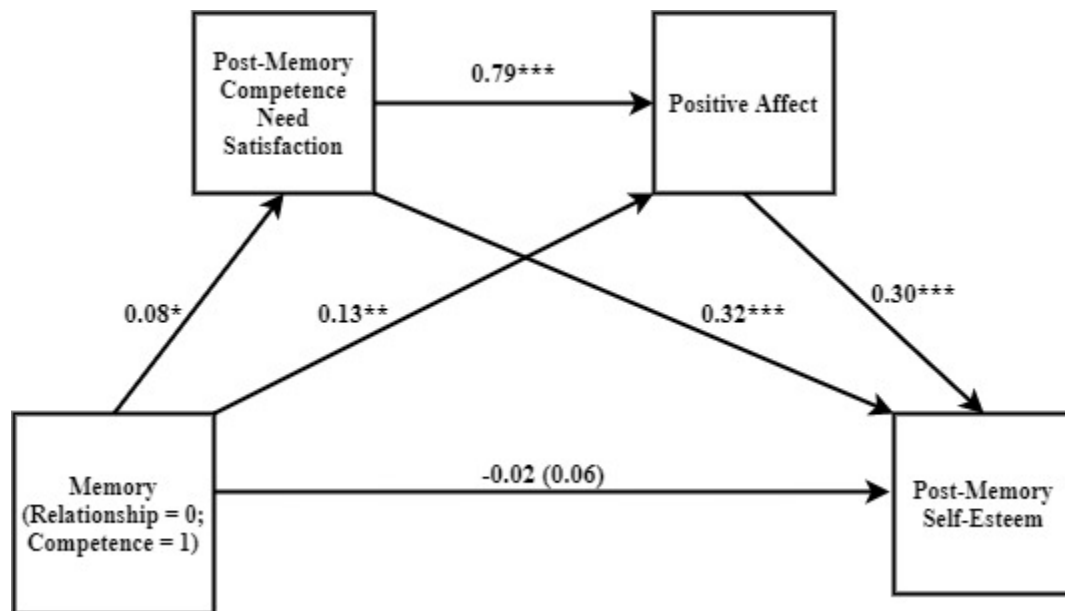self-esteem because it increases competence need satisfaction and positive affect.

Figure 1. Experiment 2: Mediation model with memory condition as the independent variable
(competence success memories coded as 1), pre-memory competence need satisfaction as
covariate, post-memory competence need satisfaction and positive affect as mediators, and self-
esteem as dependent variable. The above model presents the unstandardized regression
coefficients, *p < .05, **p < .01, ***p < .001.

Optimism. There were significant effects on optimism of post-memory competence

need satisfaction, $b = .34$, $t(233) = 4.26$, $p < .001$, 95% CI [.18, .51] and of positive affect, $b =$

.39, $t(233) = 7.93$, $p < .001$, 95% CI [.29, .48], see Figure 2. There was a direct effect of memory

focus on optimism, $b = -.10$, $t(233) = -2.94$, $p = .003$, 95% CI [-.03, -.14]. The bootstrapped

unstandardized indirect effect through competence need satisfaction for competence memory vs.

relationship memory was .03, 95% CI [.004, .06]; the bootstrapped unstandardized indirect effect

through positive affect was .05, 95% CI [.01, .09]; and the bootstrapped unstandardized indirect

effect through competence need satisfaction and then positive affect for optimism was .02, 95%

CI [.004, .04], suggesting that the indirect effects of post-memory competence need satisfaction

was significant for participants who selected a competence success memory relative to

participants who selected a relationship success memory. Results are consistent with mediation

effects and provide support for the hypothesis that reflecting on a competence success memory

leads to optimism because it increases both competence need satisfaction and positive affect.
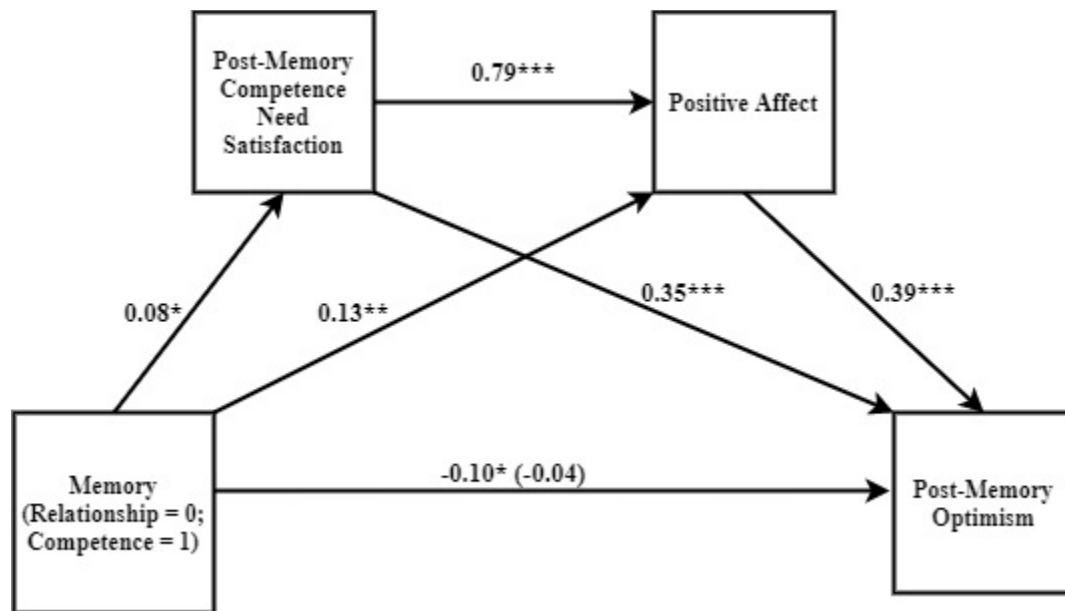

Figure 2. Experiment 2: Mediation model with memory condition as the independent variable (competence success memories coded as 1), pre-memory competence need satisfaction as covariate, post-memory competence need satisfaction and positive affect as mediators, and optimism as dependent variable. The above model presents the unstandardized regression coefficients, *p* < .05, **p* < .01, ***p* < .001.

Experiment 2 Discussion

Results of Experiment 2 indicated that individuals appeared equally like to seek out competence-specific opportunities after their competence need was threatened as they were to seek domain-irrelevant opportunities. Research indicates that individuals with complex self-concepts have better coping strategies in the face of failure than those who have less complex self-concepts primarily due to the fact that they have other domains they are able to access that can buffer against the domain that is being threatened (Linville, 1985). Indeed, results from the present experiments suggest this coping strategy would be somewhat effective. The main effects of time in Experiment 2 indicate that both competence success and relationship success memories prompted increases in need satisfaction and positive affect. However, results also indicated that for participants who were assigned to the difficult RAT condition, those who selected a competence success memory reported greater post-memory competence need satisfaction and greater positive affect than did those who selected a relationship success memory, a pattern that was not observed for those whose need for competence was already satisfied. These results are consistent with Sheldon and Gunz's (2009) arguments that when a particular need is frustrated, a need-relevant memory provides greater satisfaction to that need than a need-irrelevant memory. Results of the mediation analyses supported our predictions that competence success memories would predict competence need satisfaction and in turn, positive affect and then general psychological well-being.

Exploratory analyses indicated that those who selected a competence-related memory had greater *pre-memory* competence satisfaction scores and positive affect than those who selected a relationship-related memory, suggesting that strategies used to restore frustrated need satisfaction may vary as a function of current perceived threat. Individuals who felt greater self-

concept threat after receiving failure feedback may have retreated from the threatened domain to preserve the self-concept, a possibility that should be explored more fully in future work.

General Discussion

The present investigation delved into the role of memory on need satisfaction to better understand how recalling previous life events can bolster the current self when the self-concept is threatened. Two experiments examined how reflecting on an autobiographical memory of competence success restored perceived competence after competence had been threatened in a previous task. Across both experiments, results indicated that competence need satisfaction improved after participants reflected on an important, positive memory. This boost in competence need satisfaction was observed even among individuals who had previously had an actual competence-relevant achievement (i.e., success on an analytical task), highlighting the powerful role of reflecting on important autobiographical experiences on need fulfillment.

Moreover, results indicated that reflecting on an autobiographical episode entailing competence success improved competence need satisfaction, an increase that was greater for those who experienced a threat to competence than for those who did not, suggesting that autobiographical memory is effective at *restoring* a threatened need for competence. The process of restoring a threatened need to satisfactory levels can be explained by the reflective impulsive model (RIM), which theorizes that behavioral schemata that were successful at combating need deprivation in the past become more accessible when a particular need is deficient in the present (Strack & Deutsch, 2004). These results are also consistent with Kunda's (1990) model of motivated reasoning and previous work on the role of attentional bias in competence restoration (Waterschoot et al., 2020), demonstrating that autobiographical memories can be recruited to satisfy a frustrated need. Additionally, results from the present

investigation provide an extension to the literature on autobiographical memory and mood regulation, which indicates that positive memories can function to counteract and reduce negative emotions (Bluck, 2003; Öner & Gülgöz, 2018) by illustrating that autobiographical memories can regulate central psychological needs as well.

The functionality of autobiographical memory is dependent on context (Berntsen, 2018). Importantly, autobiographical memories have a unique ability to buffer against threatening information and to enhance feelings of self-worth, particularly when themes of the memory are relevant to the themes of a threat. Results of Experiment 1 indicated that reflecting on a memory of competence success was beneficial for competence need satisfaction, as expected, but also for relatedness and autonomy need satisfaction as well. This finding is consistent with previous work indicating that reflecting on memories with intrinsic themes (i.e., themes of growth, inherently satisfying values, and meaning) is beneficial for satisfaction of all three basic psychological needs (e.g., Bauer & McAdams, 2004; Lekes et al., 2014).

Experiment 2 examined whether individuals would select a need-relevant or need-irrelevant memory after experiencing a competence threat, and then traced the downstream consequences of this selection on positive affect, self-esteem, and optimism. Results indicated that participants were equally likely to elect to write about a competence success as they were to write about a relationship success. This work is consistent with research that finds that self-concept threats can evoke *both* within-domain and across-domain coping strategies (Brannon, 2019). That is, individuals may elect to bolster the self-concept through direct attempts at restoring the need that is felt to be lacking (i.e., in this case, with competence-success memories) or through fluid compensation, in which individuals may bolster the self-concept by affirming the self in a domain that is distinct from the one related to the current threat (Mandel, Rucker,

Levav, & Galinsky, 2017). In fact, work on self-concept complexity indicates that having multiple domains of one's self-concept can buffer against a threat in any one self-relevant domain (Linville, 1985). Moreover, research in the memory and self-affirmation literature has argued for the primacy of belongingness needs when confronted with a self-threat (Knowles et al., 2010). Together, this work suggests that some participants may have selected a relationship success memory in an effort to bolster the self-concept.

Exploratory analyses conducted for Experiment 2 indicated that individuals who elected to write about a need-irrelevant domain (i.e., relationship success memory) reported lower competence need satisfaction and lower positive affect after completing the difficult analytic test, despite illustrating equal levels of performance on the test as compared to those who selected competence success memories. It is therefore possible that individuals who felt the competence threat most acutely might elect to distance themselves from the threatened domain and instead pursue compensatory strategies in a new self-relevant domain (Aronson, Blanton, & Cooper, 1995). Alternatively, results may be indicative of individual differences in the degree to which participants value competence. Work conducted by Schüler, Sheldon, and Fröhlich (2010) indicated that high implicit need for achievement moderated the relationship between competence need satisfaction and intrinsic academic goal motivation. This is consistent with arguments that intrinsic motivation and subsequent well-being is enhanced when the content of one's memories is congruent with their values and identity (Bauer & McAdams, 2000). Thus, it is possible that participants who valued competence were more likely to select a competence-focused memory than those who did not.

The results of mediation analyses performed in Experiment 2 suggest that affirming in a need-irrelevant domain would be less effective than doing so in a need-relevant domain. Need-

relevant memories restored greater satisfaction toward the threatened need (i.e., competence) than did need-irrelevant memories, as those participants who selected a competence success memory reported greater competence need satisfaction and positive affect than those who selected a relationship success memory. Moreover, need satisfaction and positive affect predicted self-esteem and optimism. These results are consistent with work that suggests that the basic psychological needs of competence, relationships, and autonomy are not directly substitutable – a frustrated need for competence cannot be resolved by satisfying the need for relatedness (Sheldon & Gunz, 2009).

The present investigation focused on the role of autobiographical memory in the regulation of competence need satisfaction. Research indicates that perceptions of competence strongly affect self-concept perceptions and judgments (Wojciszke, 2005). Additionally, perceptions of competence are critical to the development of intrinsically motivating behaviors, such as learning and achievement (Deci & Ryan, 1985; White, 1959). The present work underscores the importance of autobiographical memories to fulfilling and restoring this critical psychological need and suggests that autobiographical memory could be harnessed to facilitate important life outcomes such as academic or professional achievement.

Limitations and future directions

The present investigation illustrates how autobiographical memories of fulfilling competence needs are actively and dynamically recruited as motivational resources to bolster against current self-threats. Future work should broaden this approach to examine whether autobiographical memory can similarly function to regulate the need for relatedness and that of autonomy, as well as other important needs, such as the needs for meaning and life purpose. Over time, memories of past life experiences become more thematic, complex, and coherent

(McAdams & Olson, 2010), and the utilization of reminiscence and its influence on identity and well-being changes across the lifespan (e.g, Cappeliez, O'Rourke, & Chaudhury, 2005; McAdams & Olson, 2010; Parker 1999). For example, previous work has demonstrated that for older adults, autonomy and relatedness need satisfaction was positively related to life purpose and personal growth (Ferrand, Martinent, and Durmaz, 2014). As such, future research should examine how the relationships among memory, need satisfaction, and positive self-perceptions change across time and life circumstance.

Although the present research demonstrated that reflecting on a competence satisfying memory increased satisfaction with the competence need when it was directly threatened, previous work has emphasized the importance of balance of need satisfaction across contexts to achieve optimal functioning, such that our work should not suggest that individuals pursue competence need satisfaction at the expense of other important psychological needs. Milyavskaya and colleagues (2009) reported that need satisfaction across school, home, friends, and jobs settings was related to greater well-being and adjustment in adolescents across four countries. The present investigation suggests that autobiographical memory could be a rich motivational resource to help maintain a balance of need satisfaction across contexts.

It is important to note that the analyses linking need-relevance of memory with downstream consequences in Experiment 2 used data in which participants selected their own memory prompt. Additional research is needed to understand whether the results would extend to situations in which participants were randomly assigned to reflect on a need-relevant or need-irrelevant memory.

Regardless of their reasons for selecting the memory, competence success memories in Experiment 2 still provided benefits beyond competence need satisfaction than did relationship

success memories, suggesting that perhaps need-relevant memories would be an effective

method for providing true need fulfillment. It is important to note that the memory choices in

Experiment 2 did not include an autonomy-satisfying option as autonomy is less often

represented in a single episodic event (Bauer & McAdams, 2000). Previous research suggests

that autonomy-relevant memories can satisfy psychological needs if the memories include events

that are intrinsic (i.e., inherently enjoyable, Wang, Chatzisarantis, & Hagger, 2018). Indeed,

previous work has demonstrated that individuals who described memories with more intrinsic

themes (i.e., themes of growth, inherently satisfying values, and meaning from significant

episodes of one's life) when recalling high points, low points, and turning points of their life

report greater satisfaction with life and psychological well-being than individuals who recalled

memories with fewer intrinsic themes (Bauer & McAdams, 2004; Bauer, McAdams, & Sakaeda,

2005). Future research could examine memorial themes to determine whether need satisfaction

improves for those who use an intrinsic approach to a competence success memory, as opposed

to an extrinsic approach.

Additionally, future work could examine individual differences in implicit need for

competence, relatedness, and autonomy to determine the degree to which they impact need-

specific memory retrieval, need satisfaction, and well-being.

Concluding thoughts

The present investigation highlights how autobiographical memory functions to satisfy

basic psychological needs and well-being. Reflecting on a positive, important autobiographical

memory was shown to improve satisfaction with all three basic psychological needs, as well as to

improve positive affect, self-esteem, and optimism for the future. Importantly, autobiographical

memory functioned to restore a basic psychological need after it was threatened. Together, this

work identifies a new avenue through which reflecting on important autobiographical events

meaningfully contributes to need satisfaction and well-being.

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