

# Resilience and Positive Emotions: Examining the Role of Emotional Memories

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**ABSTRACT** Resilience has been frequently associated with positive emotions, especially when experienced during taxing events. However, the psychological processes that might allow resilient individuals to self-generate those positive emotions have been mostly overlooked. In line with recent advances in memory research, we propose that emotional memories play an important role in the self-generation of positive emotions. The present research examined this hypothesis in two studies. Study 1 provided initial data on the validity and reliability of a measure of emotional memories networks (EMN) and showed that it had a predictive value for broad emotion regulation constructs and outcomes. In addition, Study 1 showed that positive EMN mediated the relationship between psychological resilience and the experience of positive emotions in a context of sadness, even after controlling for pre-experimental positive mood. Study 2 replicated results of Study 1 in a context of anxiety and after controlling for positive affectivity trait.

To produce change in a person's thoughts and feelings from negative to positive is probably a much more difficult task than meets the eye.

—Richard Lazarus, 2003

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A currently promising paradigm in psychology is that of positive psychology. A decade of research has shown that optimism, and in particular the intervention of positive emotions, is a critical ingredient of a number of positive outcomes as various as psychological adjustment (Fredrickson, Tugade, Waugh, & Larkin, 2003), interpersonal relationships (Waugh & Fredrickson, 2006), flexible behavior (Isen & Daubman, 1984; Tugade & Fredrickson, 2004), life longevity (Danner, Snowdon, & Friesen, 2001), or physical health (Huppert & Whittington, 2003). However, if such investigations have shown that experiencing positive emotions leads to a number of positive outcomes, how these positive emotions are self-generated<sup>1</sup> has been mostly overlooked. The purpose of the present research was to examine this issue.

One individual characteristic that has been frequently linked to the self-generation of positive emotions is psychological resilience. More specifically, resilient individuals are believed to experience positive emotions in the face of difficult events, thus allowing them to thrive and benefit from positive outcomes (e.g., Fredrickson, 2001). Indeed, research has shown that psychological resilience was associated with positive emotions in general (Block & Kremen, 1996; Klohnen, 1996) and throughout taxing situations (Ong, Bergeman, Bisconti, & Wallace, 2006; Tugade & Fredrickson, 2004). What is not clear, however, from these studies is how resilient people make use of these positive emotions in the face of difficult emotional situations and how they are self-generated. Some authors have suggested that intentional conscious coping or intentionally recruiting positive emotions might account for the self-generation of positive emotions (e.g., Fredrickson, 2001). However, such approaches rely exclusively on a deliberate or explicit motivation to cope or to regulate one's mood. It does not encompass implicit appraisal based on the memory of past experiences or antecedent events, which have been shown to play an important role in emotion elicitation (Lazarus, 1991; Scherer, 2005). We suggest that the implicit (i.e., out of one's awareness) and automatic activation of past emotional memories by external cues of stressful or

1. By self-generation the authors mean that positive emotions are produced—in an explicit or implicit fashion—by the person's internal resources without an external positive source of induction (e.g., an experimental induction of positive emotions with a pleasant film excerpt).

taxing events may play a role in the emotional elicitation these events will sustain and how they will be appraised.

### Emotional Memories

Emotional memories can be defined as memory for events or things that have been experienced as emotionally arousing and that have been stored in memory. Emotional memories are believed to be integrally linked in memory to the emotion associated with the experienced event (Christianson & Engelberg, 1999; LeDoux, 1992; Westen, 1998). This emotion is automatically evoked whenever an emotional memory is activated (Collins & Allard, 2004) leading to a subjective feeling and a physiological state similar to the ones experienced in the original situation (Schwartz, Weinberger, & Singer, 1981). Because emotions tend to influence what is attended to in the environment (e.g., negative emotions will alert one to potential threat or positive emotions will promote exploration and approach behavior), activation of an emotional memory and of its related emotion should influence the way one will experience and perceive current and actual situations. Emotional memories are thus used to make sense of and explain external events (Pillemer, 2001) the same way factual knowledge is used to understand the world around us (Robinson, 1986). Stored emotional memories can thus later serve to emotionally appraise novel events and situations (Lazarus, 1991; Robinson, 1986; Scherer, 2005), as they become resources of the self (Robinson, 1986; Sutin & Robins, 2005). For these reasons, they are posited to be an important mediator between personality functioning (Block, 2002; Singer & Salovey, 1993; Sutin & Robins, 2005) and emotional and behavioral outcomes (Dweck & London, 2004; Pillemer, 2001). For instance, Andersen and Baum (1994) showed that people were experiencing negative emotions when they were about to meet an unknown person who looked slightly similar to a significant other from their past with whom they had negative experiences. Clearly, the activation of an emotional memory by cues from an external event can influence the emotional experience and appraisal of that event.

Three components have been frequently reported as essential to the psychological organizational structure of emotional memories. First, each emotional memory has a characteristic level of intensity. Indeed, the vividness of the recollection of an emotional memory has

been found to be proportionally associated with greater emotional intensity (Porter & Birt, 2001), even after controlling for event novelty, importance, and amount of rehearsal (Conway, 1995; Thompson, Skowronski, Larsen, & Betz, 1996).

A second component of an emotional memory is its valence. Indeed, positive and negative emotions lead to different information processes. For instance, fMRI data have shown that the recall of positive versus negative pictures produced different patterns of brain activation (e.g., Canli, Zhao, Desmond, Glover, & Gabrieli, 1999), thus suggesting that the valence of emotional memories might be processed differentially. According to the Broaden-and-Build Theory (Fredrickson, 2001), positive emotions lead to a broadening of the scope of the thought–action repertoires that is conducive to a global processing (Fredrickson & Branigan, 2005) and patterns of thought that are flexible (Isen & Daubman, 1984), creative (Isen, Daubman, & Nowicki, 1987), open-minded (Estrada, Isen, & Young, 1997), and integrative (Isen, Rosenzweig, & Young, 1991). Conversely, negative emotions lead to a narrowing of the thought–action repertoires (Fredrickson, 2001; Fredrickson & Branigan, 2005) that is conducive to a local awareness. Research has shown that positive autobiographical memories tend to include a wide range of information, whereas negative autobiographical memories focus on central information at the expense of peripheral details (Berntsen, 2002). For instance, a study about the trial of O. J. Simpson (Levine & Bluck, 2004) showed that people who were happy with the verdict remembered a wider range of details of the trial compared to people who were unhappy with the verdict. Furthermore, people who were happy were also more likely to report false information concerning the trial, as positive emotional memory allowed them to draw freely on their general knowledge and fill in the gaps of their representations (Levine & Bluck, 2004). However, people who were unhappy with the outcome remembered fewer details about the trial, but made fewer mistakes, as they did not report elements that did not happen during the trial (Levine & Bluck, 2004). Negative emotional memories led them to constrain their general knowledge and analyze the situation in a rigid and systematic—but less error prone—fashion (Levine & Bluck, 2004). The valence of an emotional memory thus appears to lead to different types of information processing.

Finally, a third component of an emotional memory is binding or its associative structure. This component supposes that emotional

memories are modeled into associative networks (McClelland, 1995; Smith, 1998) that are formed through contiguity, when the elements they link are experienced or thought about together (Smith, 1998). When an emotional memory is activated, other emotional memories to which it is linked become active, as activation spreads across the links (Anderson, 1984; Smith, 1998). Tomkins (1979) posited that memories get linked together according to a common theme, leading to the composition of scripts organized through past and novel information and that these scripts later serve to appraise subsequent situations. Other researchers also argue for associative networks of knowledge in which the remembering of an autobiographical memory comes to activate a pathway of memories through a knowledge base (Conway & Pleydell-Pearce, 2000). Research has also shown that memories tend to organize by linking themselves together according to a common theme (Robinson, 1992). It has also been found that when a memory is cued to cue recall another, event clusters emerge, thus suggesting local organization of memories (Brown & Schopflocher, 1998).

This binding process is also posited to serve an emotional regulation function. Indeed, when an event is experienced with a certain emotional intensity, it comes to be internalized in a network of related memories. When this newly internalized event is activated, the peripheral memories are activated as well. Depending on the quality of this network (peripheral memories), the affective experience of the novel event will be dampened or intensified. For instance, experiencing a negative event and internalizing it into a relatively positive network of past memories might help reduce the intensity of the negative emotions associated with this event (see also Fredrickson, Mancuso, Branigan, & Tugade, 2000, for a similar undoing model). This negative event might thus come to be experienced with mixed emotions (negative and positive) the next time it is encountered, and not as all negative. Conversely, experiencing a negative event and internalizing it to a network composed of strong negatively valenced memories might have the opposite effect. Therefore, it is not so much the affective experience of an event that is important, but rather the quality (positivity) of the network in which it will be internalized that is determinant of how this experience will be regulated.

In sum, it would appear that three components—intensity, valence, and binding—play an essential role in the cognitive organization of emotional memories. These three components are not new

and are core features of several theoretical organizational systems of cognitions (e.g., Anderson, 1984; Kruglanski et al., 2002; McClelland, 1995).

### The Emotional Memory Networks Theory

We propose that when the content of an emotional memory is activated, its components (valence and intensity) are activated along and spread an emotional activation to associated emotional memories (binded memories), thus activating a network of emotional memories (see Anderson, 1984; Bower, 1981; Kruglanski et al., 2002, for similar spreading activation systems). Therefore, when a particular situation comes to activate an emotional memory, this activation also leads to the activation of other emotional memories (or elements of other emotional memories) to which the prior memory is associated. Activation of this network of memories also activates each of their respective emotional intensity and valence. The network now activated would then combine its information and yield a qualitative outcome or a type of emotional “script” (Sutin & Robins, 2005; Tomkins, 1979) posited to influence thoughts, emotional elicitation, appraisal, and behavior. Therefore, we suggest that taking into account emotional memories peripheral to an activated memory is of a critical importance for the prediction of various outcomes. In line with past research on the role of positive and negative emotional memories (Berntsen, 2002; Levine & Bluck, 2004; Levine, Prohaska, Burgess, Rice, & Laulhere, 2001), we propose that activating an emotional memory with a high number of positive and intense links (i.e., associated emotional memories) should lead to a positive emotional elicitation and to a larger and more flexible access to internal resources (Fredrickson, 2001), such as coping or cognitive regulation strategies and approach behavior (Hendersen, 1985; Levine, 1997; Levine et al., 2001). Conversely, activating an emotional memory with a high number of negative and intense links should lead to a strong reactivation of the prior negative experience (Christianson & Engelberg, 1999). This condition should thus be conducive to a negative emotional elicitation and to a narrowing of the thought–action repertoires (Fredrickson, 2001; Fredrickson & Branigan, 2005), thereby leading to more rigid situational analyses and defensive avoidant behavior (Hendersen, 1985; Levine, 1997; Levine et al., 2001).

Finally, we further propose that emotional memories networks are relatively context dependent; that is, memories are minutely sensitive to external cues (Conway & Pleydell-Pearce, 2000). Therefore, external cues of a context will most likely activate memories related to this context. In addition, the memories activated by a context can operate in parallel. Thus, one context may simultaneously activate several memories networks that are relatively independent from each other (McClelland, 1995). For instance, playing tennis might activate an emotional memories network related to tennis playing and also activate another emotional memories network related to father, if one is playing tennis with one father's racket. In this case, the emotional network related to tennis would be relatively independent from the one related to father. We thus posit that this multicomponent information processing can include different networks and that it takes place in parallel (McClelland, 1995). However, the output of each of these networks (e.g., positive perceptions of tennis, but negative relationship with the father) should combine at some point and serve the appraisal, thus affecting one's emotional regulation of the current experience. Therefore, sampling and assessing only one of several relatively independent networks should not yield a perfect prediction, but it would at least have a partial predictive value for appraisal and emotional elicitation.

### **Resilience and Emotional Memories: The Present Research**

We posit that resilient people experience and self-generate positive emotions in distressing situations because they rely on more positive affect-laden emotional memories composed of intense positive links to other memory elements. Because the emotion associated with an emotional memory is automatically evoked when it is activated (Collins & Allard, 2004), activation of a positive emotional memories network and of the related positive emotions should in turn facilitate a positive emotional elicitation and a positive appraisal of the current experienced event. Thus, individuals with internal resources, such as positive affect-laden memories, might thus be better skilled at self-generating positive emotions and at coping in times of adversity (see Block, 2002; Fredrickson et al., 2003). Emotional memories are thus likely to play the role of a buffer between the distressing situation and the emotional elicitation and appraisal of that situation. Two studies examined this issue. Study 1 aimed at validating an

operational measure of emotional memories networks (EMN). It also sought to test the mediating role of EMN between resilience and emotional experience to an induction of sadness. Study 2 replicated the results of Study 1 with an anxiety-inducing task. It further showed that the measure of EMN was not influenced by positive affectivity trait and by the concurrent activation of a short-lived emotional state.

### STUDY 1

In the present study, participants were induced with a distressing experience of sadness by being exposed to a film excerpt picturing two young children at the funerals of their parents. The themes of loss and sadness were selected because research has shown that resilience was particularly at play in the face of loss and grief (Bonanno et al., 2002). Participants were then assessed for their EMN related to the film excerpt. Past research has shown that trait-like characteristics are associated with the valence of broad emotional memories (Sutin & Robins, 2005). In line with the Emotional Memory Networks Theory, it was thus hypothesized that each positive components of the EMN (positive valence, number of positive links, and intensity of positive links) should be positively associated with general adaptive mechanisms of emotion regulation such as resilience and adaptive defenses and to the elicitation of positive emotions following the distressing induction of sadness. Conversely, these positive components were hypothesized to be negatively associated or unrelated to maladaptive mechanisms of emotion regulation, such as alexithymia, impulsive defenses, and dependency, and to negative outcomes such as level of current depression and to the elicitation of negative emotions following the distressing induction of sadness. Depression and dependency have been selected because they both refer to emotion regulation processes. In addition, the manipulation that was used to induce sadness was thematically related to loss, and both constructs have been shown to be involved in the dysfunctional processing of sadness (e.g., Surguladze et al., 2004) and to be particularly relevant to the theme of loss (e.g., Blatt, D’Afflitti, & Quinlan, 1976; Monroe, Rohde, Seeley, & Lewinsohn, 1999). It was also hypothesized that each negative component of the EMN (negative valence, number of negative links, and negative links intensity) should be positively associated to these maladaptive mechanisms



of emotion regulation and outcomes, but negatively associated or unrelated to general adaptive mechanisms of emotion regulation and outcomes. Finally, it was hypothesized that all these associations would be of a low to moderate strength, as the assessed network was thematically specific (loss), whereas these measures refer to broad and general concepts of emotion regulation. Second, in line with past research (Ong et al., 2006; Tugade & Fredrickson, 2004), it was hypothesized that resilience would be associated with the self-generation of positive emotions following the negative emotional induction. It was further hypothesized that positive EMN would mediate this relationship, even after controlling for preinduction positive mood.

## Method

### *Participants*

Two hundred twenty-two undergraduate students (169 women, 53 men) from a French-Canadian university took part in this study. Mean age was 23.04 years ( $SD = 5.50$  years; range = 17 to 58 years).

### *Material*

A short film excerpt lasting 4:12 min from the motion picture *You Can Count on Me* (Lonergan, 2000) was used to induce sadness relative to a theme of loss. The film clip depicted two parents who suddenly die in a car accident. This scene was elliptically followed by another one showing two children crying during their parent's funeral ceremony.

### *Measures*

*Ego-resiliency.* The French adaptation (Callahan, Roge, Cardenal, Cayrou, & Sztulman, 2001) of the original Ego-Resiliency Scale (Block & Kremen, 1996) was administered to assess psychological resilience. Psychological resilience is conceived as a personality trait rather than as an outcome (Luthar, Cicchetti, & Becker, 2000). In this study, we were interested in trait-resilience, as the hypothesized resilient outcome was positive emotions. This scale consists of 14 items forming a single dimension. Items were responded to on a 4-point Likert scale (1 = *does not apply at all*, 4 = *applies very strongly*). A sample item is "I quickly get over and recover from being startled." In Study 1,  $\alpha = .85$ .

*Positive and negative emotions.* A modified version of the French version (Lapierre, Gaudreau, & Blondin, 1999) of the original Positive and

Negative Affects Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was administered to assess positive and negative emotions. Participants were asked to rate the extent to which they felt a number of affects. Ratings were made on a 5-point Likert scale (1 = *very slightly or not at all*, 5 = *extremely*). Three measurement moments were used: (1) at the very beginning of the experiment, to assess initial positive and negative mood (Time 1: *how do you feel at the present moment*) and 2) right after the film excerpt induction, to assess emotional distress and positive emotions (Time 2: *how do you feel at the present moment*), and 3) it was also used in order for participants to evaluate a reported emotional memory (*how did you feel at the time of the event of your memory*).

The original PANAS consists of 10 positive affects items (e.g., active, alert, attentive) and 10 negative affects items (e.g., afraid, ashamed, distressed). Four items of sadness (sad, depressed, discouraged, despondent) were added to the negative affect subscale to assess the level of induced sadness. We subjected all of the affect terms (original and added items) to a principal components factor analysis. Two dominant factors emerged, together accounting for 42% of the common variance. A factor analysis using only the items from the original PANAS also yielded two factors, accounting for 30% of the common variance. Positive and negative affects subscales were then separately calculated by computing the mean of the original items for the positive affects subscale (10 items) and the mean of the combined original and added items for the negative affects subscales (14 items) to yield two separate subscales. Correlation between those two subscales was  $-.06$ , which is in line with the expected orthogonality of the PANAS. Alphas for the positive affects subscale were .90, .88, and .85 for Time 1, Time 2, and for the emotional memory, respectively. Alphas for the negative affects subscale were .84, .85, and .83 for Time 1, Time 2, and for the emotional memory, respectively.

*Mature and impulsive defenses.* Two subscales of the 60-item Defense Style Questionnaire (DSQ-60; Trijsburg, Bond, Drapeau, Thygesen, & de Roten, 2005) were used to assess mature defenses, or dispositional adaptive copings, and impulsive defenses. Defenses have been shown to play an important role in regulating emotions, especially when one faces disturbing events (see Vaillant, 2000). The mature defenses or adaptive copings subscale was composed of 16 items assessing eight types of mature defenses (self-observation, humor, self-acceptance, self-assertion, sublimation, anticipation, altruism, and suppression). Alpha for this subscale was .70. The second subscale was composed of eight items and assessed four impulsive defenses (acting out, withdrawal, hypochondria, and passive-aggression). Alpha in this study for that subscale was .64. All items were responded to on a 9-point Likert scale ranging from 1 (*totally*

*disagree*) to 9 (*totally agree*). The DSQ-60 has been validated in three languages (English, French, and German) and has been shown to display adequate validity and reliability and to constitute an improved version of previous self-report measures of defenses (Trijsburg et al., 2005).

*Alexithymia.* The French translation (Loas, Otmani, Verrier, Fremaux, & Marchand, 1996) of the original 20-item Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994; Bagby, Taylor, & Parker, 1994) was used to assess alexithymia, that is, difficulties in identifying and communicating emotions. Items (e.g., *I can easily describe my feelings*) were responded to on a 5-point Likert scale (1 = *totally disagree*, 5 = *totally agree*). Adequate levels of validity and reliability have been obtained with this instrument (Loas et al., 1996; Bagby, Parker, et al., 1994; Bagby, Taylor, et al., 1994). Alpha in this study was .81 for the entire set of items.

*Depressive Experience Questionnaire.* The French translation (Boucher, Cyr, & Fortin, 2006) of the Depressive Experience Questionnaire (DEQ; Blatt et al., 1976) includes 66 items assessing different feelings and attitudes about the self and others. Three orthogonal factors underlie this scale—that is, dependency, self-criticism, and efficacy. This scale has shown high internal consistencies and high test–retest reliabilities (Blatt et al., 1976; Zuroff, Moskowitz, Wielgus, Powers, & Franko, 1983). Only the dependency factor was retained in this study, as it refers to a predisposition to depression characterized by a fear of losing significant people in one’s life (Blatt et al., 1976). This construct was thus directly related to the induced theme of loss. The factor-weighting method described by Blatt and colleagues was used to calculate a global dependency score.

*Depression.* The Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) is a 21-item inventory responded to on a 4-point forced choice assessing symptoms of depression. Research has consistently shown high reliability and validity for this widely used scale (e.g., Shaw, Vallis, & McCabe, 1985). The French translation of this instrument was used in this study (Bourque & Beaudette, 1982). Alpha in this study was .85.

*Emotional Memories Network Assessment (EMNA).* The EMNA is a questionnaire that has been created to collect autobiographical emotional memories that are context dependent, in this case related to the sad film clip. The questionnaire first asked the participants to describe in a short text “a personal memory that the film excerpt made you spontaneously think about.” Thus, participants were free to recall any type of memory. This procedure is particularly critical, as we were interested in memories

that might pop spontaneously to the participants' mind. These types of memories are thus likely to have been cued by elements of the film excerpt. This procedure is in line with Conway and Pleydell-Pearce's (2000) model of autobiographical memory, which suggests that elements of memories are minutely activated by cues and that these activations do not necessarily emerge to consciousness. Therefore, exposing participants to a film excerpt might automatically activate, consciously or not, memories related in some way to the film excerpt. In addition, in line with priming studies (e.g., Schacter, Chiu, & Ochsner, 1993), activating out of awareness a specific memory improves the likelihood to retrieve this memory later on, when asked to. Therefore, our procedure should increase the likelihood that participants report memories that were indeed automatically activated during the film excerpt. To ensure the inclusion of essential narrative components, participants were asked to "try to answer the four following questions in the order that best suits you" while they were detailing their memory. These four questions were (1) What is the central element of your memory? (2) How did the event/situation/element of your memory begin? (3) How did you react in this event/situation/element? and (4) How did it end? They were also informed that they could add any additional element. Finally, to induce longer and elaborated answers, the sheet of paper was filled with empty lines from top to bottom, and it was mentioned that the back of the page could be used if necessary. Participants were also asked to rate the emotional content of their reported memory according to our modified version of the PANAS. Instructions required participants to recall how they felt at the moment at which the event composing their memory occurred. This measure yielded the valence (positive and negative) of the participants' reported emotional memory. In addition, the content of each memory was rated by two judges according to the themes reported. The judges were blind to the participants' scores to the other scales. Overall, reported categories were *death of a parent*, *death of a close relative*, *death of an unknown person*, *fear of loss*, *accidents*, and *other*. Each memory was rated according to only one of these categories. Interrater agreements (kappas) ranged from .87 to .96 for all categories, which indicates excellent agreement beyond chance. Discrepancies were resolved by discussion.

To assess the associated links to the reported personal memory, the questionnaire further asked participants to recall and list other personal memories that they might find to be directly or indirectly related to the memory they had just described and to give each one a short name. Participants were thus more or less requested to *free associate* around that memory. However, it is important to note that participants were not invited to report just any memory (which could lead to mood regulation strategies by using unrelated memories to alleviate one's mood; see

Sakaki, 2007, on this issue) as they were instructed to recount memories they found to be related in some way to the memory elicited by the film excerpt. This assessment of associated memories thus allows the evaluation of the participants' emotional memories network related to the film excerpt (film excerpt → a memory related to the film → memories associated to the memory related to the film). A maximum of seven lines were provided to the participants, as they could write a maximum of seven titles of personal memory. However, they were informed that they did not have to fill out all the lines. They should write down only titles of memory that came spontaneously to their mind. They were also asked to indicate whether each of their reported links was a globally positive or negative experience (a dichotomous decision) and to rate its intensity on a scale from 1 to 5 (1 = *not intense at all*, 5 = *extremely intense*).

*Emotional Memories Networks Scores (EMNS)*. The emotional memories networks scores were derived from the combination of the three components of emotional memories presented above. First, the 10 positive affect items from the PANAS for the principal memory related to the sad clip were averaged to yield a positive valence score for that memory. Second, the number of reported positive links associated with the principal memory was summed and, third, their reported relative intensity was averaged (summing it would have created a score dependent of the number of links). The same calculations were conducted for the reported negative valence of the memory associated to the film excerpt, links, and intensity of these links. In all, these calculations yielded six scores (3 components [valence, number of links, intensity of the links] × 2 types of emotional memories [positive, negative]) of the assessed EMN. Correlations between each of these components are shown in Table 1. An Exploratory Factor Analysis with an Oblimin rotation on these six variables at one Eigen value yielded two factors accounting for 60.36% of the variance. The first factor to emerge was composed of the three negative components of the EMN (loadings ranging from .58 to .89) and the three positive components of the EMN loaded on the second factor (loadings ranging from .60 to .82). Alphas for these three positive and negative components were .62 and .68, respectively.

Two general composite scores were then computed in order to obtain a score assessing the global quality of the EMN for each valence polarity according to the following equation:

$$EMNS = (V * L * I) \quad (1)$$

The equation above thus shows that the EMNS for each polarity (positive and negative) is obtained from the product of valence ( $V$ ), number of links ( $L$ ), and intensity of those links ( $I$ ). Thus, in line with the

**Table 1**  
**Means, Standard Deviations, Ranges, and Correlations Among Emotional Memories Networks Components: Study 1**

	Mean	SD	Possible Range	Observed Range	1	2	3	4	5	6
1. Positive valence	2.13	0.79	1-5	1-4,50	—	—	—	—	—	—
2. Number of positive links	1.40	1.37	0-7	0-6	.18**	—	—	—	—	—
3. Positive links intensity	2.67	1.71	1-5	1-5	.18**	.66***	—	—	—	—
4. Negative valence	2.45	1.06	1-5	1-5	-.18**	-.18**	-.22***	—	—	—
5. Number of negative links	2.04	1.47	0-7	0-7	-.09	-.38***	-.27***	.39***	—	—
6. Negative links intensity	3.22	1.43	1-5	1-5	-.09	-.39***	-.28***	.22***	.59**	—

*Note:*  $N = 222$ . There were no gender differences on all positive memories components. However, women reported a higher score than men on all three negative memories components,  $F_s > 6.90, p < .01$ .  
 \*\* $p < .01$ , \*\*\* $p < .001$ .

Emotional Memory Networks Theory, high valence or high number of links or strong intensity results in a higher score, whereas low valence or few links or weak intensity results in a lower score. These calculations were applied to the three positive components and to the three negative components of the EMN to obtain two separate EMNS relative to the positive and the negative quality of the EMN.<sup>2</sup> The correlation between positive and negative EMNS was  $-.32$  ( $p < .001$ ).

### *Procedure*

Participants were sitting in a classroom facing a wide projection screen. They were first asked to complete the PANAS Time 1, the Ego-Resiliency questionnaire, the DEQ, the BDI, the TAS-20, and the two subscales of the DSQ-60 (only 83 participants were assessed with the DSQ-60). Right after, they were told that they were going to see a film excerpt. No other instruction was given at this time. Right after the film excerpt, they were asked to complete the PANAS Time 2. After this latter scale was completed, participants were administered the EMNA. Participants were then fully debriefed and thanked for their participation.

## Results and Discussion

### *Manipulation Checks on Sadness Induction*

Analysis of the PANAS at Times 1 and 2 confirmed that the induction of sadness was successful. Sadness induction intensity, calculated as the difference of mean between the sadness items at T1 and those at T2, proved to be significant,  $t(1, 222) = -9.78$   $p < .00$ . Effect size was medium to large ( $d = .68$ ). The specificity of the induction was also significant, as sadness showed to be the single negative emotion with the highest reported level at T2 ( $M = 2.31$ ,  $SD = 1.21$ ). Paired  $t$  test between sadness and the second highest reported negative emotion (anxiety:  $M = 1.99$ ,  $SD = 1.02$ ) showed significant difference,  $t(1, 222) = 4.77$ ,  $p < .01$ . Effect size was small to medium ( $d = .28$ ). Finally, the report of induced sadness was not

2. It should be noted that the positive and negative EMNS can be combined by subtracting one from another to yield a differential score of approach and avoidance or by reverse coding one of the score and averaging it with the other to account for the variance of both scores in one variable. In this latter method, both scores should be transformed in  $z$  scores before being reversed and averaged together. In this study, positive and negative EMNS were kept separate to examine their specific predictive value.

associated with resilience ( $r = .08, p < .05$ ). These results suggest that the induction of sadness was effective, but that the level of sadness reported was unrelated to psychological resilience.

### *Hypothesis 1: Concurrent Validation of EMN*

First, the EMNA was screened for its relationship to memory content. Analysis of the autobiographical memories content showed that positive and negative EMN were not associated with the report of the actual loss of a loved one, close other, or of a relatively unknown person or to report of accidents (point-biserial correlations ranging from  $-.08$  to  $.08, ns$ ). However, negative EMN was positively associated with the fear of losing a loved one ( $r_{pb} = .27, p < .05$ ). Such findings suggest that the measure of EMN is not influenced by the nature of actual events (actual loss remembered by the participant), but is influenced by the way actual events are emotionally experienced (fear of such a loss). However, positive EMN was positively associated ( $r_{pb} = .21, p < .05$ ) with content of emotional memories that were thematically unrelated to the film excerpt and classified as “other” (e.g., “That time when I went to the dentist”) and negative EMN was negatively associated with this content category ( $r_{pb} = -.32, p < .001$ ). It could be argued that the report of memories that were apparently not directly linked to the film excerpt’s theme should be considered as defensive or as stemming from strategies of avoidance. However, analyses with and without participants who reported those types of memories (19%) did not change the results of the present study. All participants were thus retained.<sup>3</sup>

Second, we examined the relationship between EMN and emotion regulation mechanisms and outcomes. Results supported our hypotheses, as correlational analyses revealed that most positive EMN components were positively associated with adaptive emotion regu-

3. Global EMN scores were separated at their means to examine how many participants reported positive EMN compared to negative EMN. Participants reporting high EMN were conceptualized as those who had a score over the mean on this variable, and participants reporting low EMN were those who had a score under the mean. Results revealed that 16% of the participants reported both high positive and negative EMN, 30% had a high positive EMN score but low negative EMN score, 32% reported low positive EMN but high negative EMN, and 22% had both low positive and negative EMN scores. These results show that the distribution along the EMN scores was relatively heterogeneous.



lation mechanisms (at least at  $p < .10$ ) and were all negatively associated or unrelated to negative emotion mechanisms and outcomes (see Table 2). Specifically, positive valence of the principal memory was positively associated with resilience and negatively related to dependency. The number of positive links was significantly associated with resilience and adaptive defenses and negatively related to depression, alexithymia, dependency, and marginally to impulsive defenses. Finally, the intensity of those links was positively associated with resilience and adaptive defenses and negatively associated with depression and alexithymia, but unrelated to dependency and impulsive defenses. More importantly, all three positive EMN components were positively associated with the elicitation of positive emotions right after the film excerpt, even after controlling for preinduction positive mood (except for intensity), and negatively associated or unrelated to the elicitation of negative emotions after controlling for preinduction negative mood. Even more striking is that all negative EMN components were positively associated to all negative emotion mechanisms and outcomes (at least at  $p < .10$ ) and were all unrelated to adaptive emotion regulation mechanisms and outcomes. These results strongly support the concurrent validation of the EMN components under a sadness induction.

### *Hypothesis 2: Resilience and Positive Emotions*

To test the hypothesis that resilience would be positively associated with positive emotions, we examined subjective reports of positive emotions from the PANAS. Psychological resilience was positively correlated with initial positive mood (T1) and with positive emotions reported right after the sad film excerpt (T1:  $r = .42, p < .01$ ; T2:  $r = .38, p < .01$ ). Analysis of emotions in terms of discrete categories for T2 indicated that psychological resilience was associated with all but one positive emotion (excitement). All correlations, ranging from .21 (alert) to .38 (determined), were significant at  $p < .01$ . Negative emotions experienced during the film excerpt were not highly correlated with psychological resilience. Negative emotion items that reached significance were depressed ( $r = -.14, p < .05$ ), discouraged ( $r = -.14, p < .05$ ), and fearful ( $r = -.13, p < .05$ ). Psychological resilience was not associated with high or low change in negative emotions between T1 and T2 (Negative emotions T2 regressed on resilience, controlling for negative emotion T1:  $\beta = -.09, p > .05$ ).

**Table 2**  
**Correlations Among Emotional Memories Networks Components and General Measures of Emotion Regulation and Outcomes: Study 1**

	Resilience	Adaptive Defenses <sup>a</sup>	Positive Emotions <sup>b</sup>	Depression	Alexithymia	Dependency	Impulsive Defenses <sup>a</sup>	Negative Emotions <sup>c</sup>
Positive valence	.14*	.00	.36***	-.06	-.04	-.17*	-.05	-.02
Number of positive links	.13*	.31**	.21**	-.22***	-.26***	-.13 <sup>†</sup>	-.15	-.15*
Positive links intensity	.12 <sup>†</sup>	.28**	.05	-.24***	-.13*	-.03	-.13	-.07
Global positive EMN	.18*	.28*	.27***	-.18**	-.20**	-.17**	-.09	-.13
Negative valence	-.05	-.13	-.06	.24***	.14*	.34***	.27*	.41***
Number of negative links	-.10	.08	-.11	.19*	.18*	.13*	.22*	.16*
Negative links intensity	.01	-.07	-.04	.18**	.19**	.14*	.21 <sup>†</sup>	.13 <sup>†</sup>
Global negative EMN	-.09	-.04	-.09	.28***	.21**	.34***	.33*	.36***

*Note:*  $N = 222$ .

<sup>a</sup> $n = 83$ .

<sup>b</sup>Partial correlation controlling for preinduction positive mood (PANAS-TI).

<sup>c</sup>Partial correlation controlling for preinduction negative mood (PANAS-TI).

<sup>†</sup> $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

These findings provide support for our second hypothesis and corroborate the findings obtained in past research that showed that psychological resilience is associated with positive emotions in general and during a difficult situation but not with lower negative emotional elicitation (Tugade & Fredrickson, 2004).

*Hypothesis 3: Emotional Memories Networks Mediate the Resilience-Positive Emotions Relationship*

It was predicted that positive EMN would mediate the relationship between resilience and positive emotions reported right after the sad film excerpt (T2), even when controlling for initial positive mood. To test this hypothesis, a linear regression analysis was conducted in line with Baron and Kenny's (1986) recommendations. Positive emotions at T2 served as the dependent variable, and psychological resilience was entered as the independent variable, controlling for initial positive mood (T1). Results revealed that resilience positively predicted positive emotions at T2 ( $\beta = .12, p < .05$ ) when controlling for initial preexperimental positive mood ( $\beta = .59, p < .001$ ). The same regression analysis was again conducted, this time substituting psychological resilience for positive and negative EMN as independent variables. Results showed that positive EMN positively predicted positive emotions at T2 ( $\beta = .28, p < .001$ ), even when controlling for initial positive mood ( $\beta = .55, p < .001$ ). Negative EMN was unrelated to it ( $\beta = .02, ns$ ). Finally, resilience and positive EMN were entered together as independent variables in a multiple linear regression, controlling for initial positive mood. Results indicated that positive EMN was the only significant predictor of the change in positive emotions experienced during the sad film excerpt ( $\beta = .26, p < .001$ ) when controlling for initial positive mood ( $\beta = .53, p < .001$ ). Resilience was not a significant predictor anymore ( $\beta = .09, ns$ ). In addition, a Sobel Test suggested that the mediation between resilience and positive emotions by positive EMN was significant ( $z = 2.28, p < .05$ ). These results support our hypothesis and suggest that positive EMN are involved in the self-generation of positive emotions by resilient individuals in the face of difficult events. In addition, the fact that the removal of participants who reported apparently unrelated memories to the film excerpt did not affect the results presented above suggests that resilient people do not engage in distraction (recalling unrelated memories) to

experience positive emotions through taxing events. Rather, they appear to rely on relatively positive memories networks related to loss.

In sum, the present results showed that the Emotional Memories Networks Assessment sampled emotional memories networks that were, in a major fashion, context dependent. In addition, the memories that were sampled had a predictive value for broad emotion regulation outcomes and mediated the relationship between resilience and positive emotions.

## STUDY 2

The purpose of Study 2 was to replicate the results of Study 1 with a number of additions. A first addition in Study 2 was to examine one counterhypothesis. Indeed, it might be argued that, instead of reflecting emotional memory organization, positive EMN might be better conceived as the manifestation of a general positive affectivity trait. Therefore, individuals with high positive emotionality (i.e., high positive affectivity trait) should generally experience positive emotions, in distressing situations as well as when recalling memories. Study 2 thus controlled for this variable.

A second addition aimed at examining the mediation effect of positive EMN between resilience and the elicitation of positive emotions, but this time in a context of anxiety/stress. Participants were thus induced with anxiety using a staged oral presentation task. They were told that two people would be randomly selected to present their oral presentation. After being allowed 5 minutes to prepare their presentation, participants were asked to report the level of emotions they were experiencing at that moment and to report their appraisal of stress in the expectation of delivering their oral presentation. Their EMN relative to oral presentations were then assessed.

A third addition of Study 2 was to examine the relative independence of two conjointly activated EMN and the combination of their outcome at the appraisal and emotion elicitation levels. In line with the Emotional Memory Networks Theory, memories networks can be activated independently from each other at the memory base level. However, once activated, the respective outcome of each activated network will combine at a higher cognitive level and will serve the appraisal and influence emotional elicitation. To implement this third addition, we used a two-group experimental design. Participants in each of the two groups were told to prepare an oral

presentation, as was described above. However, participants in one group were asked to prepare their oral presentation about their personal qualities, whereas participants in the second group were asked to prepare an oral presentation about their personal flaws. The anxious task of the staged oral presentation should therefore activate networks of past experiences related to oral performance, whereas writing about one's qualities or flaws should activate representations of evaluative components of the self (positive and negative, respectively). These two EMN (oral and self-representations) should be activated in a relatively independent fashion from one another.<sup>4</sup> In line with the Emotional Memory Networks Theory, they should be processed separately (in parallel). However, because the relative independent outcome (or script) of each of these two networks should combine at some point, they should both have an independent predictive value for the appraisal of the oral presentation and emotional elicitation during the preparation process.

Overall, in line with Study 1, it was hypothesized that resilience and positive EMN related to the oral presentation would be positively associated with the elicitation of positive emotions during the oral preparation process. It was further hypothesized that positive EMN would mediate the resilience–positive emotions relationship. Finally, these results should hold even after controlling for positive affectivity trait and participants' experimental group membership (qualities vs. flaws).<sup>5</sup> It was further expected that group membership would predict positive emotions independently of positive EMN, as these two variables should have an additive predictive value (combination of their networks should influence the emotional elicitation

4. Although self-representations might have some ties with representations of past oral performances (e.g., being shy), they should however be relatively independent from one another. For instance, writing about one's personal quality of being sportsman-like or one's personal flaw of being obstinate should not overlap with experiences of delivering oral presentations.

5. Activation of positive and negative self-representations plays the role of an artificial or external source of induction of positive (for one group) and negative emotions (for the second group). However, this external induction should be effective at the same level for all participants. Therefore, the resilience variable should not be affected by group membership—that is, resilient people should not benefit more or less from this experimental induction of their self-representation than less resilient people. This effect should only be noticed on the outcome (positive emotions) between the groups.

level), but they should be relatively independent from one another. Thus, group membership should not influence the report of emotional memories related to oral presentations.

## Method

### *Participants*

One hundred one undergraduates (65 women, 33 men, and 3 missing sex data) from a French Canadian university took part in this study. Mean age was 22.77 years ( $SD = 5.17$  years, range 19–55 years).

### *Measures*

*Ego-resiliency.* The French adaptation of the Ego-Resiliency Scale used in Study 1 was again used in Study 2. Alpha was .85 in the present study.

*Positive and Negative Affects Schedule.* The French version (Lapierre et al., 1999) of the original PANAS (Watson et al., 1988) was administered without modification this time. Participants were initially asked to rate the extent to which they felt a number of affects “in general” (affectivity trait) and “at the present moment” during the oral preparation (this latter measure will now be referred to as the PANAS-O throughout the text). Alphas were .80 and .79, for positive affectivity trait and positive emotions experienced during the oral preparation (PANAS-O), respectively. Alphas were .80 and .84 for negative affectivity trait and negative emotions experienced during the oral preparation (PANAS-O), respectively.

*Emotional Memories Network Assessment.* The EMNA was again used in this study with only slight modifications. The questionnaire again asked participants to describe a significant personal memory, but this time participants were asked what “the present situation of having to do an oral presentation” made them think of. As in Study 1, two judges (blind to participants’ data) rated the content of each memory according to reported themes. Interrater agreements were very high (kappas ranging from .92 to .98). Discrepancies were resolved by discussion. Overall, 57.1% of the participants reported a memory of an event in which they had to speak in front of an audience (e.g., oral presentations related to school work, group animation, theater representation), 9.3% reported a memory related to a job interview, 9.3% of the participants’ memories concerned a situation where they were only being watched by a group of people (dancing, attending a company dinner), and 10.2% reported a memory of a situation in which they had to talk to someone about

something important (e.g., a relationship breakup). Finally, 14.1% of the participants reported memories apparently unrelated to the oral presentation theme and were coded in the category of “other” (some participants have written about a situation in which they have had to report their qualities and flaws).<sup>6</sup>

Participants were also asked to rate the emotional content of their reported memory. However, to rule out the possibility that the association between positive emotions and EMN uncovered in Study 1 might have been overly increased by the use of the same PANAS instrument in both variables (spurious correlation due to measurement method), we used another emotions inventory. A short scale created to assess subjective report of emotions (see Tugade & Fredrickson, 2004) was used. This instrument is composed of 14 emotional adjectives (afraid, amused, angry, anxious, content, disappointed, disgusted, eager, excited, frustrated, happy, interested, sad, and surprised) relatively different from each other compared to the PANAS and can be divided into dimensions of positive and negative emotions. Participants were asked to rate on a 5-point Likert scale, ranging from 1 (*very little or not at all*) to 5 (*extremely*), the extent to which they experienced each of these emotions during the actual event of their reported memory. Alphas were .83 and .82 for the positive and negative subscales, respectively. Identical to Study 1, the EMNA also asked participants to recall and list other personal memories that they found to be related directly or indirectly to the memory they just described. They were also asked to indicate for each of their links if it represented a globally positive or negative experience and to rate the intensity of this experience on a 5-point Likert scale.

*Emotional Memories Network Scores.* The composite score to assess the EMN related to an oral presentation was calculated according to the same equation described in Study 1. Alphas in this study were .74 and .75 for positive and negative EMN, respectively.

### *Procedure*

The experiment was part of a course in psychology. Participants were nonetheless told that they were free to participate or not. Participants were split into two groups and asked to go in two different classrooms. In both classrooms, participants were first asked to complete the PANAS for affectivity trait and the ego-resiliency scale. Right after, they were told that they would have to prepare an oral presentation about their personal

6. In Study 2, the memory content coded as “other” was unrelated to all study variables.

perception of themselves. The participants were told that two students would be randomly selected and called out by their university code, in order to preserve anonymity, and would have to deliver their oral presentation in front of the class. In fact, no student actually did an oral presentation. However, such a manipulation has proven to be effective in inducing anxiety (see Tugade & Fredrickson, 2004). In addition, each group was induced with a specific mood. One group was told that they would have to talk about their personal qualities (PG: positive group), and the other was told that they would have to discuss their personal flaws (NG: negative group). Writing about one's qualities was expected to lead to a self-affirmation and produce positive emotions in participants. Conversely, writing about one's flaws was expected to produce negative emotions. These types of self-affirmation manipulations have been frequently used with success in research (see Sherman & Cohen, 2006). To simplify and clarify the task, participants were presented with a sheet of paper filled with 10 empty lines beginning with the phrase "I am a person . . . ". They were asked to fill some or all of the 10 lines. They were told that if they were chosen to perform their oral presentation, all they would have to do would be to read their qualities/flaws in front of the class and briefly explain them. To make the task more anxiously arousing, participants were further told that the oral presentations would be audiotape recorded. They were allowed 5 minutes to prepare their talk. After the 5 minutes, they were asked to complete the PANAS-O ("how do you feel right now") and to report on a 5-point Likert scale the extent to which they felt anxious to do the oral presentation (1 = *very little or not at all*, 5 = *extremely*). Participants then completed the EMNA and were asked afterward to bring their questionnaire package to the experimenter's desk. They were then fully debriefed and thanked for their participation.

## Results and Discussion

### *Task Induction Checks*

Analysis of the anxiety item and of the PANAS-O during the preparation of the oral confirmed that the anxiety induction was successful. First, both groups reported high levels of anxiety from having to do a public statement (NG:  $M = 3.92$ ,  $SD = 1.04$ ; PG:  $M = 3.05$ ,  $SD = 1.18$ ). On the 5-point Likert scale used, 3 was equivalent to being *moderately anxious* and 4 to being *highly anxiously aroused* by the task. Furthermore, as expected, the NG reported feeling significantly more anxious than the PG,  $F(1, 101) = 14.14$ ,  $p < .001$ ,  $\eta = .14$ . This suggests that both groups were, on average, moderately stressed about having to do an oral presentation, but, as



expected, the participants in the NG who had to prepare a talk about their flaws reported feeling even more anxiety. Analysis of emotion scales also supported the fact that the task induction was successful. The NG reported significantly more negative emotions on the PANAS-O than the PG,  $F(1, 101) = 5.31, p < .05, \eta = .05$ , and less positive emotions,  $F(1, 101) = -4.96, p < .05, \eta = .05$ . Analysis of discrete emotion categories revealed that “nervous” was the most strongly felt single PANAS category in both groups (PG:  $M = 2.87, SD = 1.12$ ; NG:  $M = 3.28, SD = 1.31$ ). A PANAS score of 3 corresponds to a moderate level of anxiety. Taken together, these results suggest that the anxiety induction was successful in both groups. In addition, the mood manipulation was also successful, as results showed that it had an additive effect. Indeed, participants in the PG felt more intensely positive and less intensely negative emotions than participants in the NG. These findings confirm the task induction and mood manipulation hypotheses.

### *Preliminary Analyses*

Results revealed that there was no difference between the qualities versus flaws groups on the ego-resiliency scale,  $F(1, 101) < 1, ns$ , and, more importantly, that there was no group difference on the positive and negative EMN or on any of its components—valence, number of links, or intensity—all  $F_s(1, 101) < 1.7, ns$ . This indicates that the activation of self-representations (positive and negative) were relatively independent from the activation of EMN related to past experiences of oral presentations. Table 3 shows the means, standard deviations, and ranges of all memory components along with their zero-order correlations with all study variables.

### *Resilience, EMN, and Positive Emotions*

First, it was hypothesized that resilience would be positively associated with the elicitation of positive emotions, with no regard to group membership and positive affectivity trait. To test this, a multiple regression analysis was conducted. The positive emotions as measured by the PANAS-O served as the dependent variable. Resilience and a dummy coded variable relative to group membership (PG = 0, NG = 1) were entered as independent variables. An interaction term was also computed between Group  $\times$  Resilience and

**Table 3**  
**Means, Standard Deviations, Ranges, and Correlations Among Resilience, Positive Affectivity Trait, Positive Emotions, and Emotional Memories Networks Components: Study 2**

	Mean	SD	Possible Range	Observed Range	Resilience	Positive Affectivity Trait	Positive Emotions to the Induction
1. Positive valence	2.61	0.97	1-5	1-5	.22*	.09	.29***
2. Number of positive links	2.10	1.66	0-7	0-6	.19†	.01	.19†
3. Positive links intensity	3.21	1.64	1-5	1-5	.22*	.15	.25*
4. Global positive EMN <sup>a</sup>	—	—	—	-.133-1.94	.26***	.08	.32***
5. Negative valence	2.29	0.81	1-4.50	1-5	-.20†	-.01	-.23*
6. Number of negative links	1.25	1.26	0-7	0-5	-.30***	-.16	-.17†
7. Negative links intensity	2.49	1.93	1-5	1-5	-.28***	-.23*	-.14
8. Global negative EMN <sup>a</sup>	—	—	—	-.124-2.00	-.33***	-.12	-.21*

Note: N = 101.

<sup>a</sup>These variables correspond to a z-score average of their respective three memory components.

There were no gender differences in Study 2 on all memories components.

†  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ .

entered as an independent variable to examine if resilience would have a different effect according to group membership. Control variable of positive affectivity trait was also included. As expected, results revealed a nonsignificant interaction ( $\beta = -.11$ , *ns*), but three significant main effects predicted positive emotions. Resilience emerged as a significant main effect ( $\beta = .22$ ,  $p < .05$ ) along with groups ( $\beta = -.28$ ,  $p < .05$ ) and positive affectivity trait ( $\beta = .22$ ,  $p < .05$ ). This indicates that the effect of resilience on positive emotions was independent of the experimental activation of self-representations, as shown by the nonsignificance of the interaction term between resilience and group membership and by the independent predictive value of both variables. Resilient participants did not benefit more than less resilient individuals from the activation of their positive self-representations nor were they less affected by the activation of their negative self-representations. In addition, all these results were also independent from positive affectivity trait.

Next, it was hypothesized that positive EMN would be associated with the elicitation of positive emotions, independently of group membership and positive affectivity trait. To test this, the same multiple regression analysis was conducted (see above), substituting resilience for positive EMN. An interaction term was also computed between Group  $\times$  Positive EMN and entered as an independent variable to examine if positive EMN would have a different effect according to group membership. As expected, results revealed a nonsignificant interaction ( $\beta = .07$ , *ns*), but three significant main effects predicted positive emotions reported on the PANAS-O. Positive EMN emerged as the most important significant effect ( $\beta = .31$ ,  $p < .05$ ). Groups also yielded a significant effect ( $\beta = -.24$ ,  $p < .05$ ) as well as positive affectivity trait ( $\beta = .29$ ,  $p < .05$ ).<sup>7</sup> This indicates that the significant effect of positive EMN on positive emotions was independent of the experimental activation of self-representations, as shown by the nonsignificant interaction term between positive EMN and group membership and by the independent predictive value of both variables.

Finally, the last hypothesis posited that positive EMN would mediate the relationship between resilience and positive emotions. First, the correlation between psychological resilience and positive EMN

7. Negative EMN was not a significant predictor when added in the regression analysis, nor was its interaction term with group membership.

was assessed. Results showed that there was a significant correlation between the two,  $r = .27, p < .05$ . This correlation remained the same after controlling for the effect of group or positive affectivity trait (both  $r_p = .26, p < .05$ ). Finally, positive emotions were regressed on resilience, positive EMN, and group membership, controlling for positive affectivity trait. Results revealed that positive EMN predicted significantly positive emotions ( $\beta = .28, p < .01$ ). Group membership ( $\beta = -.25, p < .01$ ) and positive affectivity trait ( $\beta = .23, p < .05$ ) were also significant predictors. However, resilience was not a significant predictor of positive emotions anymore ( $\beta = .15, p = .16$ ).<sup>8</sup> In line with Shrout and Bolger's (2002) recommendations for testing mediation effects with small sample sizes, a bootstrap sample of 1,000 cases was created. Controlling for the covariables of positive affectivity trait and group membership, results showed that bias-corrected bootstrap 95% confidence intervals did not include 0 [.05; .46], thus suggesting that the mediation effect was significant at  $p < .05$ .

In sum, the present results showed that EMN can be activated in a relative independent fashion, while all activated networks will have a predictive value at the emotional elicitation level during a stressful task. In addition, in line with Study 1, the memories that were sampled mediated the relationship between resilience and positive emotions experienced in the face of an oral presentation task.

## GENERAL DISCUSSION

The purpose of the present research was to examine the role of emotional memories as psychological processes of resilience. A number

8. The alternative model that positions positive emotions as a mediator between resilience and positive EMN was tested in Studies 1 and 2. Results showed that resilience was still a significant predictor of positive emotional memories networks ( $B = .14, p < .05$ ) after controlling for positive emotional elicitation to the film excerpt ( $B = .32, p < .01$ ). This result thus suggests that the original model (resilience  $\rightarrow$  positive emotional memories networks  $\rightarrow$  positive emotions) should be preferred. In Study 2, results showed that positive emotions were not a significant mediator in the relationship between resilience and positive emotional memories networks, as resilience was still a significant predictor of positive EMN ( $B = .24, p < .05$ ) after controlling for positive emotions. Thus, overall, the model that places positive EMN as a mediator between resilience and positive emotions fits the data better.

of findings emerged. First, in line with past research (Fredrickson, 2001; Ong et al., 2006; Tugade & Fredrickson, 2004), Study 1 showed that psychological resilience was positively associated with positive emotions in general and right after the induction of sadness relative to a theme of loss. In addition, results showed that psychological resilience was positively associated with positive EMN, which also positively predicted positive emotions elicited after the induction. Study 2 replicated these results in the context of an induced experience of anxiety. Finally, Studies 1 and 2 showed that positive EMN fully mediated the relationship between psychological resilience and the elicitation of positive emotions after inductions of sadness (Study 1) and anxiety (Study 2), even after controlling for preinduction positive mood (Study 1) and positive affectivity trait (Study 2).

The present research also proposed a theoretical framework to assess emotional memories as networks of emotional information and tested the validity of an instrument to measure it, the EMNA. Overall, results provide strong initial indications of the validity of the EMNA. First, a principal components factor analysis revealed that the bivalence structural validity of the measure was adequate when assessing EMN related to loss, as the three positive and the three negative components of the EMN loaded on two different factors. In addition, all components of the network had high loadings on their respective factor. The internal reliability of each of the two factors was also found to be adequate in Studies 1 and 2. Second, Study 1 showed that positive and negative scores of EMN were not influenced by the nature of the loss-related events reported in the primary emotional memory but only by the actual emotional experience of that event. This finding is in line with research that showed that the nature of a distressing life event might differ from one individual to another in regard to the subjective emotional intensity of that event (Lazarus, 1991).

Additional evidence for the validity of EMN is that findings revealed that positive and negative components of EMN, as well as the global measures of positive and negative EMN, were all associated with some broad adaptive and maladaptive emotion regulation constructs and outcomes in theoretically expected ways. These results are in line with research that showed that memories and personality traits might be causally linked (Singer & Salovey, 1993; Sutin & Robins, 2005). Interestingly, secondary components of the network,

such as the number of links of the principal memory and the intensity of these links, were sometimes more strongly correlated with these broad emotion regulation measures and outcomes than the valence of the primary emotional memory assessed. This suggests that the binding structure between emotional memories might play a significant role in emotion regulation traits and emotional outcomes (e.g., depression). These results are in line with the binding assumption of the Emotional Memory Networks Theory, which posits that the internalization of a subjective event into a relatively positive emotional memories network is the decisive factor influencing the quality of its regulation, rather than emotional valence and intensity alone—although they do play an important role. Therefore, the binding structure of a network might play a critical role in regulating experienced events, which might over time be reflected in trait emotional regulation measures. Future research might benefit from further examining such an avenue.

Finally, Studies 1 and 2 showed that the EMNA sampled emotional information that was context dependent, as the theme reported in the memories were principally related to the inductor. Furthermore, Study 2 showed that EMN could be activated in a relatively independent fashion, as activation of self-representations did not overlap with the parallel activation of EMN related to oral presentations. However, all activated EMN (self-representations and oral presentations) could independently predict emotional elicitation outcomes. These results support the idea of a parallel processing of EMN (McClelland, 1995), where all activated information would combine at a higher cognitive level to influence one's emotional elicitation. Although they consist of preliminary evidence of this phenomenon, the present findings highlight interesting avenues for future research.

The present research also provided a number of additional contributions. First, results from Study 1 showed that psychological resilience was associated with positive emotions in general and also after an induction of sadness relative to a theme of loss. This is the first study, to our knowledge, that assesses the relationship between resilience and the self-generation of positive emotions through sadness with an experimental induction. In addition, Study 2 corroborated prior research (Fredrickson, 2001; Tugade & Fredrickson, 2004) in showing that psychological resilience was associated with positive emotions when faced with an anxiety-inducing task. These

findings provide support to the idea that psychological resilience is associated with positive emotions in general (Klohn, 1996), as well as with positive emotions experienced during negative emotional arousing events, such as a loss or an oral presentation (Fredrickson et al., 2003; Ong et al., 2006; Tugade & Fredrickson, 2004). This also highlights the importance of mixed emotions, that is, experiencing both positive and negative emotions at the same time in order to cope with adversity (Larsen, Hemenover, Norris, & Cacioppo, 2003).

Another contribution of the present research is that Study 1 showed that psychological resilience was entirely mediated by positive EMN in its relationship with positive emotions experienced following an induction of sadness. Study 2 showed the same mediation effect between psychological resilience and the elicitation of positive emotions during the preparation of an anxiety-provoking oral presentation. These results shed light on the underlying processes that might allow resilient individuals to self-generate positive emotions when faced with emotionally disturbing events. More specifically, resilient people might be able to thrive through taxing situations because they can rely on positive EMN related to these situations. These positive EMN might thus, in turn, help them to cope with the stress and threat of the situation. It would thus appear that resilience is not synonymous with invulnerability (Luthar & Zigler, 1991), as it would depend in part on the activation of contextual resources by relevant external cues of events. Additionally, psychological resilience might also develop in a reciprocal process involving the self or personal traits and the internalization of contextual experiences as emotional memories (Block, 2002; Sutin & Robins, 2005). In this perspective, experienced events would be first influenced by stored EMN. These newly experienced events would thus be internalized as new emotional memories that would be integrated into a network and influence in return global personality traits (Singer & Salovey, 1993), such as psychological resilience. More research is needed in order to better understand how this process might take place.

Some limitations of the present research need to be underscored. First, cross-sectional correlational designs were used in Studies 1 and 2. We thus cannot infer causality from the present results. Future research involving longitudinal designs is needed in order to better delineate the role of resilience in the development of positive EMN and vice versa. A second limitation is that the measure of EMN was

completed after the experimental emotional induction had taken place. Methodological restraints from the present research prevented the measurement of EMN before the inductions, as participants could not report what emotional memories would be activated before the induction method activated them. However, results from Studies 1 and 2 showed that participants reported positive EMN along with negative EMN even if the film excerpt and the oral preparation process induced sadness and anxiety predominantly. Therefore, it would appear that these emotional inductions did not influence participants to focus predominantly on sad or anxious memories, as they recruited context-dependent memories rather than mood-dependent memories. Future research is needed, however, in order to examine this issue in detail. A third limitation is that the present results do not allow us to fully rule out some alternative explanations. For instance, the memories reported might not totally reflect the participants' prior memories organization as activated by the inductive condition, as they might also be the product of a deliberate strategy to cope with the inductive condition by explicitly recalling certain types of memories. Similarly, it is also possible that an experience of positive emotions facilitates the recall of positive memories. However, our findings indicate that this might not be the case. Indeed, the alternative model resilience  $\rightarrow$  positive emotions  $\rightarrow$  positive EMN did not fit well the data in both studies, and positive memories were not positively predicting negative emotions after the inductions—whereas this should have been the case if participants had deliberately recalled positive memories to alleviate their negative mood. Nevertheless, the present research did not fully rule out the possibility of an explicit recall of memories. Therefore, developing ways to assess EMN long before the experimental induction or measured outcomes would appear relevant in order to clearly highlight the role of memories organization on the self-generation of positive emotions. It would also be of interest in future research to disentangle mood repair or mood-incongruent effect (e.g., Josephson, Singer, & Salovey, 1996) from the effect of the activation of a positive emotional memories organization. Finally, Study 2 did not use a neutral experimental group. Such a group might be necessary to understand whether a minimal level of stress is required for resilient people to activate positive EMN or whether they might be able to generate positive EMN related to any type of inductor, including a neutral one. Despite these limitations, the present study



provides preliminary information on the role of EMN in psychological resilience. It would appear that resilient individuals self-generate positive emotions in distressing contexts by the use of their positive EMN. Additional research on this issue and further examinations of the role of EMN would therefore appear to be worthy lines of investigation.

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