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Cognitive integration of personal or public events affects mental health: Examining memory networks in a case of natural flooding disaster

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Abstract

Objective: The purpose of this research was to examine whether memories of personal or public events could affect mental health through the way those memories are integrated in memory networks.

Method: Participants from the general population ($N = 224$, age mean $= 36.62$ years, 74% female) were either directly or indirectly personally affected by a natural flooding disaster with moderate consequences or had simply learned about it. A prospective design (during the floods and two months later) was used to examine the impact that such a personal or public event memory could have on their mental health.

Results: Results showed that flood-affected individuals reported poorer mental health compared to the unaffected. However, both affected and unaffected individuals who had encoded a current floods-related event in memory as need satisfying or who had embedded such an event in need satisfying memory networks showed better mental health over time. These results held after controlling for the effect of various demographics and dispositional emotion regulation styles.

Conclusion: Simply learning about public events can impact mental health through the way those events are integrated in memory, which appears as a critical individual difference.

KEYWORDS

integration, memory networks, mental health, natural disaster, well-being

1 | INTRODUCTION

The effect of negative life events on mental health has been vastly studied. Personally experienced negative events, such as traumatic events, but also less intense negative events, such as romantic breakups, work conflict, or unsuccessful achievements, are well known to disrupt mental health and increase psychological symptoms months after the event occurred (Crane et al., 2016; Houle & Philippe, 2019). Conversely, public events that are remembered over time (sometimes called flashbulb memories) are typically special emotional public events, but which are not personally experienced (Neisser,

1982). For instance, Bohannon (1988) studied memories for the explosion of Space Shuttle Challenger. Kvavilashvili, Mirani, Schlagman, and Kornbrot (2004) investigated British participants' memories of the circumstances under which they learned of the death of Princess Diana. Most people were not directly involved in those traumatic incidents and did not know close others implicated. Yet, these events were experienced as highly emotional by most.

Research on this topic has mainly focused on how these public events and the circumstances under which they were learned about are encoded or well recalled over time (Hirst et al., 2009; Neisser, 1996). However, very few studies have

investigated the impact of these flashbulb-like memories on mental health. It is therefore unknown whether some individuals may thrive or decrease in mental health following public events and whether the operating mechanisms are the same as for personally experienced events. In the present research, we investigated one of these mechanisms—memory networks—and examined how such networks can protect mental health through a natural flooding disaster, which was either personally experienced or simply learned about as a public event.

1.1 | The effect of public events on mental health

In the present research, we defined mental health according to the World Health Organization (2004), which considers both the absence of mental symptoms and the presence of well-being as indicators of mental health. Few studies have investigated the effect of public events on mental health. However, there is evidence from the clinical literature suggesting that witnessing negative events, without personally experiencing them, can harm mental health. For instance, the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders recognizes that witnessing or learning about traumatic events can contribute to posttraumatic stress disorder symptoms (e.g., intrusive flashbacks, distress, sleep disturbance) to the same extent as directly experiencing such events (American Psychiatric Association, 2013).[1] Research has supported this view by showing that witnessing an accident without being personally involved or witnessing death account for the most frequent traumatic experiences (Benjet et al., 2015) and lead to increased psychological symptoms months following the event (e.g., Compton, Grace, Madgy, & Swor, 2009). Relatedly, the term vicarious trauma has been developed to explain why trained professionals who are simply exposed to narratives of a traumatic event can show increased psychological symptoms (Jenkins & Baird, 2002).

There is also some evidence that public events impact mental health and that simply learning about a public event can affect mental health. Fredrickson, Tugade, Waugh, and Larkin (2003) showed that low-resilient people living in Michigan, who did not directly experience the September 11th attacks (i.e., no participant had lost a loved one in the attacks or were at the location of the attacks when they took place), decreased in positive emotions and in mental health (e.g., greater depressive symptoms, lower well-being) following the aftermath of this event. Protestants who could spontaneously recall the 1987 Enniskillen bombing 8 years following the event had lower mental health than non-Protestants or those who did not recall the event (Cairns & Lewis, 1999). Even in the absence of direct proximity with the location of the event, public events appear to affect mental health. For instance, Metcalfe et al. (2011) uncovered that

UK residents surveyed after the occurrence of the September 11 attacks had lower well-being than those surveyed before, despite the fact that there is no territorial proximity with the United States. Extensive media coverage of distressing events, real or fictive, has also been shown to increase mental symptoms (Propper, Stickgold, Keeley, & Christman, 2007; Vasterman, Yzermans, & Dirkzwager, 2005) or suicide attempts. For instance, research has found increased suicide attempts following the suicide of celebrities (Cheng, Hawton, Lee, & Chen, 2007; Stack, 2005) or following the release of popular series (e.g., TV Series 13 Reasons Why: Bridge et al., in press; Niederkrotenthaler, 2019) or books on suicide (e.g., Book *Final Exit*, Marzuk, Tardiff, & Leon, 1994).

The evidence presented above of how public events can alter mental health includes mostly dramatic and fairly rare events (terrorist attacks, shuttle explosion). These are highly emotional and likely to strongly impact most people's core world meaning and sense of security. However, the effect of more moderate negative events is unknown, such as learning over the news about the collapse of a bridge, forest fire, or a serious flooding in one's community or country. Typically, at least one such type of event occurs in every country every year. Because the same public event can increase mental health for certain individuals and decrease it for others (e.g., Fredrickson et al., 2003), the overall effect of such more moderate public events on mental health might have remained hidden. It appears important, therefore, to also consider the psychological mechanisms that may be at play to uncover potential individual differences in the processing of those moderately emotional public events.

It is believed that memories of witnessing an event or simply being told about an event are similar to memories of personal experiences (Akhtar, Justice, Morrison, & Conway, 2018; Pillemer, Steiner, Kuwabara, Thomsen, & Svob, 2015). This would implicate an adaptive evolutionary function decreasing the necessity to personally experience all possible events to develop an appraisal of similar future situations and to encode which actions and behaviors should be exerted in such conditions. As such, memories of public events may influence mental health in the same way as memories of personal events. The impact of a public event on one's mental health could therefore depend on the way the memory of this public event is encoded and is cognitively integrated into the memory system.

1.2 | Memory networks and the cognitive integration of personal and public events

Personal events that are emotional and personally relevant are typically encoded as episodic memories with their experiential component, that is, how the event has been emotionally and cognitively experienced

(Conway & Pleydell-Pearce, 2000; Philippe, Koestner, Lecours, Beaulieu-Pelletier, & Bois, 2011). One key experiential component is the extent to which the past event satisfied or thwarted the three basic psychological needs highlighted by self-determination theory (SDT: Ryan & Deci, 2017), that is, autonomy, competence, and relatedness. Autonomy refers to the need to feel volitional and authentic in one's actions. Competence is defined as the need to feel effective and efficacious. Relatedness refers to the need to feel connected and to care for others and be cared for by others in turn. The level of need satisfaction characterizing a memory has been shown to serve the appraisal of future experiences similar to the content of the memory (Philippe, Koestner, Lecours, et al., 2011). Need-satisfying memories signal an opportunity for growth and trigger approach behaviors, whereas need-thwarting memories denote a potential threat and set avoidant behaviors in place (Hodgins & Knee, 2002; Philippe, Koestner, & Lekes, 2013). Over time, need satisfying memories that are frequently used to appraise the external environment predict increases in well-being, whereas need thwarting memories predict decreases in well-being (Houle & Philippe, 2017; Milyavskaya, Philippe, & Koestner, 2013; Philippe & Bernard-Desrosiers, 2017).

The way these memories of specific past events are cognitively organized also matters in terms of mental health. Memories tend to associate with each other based on episodic and surface features, such as common location, emotion, and object, as well as in terms of autobiographical clusters, such as similar events, life themes, and self-aspects, thereby forming memory networks (Brown & Schopflocher, 1998; Burt, Kemp, & Conway, 2003). Research has shown that the deleterious impact of negative memories on mental health will be reduced if they are embedded in a memory network characterized by memories that are need satisfying. Conversely, negative memories that are enclosed in a need thwarting memory network are amplified and hinder mental health even more (Philippe, Koestner, Beaulieu-Pelletier, Lecours, & Lekes, 2012; Philippe, Koestner, Lecours, et al., 2011).

Memory networks are constantly reactivated by external situational cues, mostly outside of awareness (Conway & Pleydell-Pearce, 2000; Pillemer, 2003). Each time this occurs, it affects people's well-being and actions according to the level of need satisfaction of the memory network activated. Reactivating need thwarting memory networks leads to an immediate decrease in well-being, whereas reactivating need satisfying memory networks produces an increase in well-being. Over time, such frequent reactivations and subsequent effects on situational well-being culminate in stable changes in mental health (Philippe & Bernard-Desrosiers, 2017; Philippe et al., 2012). Thus, memory networks related to public events might affect mental health the same way memory networks of personal events do.

Research on memory networks has only examined how personal memories and future prospections are organized in networks (e.g., Demblon & D'Argembeau, 2016). Therefore, it is unknown how public memories are organized and whether the buffering or amplifying effect of this organization is the same as for personal memories. This would highlight a critical individual difference in the processing of public events and in how they can affect mental health.

2 | THE PRESENT STUDY

The purpose of the present study was to examine how public events of moderate consequences that are either personally or not personally experienced are integrated in memory networks and the impact of this integration on mental health. We investigated this research question within the aftermath of a natural disaster—massive floods that occurred in several areas in Quebec, Canada in 2017 (Lau, 2017). This public event was particularly suited for the present study as surveyed individuals could have had direct personal experiences with the floods (e.g., flood water in the house or helping a close relative with the floods) or they could have just learned about them through traditional news or social media. Therefore, the same stressful event could be experienced as either personal or public. Personally experiencing these floods should have a greater effect on mental health than only learning about this event, as this is what past research has shown (e.g., Fernandez et al., 2015). However, not personally experiencing these floods could also have an impact on mental health. They were alarming from a general perspective since they have been linked to signs of a global warming effect, which could worsen in the years to come. Therefore, even if one was not affected by floods now, personal harmful consequences could occur in the years to come, thus signaling a potential future threat and personal relevance.

Participants were assessed during the last weeks of the floods (Phase 1) and completed measures of mental health (psychological and somatic symptoms and well-being). They also described a personal memory related to the current floods and described networked memories related to this floods-memory. We targeted the end of the floods as the first measurement time point in order to assess memories of the events experienced (i.e., what was encoded and recalled) rather than situational experiences while the floods were at their peak. Two months later (Phase 2), once the floods had resolved, participants were assessed again on the same measures of mental health to examine changes.

The first objective was to examine how such a personal or public event would be related to mental health. Given that personally experiencing floods is a stressful experience, we expected that those with direct personal experiences with the current floods would show reduced mental

health during the floods (H1a) as well as 2 months later (H1b) compared to those not affected. Direct experiences with natural disasters have indeed been shown to affect mental health even months after the event (Neria, Nandi, & Galea, 2007; Stanke, Kerac, Prudhomme, Medlock, & Murray, 2013).

Second, the encoding of floods-memories and their integration in memory networks should also impact mental health for both personal and public events. Floods memories that are more need satisfying and integration of these memories in need satisfying memory networks should be independently and positively associated with mental health (H2a). Moreover, since the consequences of these floods were easily observable in several areas of the Province of Quebec and that they were constantly reported for months by traditional and social media, frequent encounters of related external stimuli should frequently activate related memory networks, thereby frequently exerting their effect, which should cumulate in stable changes in mental health over time. Therefore, need satisfying floods-memory and memory networks should predict increases in mental health over time and this should be true for both participants affected by the floods and those not affected (H2b).

2.1 | Control variables

It is well recognized that individuals rely on distinct emotion regulation styles to manage personal stressful events, which alter the way these events are emotionally experienced (Lazarus, 1991) as well as the consequences of these events on mental health (Troy & Mauss, 2011). These strategies are also likely to alter the way public events affect mental health. However, we expected that the above results would hold even after controlling for dispositional emotional regulation styles. This is because memory networks do not strongly reflect the impact of higher person or trait levels and are only weakly associated with general traits or attitudes (Milyavskaya et al., 2013; Philippe et al., 2012; Philippe, Koestner, Lecours, et al., 2011). Moreover, contrary to general dispositions, memory networks are constantly reactivated by external situational cues, mostly outside of awareness (Conway & Pleydell-Pearce, 2000; Pillemer, 2003). Each time this occurs, it affects people's well-being and actions according to the level of need satisfaction of the memory network activated. Therefore, given these frequent expected effects of memory networks, they should impact mental health over time, even over a short time span like the 2-month period of the present study. Conversely, the effect of general emotion regulation styles should be more stable over such a short time span, and therefore only be associated with mental health at Phase 1. Finally, we also controlled for various socio-demographic characteristics—age, sex, income, and education—given that these variables might affect mental health, particularly in times of stress (e.g., Akhtar-Danesh & Landeen, 2007).

3 | METHOD

3.1 | Participants and procedure

We based our power analysis on the most complex analysis required, that is, that need satisfaction in floods-memories and in memory networks would predict increases in mental health over time (2 months), while controlling for demographics and emotion regulation styles. The expected effect size was estimated from Philippe and Bernard-Desrosiers (2017, Study 2), who found an effect size of $f^2 = 0.067$ for the prediction of need satisfaction in memories on changes in well-being over two months. The power analysis recommended a sample size of 147 participants for multiple regressions with two tested predictors (floods-memories and networked memories) and eight control variables (mental health Phase 1, four demographics, and three emotion regulation styles), with a statistical power of .80 and an alpha of .05. A total of 224 community-dwelling participants from the Province of Quebec, Canada, took part in Phase 1. Participants were randomly selected from a compiled list of people interested to participate in studies in psychology, who were recruited through various public areas of the Greater Montreal (Quebec, Canada). Other participants were recruited using advertisements posted on blogs and websites related to the floods.

Participants were invited to take part in an online study of two phases pertaining to the floods that were then currently occurring in the Province of Quebec in Canada, during the spring of 2017. Participants first responded to various demographic questions concerning their age, sex, education, and income. They also completed measures assessing their well-being and diverse psychological symptoms and responded to an emotion regulation measure. Afterward, they indicated whether they had been directly or indirectly affected by the floods, or not affected (e.g., learned about them over the news). Then, all participants were asked to describe a personal memory of a specific event related to the current floods, as well as networked memories. Finally, participants rated the level of psychological need satisfaction experienced in each of their memories.

Between one and two months later (M = 1.40 months, SD = 11.94 days), participants were contacted again to participate in Phase 2, in which they completed the same measures of well-being and psychological symptoms again. A total of 150 participants completed Phase 2, for a response rate of 67%. This final sample was composed of 111 females and 39 males, with a mean age of 37.69 years old (SD = 15.54), ranging from 19 to 82 years.

3.2 | Measures: Phase 1

3.2.1 | Well-being and psychological symptoms

Five scales were used to assess well-being and psychological symptoms in the present study. First, the Satisfaction with Life scale (Diener, Emmons, Larsen, & Griffin, 1985) was used to measure participants' level of hedonic well-being with five items. Rating were made on a 7-point Likert scale (1 = *Disagree strongly*, 7 = *Agree strongly*) (α = .89). Second, the short self-acceptance dimension of the Psychological Well-Being Scale (Ryff & Keyes, 1995) measured eudemonic well-being with three items, on a 7-point Likert scale (1 = *Disagree strongly*, 7 = *Agree strongly*) (α = .71). Third, the depression scale of the Patient Health Questionnaire (PHQ-9: Kroenke & Spitzer, 2002) assessed participants' depressive symptoms in the last 2 weeks with nine items, responded to on a 4-point Likert scale, ranging from 0 (*Not at all*) to 3 (*Nearly every day*) (α = .89). Fourth, a short six-item version (Osman, Kopper, Barrios, Osman, & Wade, 1997) of the Beck Anxiety Inventory (BAI: Beck, Epstein, Brown, & Steer, 1988) measured participants' subjective state of anxiety in the last 2 weeks, on a 4-point Likert scale, ranging from 0 (*Not at all*) to 3 (*Severely; It bothered me a lot*) (α = .89). Fifth, the Physical Health Questionnaire (PHQ: Schat, Kelloway, & Desmarais, 2005), assessed the presence of psychosomatic symptoms in the last two weeks with 14 items, responded to on a 7-point Likert scale (1 = *Not at all*, 7 = *All of the time*) (α = .83). An exploratory factor analysis, using Maximum Likelihood and a Varimax rotation, revealed two factors with an eigenvalue higher than one (2.98 and 1.09) in the present study data. The PHQ-9, BAI, and PHQ loaded on a first factor representing symptoms (all factor loadings > 0.71). Therefore, these scales were standardized and averaged into a single index of psychological symptoms (α = .84). Hedonic well-being and self-acceptance loaded on a second factor (all factor loadings > 0.80). These two scales were thus standardized and averaged into a single index, representing well-being (α = .84).[2] These two indices (well-being and symptoms) also make sense on a theoretical basis, as well-being measures typically correlate highly together (e.g., Philippe et al., 2012), whereas psychological symptoms tend to aggregate onto a single factor (e.g., Caspi et al., 2014).

3.2.2 | Dispositional emotion regulation styles of negative emotions

Recent theoretical models of emotion regulation strategies (e.g., Nolen-Hoeksema, 2012) and meta-analyses (e.g.,

Naragon-Gainey, McMahon, & Chacko, 2017) classify emotion regulation and coping strategies in three general factors. These include adaptive cognition-oriented (e.g., reappraisal, problem-solving, acceptance), maladaptive avoidance (e.g., suppression, denial), and dysfunctional strategies (e.g., rumination, emotional overwhelming). We used the scale developed by Roth and colleagues (2009, 2014, 2018), which taps into these three factors of emotion regulation styles, that they, respectively, labeled integrative regulation, controlling regulation, and dysregulation. We used a slight adaptation of this scale to assess the regulation of negative emotions in general (Houle & Philippe, 2019) instead of the regulation of a specific emotion (e.g., fear, anger), as assessed by the initial scale. Participants indicated their degree of agreement with each item, on a 7-point Likert scale (1 = *Disagree strongly*, 7 = *Agree strongly*). Seven items assessed integrative emotion regulation, and a sample item was "Sometimes, feeling negative emotions helps me to understand important things about myself" (α = .88). Seven items assessed controlling regulation, and a sample item was "Usually, I ignore my negative emotions" (α = .90). Six items assessed dysregulation, and a sample item was "I often behave under the influence of my negative emotions, even if I don't want to behave like that" (α = .82). This scale has shown adequate evidence of reliability and validity in past research (Houle & Philippe, 2019; Roth et al., 2014).

3.2.3 | Flood-affected and unaffected individuals

Participants indicated whether they were directly or indirectly affected by the current floods that were occurring in Quebec, Canada, by responding "Yes" or "No" to this question. We defined being directly affected by the floods as the presence of flood water in the home or close to the house, and indirectly as having a close relative affected by flood water (e.g., daughter's house flooded) or having undergone changes in one's daily routine due to the floods (e.g., daycare had to close because of the floods). Participants who had been directly or indirectly affected (19%) indicated in which way they were affected, whereas participants who had not been affected at all described how they heard or learned about the floods (see Figure S1 in supplementary file for a graphical display of the geographical location of the participants and of the floods, based on their reported postal codes).

Descriptions were then evaluated by two judges (research assistants) to confirm that participants had indeed been affected by the floods in accordance with our definition. Only one participant who mentioned being affected by the floods was reclassified as not affected. The worst situation experienced by our affected participants was water in the house or

basement, which could sometimes include a significant damage to the house (e.g., cracks in house foundation). However, no participant experienced extreme consequences due to the floods such as losing one's house or the death of a significant other due to the floods. Judges also coded descriptions of directly and indirectly affected participants for their severity on a 5-point Likert scale; 1–2 = minor change to daily routine, close relatives directly affected; 3 = went helping an affected close relative, major change to one's daily routine; 4 = threat of house being flooded such as water close to participants' house or neighbors directly affected; 5 = water in participants' house; (judges' intraclass correlation = .88). This score of severity was not correlated to any of the variables of the present study. Because past research has underscored that natural disasters can negatively impact the mental health of both directly and indirectly affected people (e.g., Fernandez et al., 2015; Verger et al., 2003) directly and indirectly affected participants were combined in the same group and they were compared to the unaffected participants in the analyses.

3.2.4 | Personal memory about the current floods

Participants were invited to describe

> *A personal memory of a specific event/moment related to the current floods that is significant (important) for you, whether you were directly or indirectly affected by those floods or not at all (even if you have not or are not currently affected, please describe the memory of a specific event related to the current floods). It is important that you do not describe the general event of the floods, but rather an event that occurred at a specific moment in time. However, do not take too much time to find the perfect memory. Choose the memory that comes to your mind the most spontaneously. This memory can be positive, negative or both.*

These instructions were adapted from previous studies on memories (Philippe et al., 2012; Singer & Salovey, 1993).

3.2.5 | Networked memories

Participants were asked to recall and describe other memories that spontaneously came to their mind, which could be either directly or indirectly related to the floods-memory they had just described. Participants were informed that these networked memories did not have to be specifically about floods. They could be about any other event that occurred at any point in their lives that is somehow related to the floods-memory they had described. Participants were provided with three textboxes, but were instructed that they could describe as many networked memories as they wished, up to three. This procedure has been used in past research on memories and memory networks (e.g., Demblon & D'Argembeau, 2016; Philippe et al., 2012; Philippe, Koestner, Lecours, et al., 2011; Philippe, Lecours, & Beaulieu-Pelletier, 2009). Some participants described at least one other natural disaster event as networked memories (34.4%), but most described other types of events (which did not occur during the present floods) as various as accidents, loss of important possessions, death of a close relative, difficult romantic breakups, buying or moving to a new house, or political events.[3] See supplementary file for illustrative examples of flood-related memories and networked memories.

3.2.6 | Memory network need satisfaction

After describing their memories, participants rated the level of psychological need satisfaction (autonomy, competence, and relatedness) they experienced when the event of each of their memories occurred (floods-related and networked memories). Three items assessed each of the three needs. Sample items were "I felt free to do things and to think how I wanted" for autonomy, "I felt skillful or capable" for competence, and "I felt connected to one or more people" for relatedness. These items were used in previous studies on episodic memories (e.g., Milyavskaya et al., 2013; Philippe et al., 2012; Philippe, Koestner, Lecours, et al., 2011). Participants indicated their degree of agreement with each item, on a 7-point Likert scale, ranging from −3 (*Strongly disagree*) to +3 (*Strongly agree*), with 0 representing *do not agree nor disagree or not applicable*. Two indices were calculated. First, the level of need satisfaction experienced in the event of the main floods-related memory was computed, by averaging the scores on the nine items ($\alpha = .75$). Second, the overall level of need satisfaction experienced in the networked memories was calculated, by averaging the level of need satisfaction experienced in each of the reported networked memories ($\alpha = .73$).

3.3 | Measures: Phase 2

3.3.1 | Well-being and psychological symptoms

The same five scales assessed at Phase 1 were measured again in the second phase of the study. One again, the PHQ-9,

BAI, and PHQ were standardized and averaged into a single index of psychological symptoms ($\alpha = .85$), whereas hedonic and eudemonic well-being were standardized and averaged into a single index of well-being ($\alpha = .88$).

4 | RESULTS

4.1 | Preliminary analyses

Independent samples t tests and chi-square tests were conducted on all study's variables to assess whether there were significant differences between participants who responded to the second phase of the study and those who did not. Results revealed that 53.5% of the floods-affected participants completed Phase 2, whereas 70.2% of the unaffected completed it—a significant difference of proportion: $\chi(1) = 4.37$, $p < .05$. This is not surprising, as affected participants probably had many duties to oversee, 2 months after the floods (e.g., cleaning, insurance follow-up, renovation, government financial compensation). This rationale was further supported by the fact that within affected participants, dropouts had been more severely affected than nondropouts, $t(42) = 2.07$, $p < .05$. However, there were no significant differences on any other variables, including mental health measures. This remains, nonetheless, a significant limitation of the present research that we address in the General Discussion.

To determine whether being affected by the floods would increase symptoms and decrease well-being during (H1a) and after the floods (H1b), a second series of independent sample t tests was conducted. Results revealed significant differences for psychological symptoms only, at both phases. Affected participants reported a higher level of psychological symptoms at Phases 1 and 2 than the unaffected, Phase 1: $t(222) = -2.71$, $p < .01$, $d = 0.36$, and Phase 2: $t(148) = -2.15$, $p < .05$, $d = 0.35$. There were no other differences on all study variables, including the memories measures. Table S1 in supplementary file reports all means and correlational results of both phases.

4.2 | Impact of memory networks on well-being and symptoms

4.2.1 | During the floods (Phase 1)

To verify the cross-sectional associations between need satisfaction in the floods-related memory network and well-being and psychological symptoms, two separate hierarchical regression analyses were performed. Well-being and psychological symptoms at Phase 1 served as the dependent variables in each regression. At Step 1, demographic variables (age, sex, education, and income), a binary variable assessing whether participants had been affected by the floods or not ($0 = $ No, $1 = $ Yes),

and the three emotion regulation styles were entered as independent variables, to control for their influence. At Step 2, levels of need satisfaction in the floods-related memory and in networked memories were included. To assess whether the results of memory networks would differ as a function of whether participants had been affected or not by the floods, two interaction terms were calculated and entered at Step 3: Floods-related memory need satisfaction × Floods-affected and Networked memories need satisfaction × Floods-affected.

Table 1 shows the results of these analyses on each of the two dependent variables (well-being and psychological symptoms at Phase 1). At Step 1, results revealed that age was negatively related to symptoms, and income was positively associated with well-being and negatively with symptoms. Moreover, being affected by the floods was positively related to psychological symptoms, but not to well-being. Regarding emotion regulation, integrative emotion regulation was positively related to well-being and negatively to psychological symptoms, whereas dysregulation was negatively related to well-being and positively to symptoms. Controlling regulation presented the same pattern of results as dysregulation, but results were marginally significant. Step 1 explained 16% of the variance of well-being and 34% of psychological symptoms.

At Step 2 (H2a), results showed that levels of need satisfaction in both the floods-related memory and networked memories were independently and positively associated with well-being during the floods, together explaining 5% of its variance, $F_{\text{change}}(2, 213) = 7.15$, $p = .001$. Networked memories need satisfaction was negatively related to psychological symptoms, but floods-related memory need satisfaction was only marginally related to them. Networked memories need satisfaction explained 6% of the variance of psychological symptoms over and above all above all other independent variables, $F_{\text{change}}(2, 213) = 10.02$, $p = .000$. The present findings thus indicate that the level of need satisfaction (vs. need thwarting) experienced in events composing a floods-related memory network had a positive and protective effect on participants' mental health during the floods, over and above demographics and emotion regulation styles.

At Step 3, none of the interaction terms were significant, indicating that the effects of memories need satisfaction were the same for participants affected by the floods or not affected. In other words, memories related to an important public event, such as a natural disaster, appear to have an effect on the mental health of all individuals, even those who did not have personal experiences with the disaster.

4.2.2 | After the floods (Phase 2)

We also sought to determine whether memory network need satisfaction could continue to impact mental health over

TABLE 1 Hierarchical regression analyses of demographic variables, emotion regulation, and need satisfaction in the floods-related memory and in networked memories on well-being and psychological symptoms at Phase 1

Independent variables	Well-being (Phase 1)				Psychological symptoms (Phase 1)			
	Model R^2	B	95% CI	β	Model R^2	B	95% CI	β
Step 1	.26				.34			
Affected by floods (AF) (0 = No, 1 = Yes)		−0.20	[−0.46, 0.07]	−.09		0.40**	[0.15, 0.65]	.18
Age		0.00	[−0.01, 0.01]	.01		−0.01*	[−0.02, −0.001]	−.14
Sex		−0.01	[−0.26, 0.24]	−.00		0.03	[−0.20, 0.27]	.02
Education level		0.01	[−0.06, 0.08]	.01		−0.02	[−0.08, 0.04]	−.04
Income		0.62**	[0.26, 0.99]	.22		−0.59**	[−0.93, −0.25]	−.21
Integrative regulation		0.33**	[0.22, 0.44]	.36		−0.14**	[−0.25, −0.04]	−.16
Dysregulation		−0.18**	[−0.28, −0.07]	−.19		0.34**	[0.24, 0.44]	.39
Controlling regulation		−0.10†	[−0.22, 0.01]	−.11		0.09†	[−0.01, 0.20]	.10
Step 2	.31				.40			
Floods-related memory NS		0.12*	[0.00, 0.24]	.13		−0.10†	[−0.20, 0.01]	−.11
Networked memories NS		0.13*	[0.01, 0.25]	.14		−0.17**	[−0.27, −0.06]	−.19
Step 3	.32				.40			
Floods-related memory NS × AF		−0.16	[−0.51, 0.13]	−.08		−0.13	[−0.42, 0.17]	−.07
Networked memories NS × AF		−0.09	[−0.34, 0.33]	−.05		0.05	[−0.29, 0.32]	.03

Note: $n = 224$, NS = Need satisfaction. AF = Affected by floods.

**p < .01; *p < .05; †p < .10.

time, once the floods would be over. The same two hierarchical regression analyses previously performed were conducted again, this time on the scores of change in well-being and in psychological symptoms (score at Phase 2—score at Phase 1) as dependent variables. Additionally, we controlled for the initial level of well-being or psychological symptoms assessed at Phase 1 and included this variable at Step 1.[4]

Table 2 presents the results of these analyses. At Step 1, none of the control variables significantly predicted changes in well-being and in psychological symptoms, including emotion regulation styles. At Step 2 (H2b), results revealed that need satisfaction in the floods-related memory and in networked memories independently and positively predicted an increase in well-being over time (with the inverse also being true; greater need thwarting led to a greater decrease in well-being), explaining 9% of its variance, $F_{change}(2, 138) = 7.43$, $p = .001$. Moreover, need satisfaction in networked memories predicted a decrease in psychological symptoms (and thus need thwarting predicted an increase in symptoms), explaining 3% of its variance, $F_{change}(1, 139) = 4.45$, $p < .05$. Need satisfaction in the floods-related memory did not significantly predict psychological symptoms.

At Step 3, there were no significant interactions with need satisfaction in the floods-memory or networked memories. These findings suggest that need satisfaction in floods-related memory network can protect mental health over time in both individuals who had personal experiences with the natural disaster and those who only learned about it.[5]

5 | GENERAL DISCUSSION

Natural disasters, such as floods, hurricanes, and tsunamis typically have profound negative impact on the mental health of people directly affected by those disasters (e.g., Stanke et al., 2013). Mental health issues tend to be higher for those directly affected as compared to those of the community who only witnessed those events or learned about them from other people and the media (Fernandez et al., 2015; Verger et al., 2003). The present study replicates those past findings in that participants who had direct experiences with the 2017 floods in Quebec, Canada, showed higher psychological symptoms (but not less well-being) than those who were not affected by those floods. These results are noteworthy given that participants of the present study only experienced moderate consequences due to the

TABLE 2 Hierarchical regression analyses of demographic variables, emotion regulation, and need satisfaction in the floods-related memory and in networked memories on well-being and psychological symptoms at Phase 2

Independent variables	Well-being change				Psychological symptoms change			
	Model R^2	B	95% CI	β	Model R^2	B	95% CI	β
Step 1	.07				.13			
Initial level of variable (Phase 1)		−0.10†	[−0.20, 0.00]	−.19		−0.19**	[−0.31, −0.07]	−.28
Affected by floods (AF) (0 = No, 1 = Yes)		−0.10	[−0.31, 0.11]	−.08		0.23†	[−0.01, 0.47]	.15
Age		−0.00	[−0.01, 0.01]	−.02		−0.01†	[−0.01, 0.00]	−.15
Sex		−0.03	[−0.21, 0.15]	−.03		−0.08	[−0.29, 0.13]	−.06
Education level		0.04	[−0.02, 0.09]	.11		0.00	[−0.06, 0.06]	.00
Income		−0.05	[−0.34, 0.23]	−.04		0.20	[−0.13, 0.53]	.11
Integrative regulation		0.00	[−0.08 0.09]	.01		−0.05	[−0.14, 0.04]	−.10
Dysregulation		−0.04	[−0.12, 0.04]	−.08		−0.00	[−0.10, 0.09]	−.01
Controlling regulation		0.05	[−0.03, 0.13]	.11		0.02	[−0.07, 0.11]	.04
Step 2	.16				.16			
Floods-related memory NS		0.09*	[0.01, 0.18]	.19		0.04	[−0.06, 0.15]	.08
Networked memories NS		0.10*	[0.01, 0.20]	.20		−0.14*	[−0.25, −0.02]	−.24
Step 3	.18				.16			
Floods-related memory NS × AF		0.18	[−0.06, 0.42]	.16		−0.02	[−0.31, 0.28]	−.01
Networked memories NS × AF		0.00	[−0.27, 0.27]	.00		−0.06	[−0.38, 0.27]	−.04

Note: $n = 150$, NS = Need satisfaction. AF = Affected by floods.

**$p < .01$; *$p < .05$; †$p < .10$.

floods. Moreover, there was no significant correlation between the severity of these consequences and mental health indicators, implying that being directly or indirectly affected by floods will impact mental health more than being unaffected.

However, there was a critical psychological mechanism at play within those groups that oriented the effect of these floods toward psychological thriving or distress. In other words, although the mean of symptoms was higher in the group affected by the floods compared to the unaffected group, the floods had an effect on mental health in both groups, which was a function of how people encoded significant floods-related events and of the kind of memory network in which such memories were embedded in. These findings highlight a critical individual difference in how people process and integrate personal and public events.

This is the first study to our knowledge to show that public events that are not personally experienced can impact mental health over time to the same extent as those that are personally experienced, through the way they are embedded in memory networks. This finding highlights that direct victims of public events, such as natural disasters, are not the only ones who can suffer psychologically in the aftermath of such

events—people from the affected community or any person for whom the events have personal relevance can experience decreases in mental health as well. This goes partly against other theoretical claims in the literature sustaining that in communities victimized by traumatic events, individuals with exposure limited to media coverage or with no close relatives implicated cannot be considered candidates for PTSD (North & Pfefferbaum, 2011, also see DSM-5). While the present research does not address PTSD symptoms per se, the present findings suggest that unaffected individuals can experience increases in psychological symptoms in the aftermath of a moderately negative public event and that the experience of PTSD-related symptoms might be a possibility in more severe negative public events. This is likely to occur through the reactivation of memories of past experienced events. Our study provides some support to a more universal recognition of the impact of public events or stories about others' experiences that is not limited to close others or to violent actions or accidents, as implied by the DSM-5. One key aspect in this issue is to consider how memories of public events or stories interact with people's memory networks of other personal events they have experienced and encoded. Public events therefore appear to alter mental health through the

reactivation of those past personal events that are associated in some way with these public events. Media coverage might have similar effects on mental health by recruiting memories of past personally experienced events.

5.1 | Floods-related memories and their networked memories

The way floods-affected and unaffected individuals remembered a significant event related to the floods in terms of need satisfaction versus need thwarting was associated with well-being during the floods and predicted an increase in well-being over two months. Need satisfaction in the main flood-related memory was only marginally negatively associated with symptoms during the floods and did not predict changes in symptoms over time. However, the way people integrated those significant flood-related memories into broader memory networks mattered for both well-being and symptoms. Need satisfaction versus need thwarting in the networked memories related to the flood memory was significantly associated with both well-being and symptoms during the floods and predicted increases in well-being and decreases in symptoms approximately two months following the floods. Thus, while the way individuals encode negative personal or public events in terms of need satisfaction matters for their well-being, the other personal memories that such events trigger within the memory system and which serve to organize and integrate the novel personal or public event can further affect both well-being and psychological symptoms.

Furthermore, whether it was personal or public floods-memories which were incorporated into the memory system, networked memories had the same effect on well-being and mental health. Recently, Pillemer and colleagues (2015) suggested that existing definitions of episodic autobiographical memories should also include mental representations of specific events that happened to other people. The present findings provide further support to this position and extend it by showing that either personal or public event memories can impact well-being and that memories of those public events are organized in memory networks just like other personal memories (Demblon & D'Argembeau, 2016). Moreover, those networked memories can further influence well-being and mental health symptoms, independently of how the personal or public floods-related memory was encoded.

An alternative explanation is that the way people report having experienced episodes of their lives in terms of need satisfaction or need thwarting might act as a proxy for a general personality variable. We believe this explanation is unlikely because research has shown that need satisfaction in memory networks predict important life outcomes even after controlling for high-level personality variables such as the Big Five traits (Philippe et al., 2012), characteristic adaptations such as motivation (Philippe, Koestner, Beaulieu-Pelletier, & Lecours, 2011; Philippe, Lopes, Houlfort, & Fernet, 2019), intentions (Philippe et al., 2013), or general perceptions of need satisfaction in life (Philippe & Bernard-Desrosiers, 2017; Philippe, Koestner, Beaulieu-Pelletier, et al., 2011; Philippe et al., 2012). Moreover, the independence of the main memory and networked memories in the prediction of outcomes provides further evidence that these are not influenced by a broader personality-level variable.

5.2 | Limitations

The present research was limited in a number of ways. First, the participants recruited for the present study had only experienced moderate consequences due to the floods. It remains unknown, therefore, whether the effect of memory networks would be different if the affected participants had experienced more dire consequences. The interpretation of the present data should therefore be limited to the effect of a natural disaster with moderate personal consequences. Second, affected participants were more likely to drop out of the prospective study than nonaffected ones. Moreover, those who had experienced the floods with greater severity were more likely to drop out. It remains possible that the results could have been different if those participants had fully completed the two waves of this study (although missing data analyses revealed that it did not affect the results). Nevertheless, the null effect of the interaction between need satisfaction in memory networks and the floods-affected versus nonaffected variable should be interpreted with caution. It is indeed a possibility that memory networks could have had an even larger effect on mental health over time for affected versus unaffected participants in a situation of no dropouts or in a sample including more participants who had undergone severe damage due to the floods. But, the reverse result (lesser effect) would be quite surprising. Future research will be needed to replicate the present findings within a public event resulting in more serious consequences. Finally, we only used a short subscale as a marker of eudemonic well-being (self-acceptance). Future research could use a more extensive scale to examine how personal and public events can specifically alter eudemonic well-being over time.

In sum, the present research shows that memories for public events can affect people's mental health to the same extent as memories of personal experiences of these public events. Directly exposed individuals typically showed higher levels of symptoms on average than those only exposed to media coverage and conversations. However, when the integration of those personal or public event memories within need satisfying or need thwarting networks

was examined, important individual differences emerged, explaining a certain amount of variance in mental health in both affected and unaffected individuals. It appears, therefore, that some individuals may thrive or decrease in mental health following public events and that some of the operating mechanisms are the same as for personally experienced events.

CONFLICT OF INTERESTS

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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ENDNOTES

[1] However, DSM-5 has restricted indirect exposure to experiences affecting close relatives or friends and experiences that are violent or accidental, such as a friend's suicide or assault.

[2] Other subscales of the Psychological Well-Being scale (mastery, autonomy, and relationship) have been excluded due to their conceptual overlap with the three needs of Self-Determination Theory (e.g., Philippe et al., 2011). Those of growth and purpose have also been excluded due to their low reliabilities in general population samples (Clarke, Marshall, Ryff, & Wheaton, 2001). Based on the exploratory factor analysis, hedonic well-being and the self-acceptance subscale loaded on a single factor and were therefore combined. A short scale assessing alcohol consumption was also used in the study, but it was not analyzed because it was found to be too stable over time.

[3] Affected participants were not more likely to describe other natural disaster events as networked memories than the unaffected. Moreover, describing networked memories related to natural disasters, or not, was not related to mental health and did not interact with need satisfaction in networked memories in predicting mental health. Therefore, this variable will not be further analyzed in the present research.

[4] Researchers sometimes wonder about the statistical technique of using a difference score and controlling for the Time 1 score instead of using the full score of the Time 2 variable as dependent variable and controlling for the Time 1 score. The former is mathematically equivalent to the latter with the exception that the model R^2 of the former will reflect the variance of change that occurred between Times 1 and 2 rather than the full variance of the score at Time 2 of which, about 60%–70% is predicted by the Time 1 score. The end result is that the t test testing the statistical significance of the beta coefficient of each independent variable is exactly the same using both methods, but the size of the beta coefficients and model R^2 reflect the weight of each variable in predicting the change that occurred between Times 1 and 2 on the dependent variable.

[5] The same regression analyses were conducted again, this time using the judges' flood severity score instead of the dichotomous variable affected/unaffected. Results were virtually the same using this continuum scoring method. Results were also analyzed using Full Information Maximum Likelihood to account for missing data. Results remained also the same.

REFERENCES

Akhtar, S., Justice, L. V., Morrison, C. M., & Conway, M. A. (2018). Fictional first memories. *Psychological Science*, *29*, 1612–1619. https://doi.org/10.1177/0956797618778831

Akhtar-Danesh, N., & Landeen, J. (2007). Relation between depression and sociodemographic factors. *International Journal of Mental Health Systems*, *1*, 1–9. https://doi.org/10.1186/1752-4458-1-4

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: The Beck Anxiety Inventory. *Journal of Consulting and Clinical Psychology*, *56*, 893–897.

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., … Koenen, K. C. (2015). The epidemiology of traumatic event exposure worldwide: Results from the World Mental Health Survey Consortium. *Psychological Medicine*, *46*, 327–343. https://doi.org/10.1017/s0033291715001981

Bohannon III, J. N. (1988). Flashbulb memories for the space shuttle disaster: A tale of two theories. *Cognition*, *29*, 179–196. https://doi.org/10.1016/0010-0277(88)90036-4

Bridge, J. A., Greenhouse, J. B., Ruch, D., Stevens, J., Ackerman, J., Sheftall, A. H., … Campo, J. V. (in press). Association between the release of netflix's 13 reasons why and suicide rates in the United States: An interrupted times series analysis. *Journal of the American Academy of Child and Adolescent Psychiatry*. https://doi.org/10.1016/j.jaac.2019.04.020

Brown, N. R., & Schopflocher, D. (1998). Event cueing, event clusters, and the temporal distribution of autobiographical memories. *Applied Cognitive Psychology*. https://doi.org/10.1002/(SICI)1099-0720(199808)12:4<305:AID-ACP569>3.0.CO;2-5

Burt, C., Kemp, S., & Conway, M. (2003). Themes, events, and episodes in autobiographical memory. *Memory & Cognition*, *31*, 317–325. https://doi.org/10.3758/BF03194390

Cairns, E., & Lewis, C. A. (1999). Collective memories, political violence and mental health in Northern Ireland. *British Journal of Psychology*, *90*, 25–33. https://doi.org/10.1348/000712699161242

Caspi, A., Houts, R. M., Belsky, D. W., Goldman-Mellor, S. J., Harrington, H. L., Israel, S., … Moffitt, T. E. (2014). The p factor. *Psychological Science*, *2*, 119–137. https://doi.org/10.1177/2167702613497473

Cheng, A. T. A., Hawton, K., Lee, C. T. C., & Chen, T. H. H. (2007). The influence of media reporting of the suicide of a celebrity on suicide rates: A population-based study. *International Journal of Epidemiology*, *36*, 1229–1234. https://doi.org/10.1093/ije/dym196

Clarke, P., Marshall, V., Ryff, C., & Wheaton, B. (2001). Measuring psychological well-being in the Canadian Study of Health and Aging.

International Psychogeriatrics, *13*, 79–90. https://doi.org/10.1017/S1041610202008013

Compton, S., Grace, H., Madgy, A., & Swor, R. A. (2009). Post-traumatic stress disorder symptomology associated with witnessing unsuccessful out-of-hospital cardiopulmonary resuscitation. *Academic Emergency Medicine*, *16*, 226–229. https://doi.org/10.1111/j.1553-2712.2008.00336.x

Conway, M., & Pleydell-Pearce, C. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review*, *107*, 261–288. https://doi.org/10.1037//0033-295X.107.2.261

Crane, C., Heron, J., Gunnell, D., Lewis, G., Evans, J., & Williams, J. M. G. (2016). Adolescent over-general memory, life events and mental health outcomes: Findings from a UK cohort study. *Memory*, *24*, 348–363. https://doi.org/10.1080/09658211.2015.1008014

Demblon, J., & D'Argembeau, A. (2016). Networks of prospective thoughts: The organisational role of emotion and its impact on well-being. *Cognition & Emotion*, *30*, 582–591. https://doi.org/10.1080/02699931.2015.1015967

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*, 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Fernandez, A., Black, J., Jones, M., Wilson, L., Salvador-Carulla, L., Astell-Burt, T., & Black, D. (2015). Flooding and mental health: A systematic mapping review. *PLoS ONE*, *10*, e0119929–e120020. https://doi.org/10.1371/journal.pone.0119929

Fredrickson, B., Tugade, M., Waugh, C., & Larkin, G. (2003). What good are positive emotions in crises? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology*, *84*, 365–376. https://doi.org/10.1037/0022-3514.84.2.365

Hirst, W., Phelps, E. A., Buckner, R. L., Budson, A. E., Cuc, A., Gabrieli, J. D. E., … Vaidya, C. J. (2009). Long-term memory for the terrorist attack of September 11: Flashbulb memories, event memories, and the factors that influence their retention. *Journal of Experimental Psychology-General*, *138*, 161–176. https://doi.org/10.1037/a0015527

Hodgins, H. S., & Knee, R. (2002). The integrating self and conscious experience. In E. L. Deci & R. M. Ryan (Eds.), *Handbook on self-determination research* (pp. 87–100). Rochester, NY: University of Rochester Press.

Houle, I., & Philippe, F. L. (2017). Need satisfaction in episodic memories impacts mood at retrieval and well-being over time. *Personality and Individual Differences*, *105*, 194–199. https://doi.org/10.1016/j.paid.2016.09.059

Houle, I., & Philippe, F. L. (2019). *Can the negative be positive? Or how emotion regulation and integration of negative memories can positively affect well-being*. Article submitted for publication.

Jenkins, S. R., & Baird, S. (2002). Secondary traumatic stress and vicarious trauma: A validational study. *Journal of Traumatic Stress*, *15*, 423–432. https://doi.org/10.1023/a:1020193526843

Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: A new depression diagnostic and severity measure. *Psychiatric Annals*, *32*, 509–515. https://doi.org/10.3928/0048-5713-20020901-06

Kvavilashvili, L., Mirani, J., Schlagman, S., & Kornbrot, D. E. (2004). Comparing flashbulb memories of September 11 and the death of Princess Diana: Effects of time delays and nationality. *Applied Cognitive Psychology*, *17*, 1017–1031. https://doi.org/10.1002/acp.983

Lau, R. (2017). IN PHOTOS: Flooding ravages municipalities across Quebec. *Global News Montreal*. Retrieved from https://globalnews.ca/news/3434281/in-photos-flooding-ravages-municipalities-across-quebec/

Lazarus, R. S. (1991). *Emotion and adaptation*. New York, NY: Oxford University Press.

Marzuk, P., Tardiff, K., & Leon, A. C. (1994). Increase in fatal suicidal poisonings and suffocations in the year Final Exit was published: A national study. *American Journal of Psychiatry*, *151*, 1813–1814.

Metcalfe, R., Powdthavee, N., & Dolan, P. (2011). Destruction and distress: Using a quasi-experiment to show the effects of the September 11 attacks on mental well-being in the United Kingdom. *Journal of Applied Biobehavioral Research*, *121*, F81–F103. https://doi.org/10.1111/j.1468-0297.2010.2416.x

Milyavskaya, M., Philippe, F. L., & Koestner, R. (2013). Psychological need satisfaction across levels of experience: Their organization and contribution to general well-being. *Journal of Research in Personality*, *47*, 41–51. https://doi.org/10.1016/j.jrp.2012.10.013

Naragon-Gainey, K., McMahon, T. P., & Chacko, T. P. (2017). The structure of common emotion regulation strategies: A meta-analytic examination. *Psychological Bulletin*, *143*, 384–427. https://doi.org/10.1037/bul0000093

Neisser, U. (1982). Snapshots or benchmarks? In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts* (pp. 43–48). San Francisco, CA: W. H. Freeman & Company.

Neisser, U. (1996). Remembering the earthquake: Direct experience vs. hearing the news. *Memory*, *4*, 337–358. https://doi.org/10.1080/096582196388898

Neria, Y., Nandi, A., & Galea, S. (2007). Post-traumatic stress disorder following disasters: A systematic review. *Psychological Medicine*, *38*, 498–514. https://doi.org/10.1017/S0033291707001353

Niederkrotenthaler, T., Stack, S., Till, B., Sinyor, M., Pirkis, J., Garcia, D., … Tran, U. S. (2019). Association of increased youth suicides in the United States with the Release of 13 Reasons Why. *JAMA Psychiatry*, *76*, 933–940. https://doi.org/10.1001/jamapsychiatry.2019.0922

Nolen-Hoeksema, S. (2012). Emotion regulation and psychopathology: The role of gender. *Annual Review of Clinical Psychology*, *8*, 161–187. https://doi.org/10.1146/annurev-clinpsy-032511-143109

North, C. S., & Pfefferbaum, B. (2011). The state of research on the mental health effects of terrorism. *Epidemiologia E Psichiatria Sociale*, *13*, 4–9. https://doi.org/10.1017/S1121189X00003171

Osman, A., Kopper, B., Barrios, F., Osman, J., & Wade, T. (1997). The Beck Anxiety Inventory: Reexamination of factor structure in psychometric properties. *Journal of Clinical Psychology*, *53*, 7–14.

Philippe, F. L., & Bernard-Desrosiers, L. (2017). The odyssey of episodic memories: Identifying the paths and processes through which they contribute to well-being. *Journal of Personality*, *85*, 518–529. https://doi.org/10.1111/jopy.12257

Philippe, F. L., Koestner, R., Beaulieu-Pelletier, G., & Lecours, S. (2011). The role of need satisfaction as a distinct and basic psychological component of autobiographical memories: A look at well-being. *Journal of Personality*, *79*, 905–938. https://doi.org/10.1111/j.1467-6494.2010.00710.x

Philippe, F. L., Koestner, R., Beaulieu-Pelletier, G., Lecours, S., & Lekes, N. (2012). The role of episodic memories in current and future well-being. *Personality and Social Psychology Bulletin*, *38*, 505–519. https://doi.org/10.1177/0146167211429805

Philippe, F. L., Koestner, R., Lecours, S., Beaulieu-Pelletier, G., & Bois, K. (2011). The role of autobiographical memory networks in the experience of negative emotions: How our remembered past elicits our current feelings. *Emotion*, *11*, 1279–1290. https://doi.org/10.1037/a0025848

Philippe, F. L., Koestner, R., & Lekes, N. (2013). On the directive function of episodic memories in people's lives: A look at romantic relationships. *Journal of Personality and Social Psychology*, *104*, 164–179. https://doi.org/10.1037/a0030384

Philippe, F. L., Lecours, S., & Beaulieu-Pelletier, G. (2009). Resilience and positive emotions: Examining the role of emotional memories. *Journal of Personality*, *77*, 139–175. https://doi.org/10.1111/j.1467-6494.2008.00541.x

Philippe, F. L., Lopes, M., Houlfort, N., & Fernet, C. (2019). Work-related episodic memories can increase or decrease motivation and psychological health at work. *Work & Stress*, *33*, 366–384. https://doi.org/10.1080/02678373.2019.15773111

Pillemer, D. (2003). Directive functions of autobiographical memory: The guiding power of the specific episode. *Memory*, *11*, 193–202. https://doi.org/10.1080/09658210244000360

Pillemer, D. B., Steiner, K. L., Kuwabara, K. J., Thomsen, D. K., & Svob, C. (2015). Vicarious memories. *Consciousness and Cognition*, *36*, 233–245. https://doi.org/10.1016/j.concog.2015.06.010

Propper, R. E., Stickgold, R., Keeley, R., & Christman, S. D. (2007). Is television traumatic? Dreams, stress, and media exposure in the aftermath of September 11, 2001. *Psychological Science*, *18*, 334–340. https://doi.org/10.1111/j.1467-9280.2007.01900.x

Roth, G., Assor, A., Niemiec, C. P., Ryan, R. M., & Deci, E. L. (2009). The emotional and academic consequences of parental conditional regard: Comparing conditional positive regard, conditional negative regard, and autonomy support as parenting practices. *Developmental Psychology*, *45*, 1119–1142. https://doi.org/10.1037/a0015272

Roth, G., Benita, M., Amrani, C., Shachar, B.-H., Asoulin, H., Moed, A., … Kanat-Maymon, Y. (2014). Integration of negative emotional experience versus suppression: Addressing the question of adaptive functioning. *Emotion*, *14*, 908–919. https://doi.org/10.1037/a0037051

Roth, G., Shahar, B.-H., Zohar-Shefer, Y., Benita, M., Moed, A., Bibi, U., … Ryan, R. M. (2018). Benefits of emotional integration and costs of emotional distancing. *Journal of Personality*, *86*, 919–934. https://doi.org/10.1111/jopy.12366

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York, NY: Guilford Publications.

Ryff, C., & Keyes, C. (1995). THE structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*, 719–727. https://doi.org/10.1037/0022-3514.69.4.719

Schat, A. C. H., Kelloway, E. K., & Desmarais, S. (2005). The Physical Health Questionnaire (PHQ): Construct validation of a self-report scale of somatic symptoms. *Journal of Occupational Health Psychology*, *10*, 363–381. https://doi.org/10.1037/1076-8998.10.4.363

Singer, J. A., & Salovey, P. (1993). *The Remembered self: Emotion and memory in personality*. New York, NY: The Free Press.

Stack, S. (2005). Suicide in the media: A quantitative review of studies based on non-fictional stories. *Suicide & Life-Threatening Behavior*, *35*, 121–133. https://doi.org/10.1521/suli.35.2.121.62877

Stanke, C., Kerac, M., Prudhomme, C., Medlock, J., & Murray, V. (2013). Health effects of drought: A systematic review of the evidence. *PLoS Currents Disasters*, *5*. https://doi.org/10.1371/currents.dis.7a2cee9e980f91ad7697b570bcc4b004

Troy, A. S., & Mauss, I. B. (2011). Resilience in the face of stress: Emotion regulation as a protective factor. In S. M. Southwick, B. T. Litz, D. Charney, & M. J. Friedman (Eds.), *Resilience and mental health: Challenges across the lifespan* (pp. 30–44). Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511994791.004

Vasterman, P., Yzermans, C. J., & Dirkzwager, A. J. E. (2005). The role of the media and media hypes in the aftermath of disasters. *Epidemiologic Reviews*, *27*, 107–114. https://doi.org/10.1093/epirev/mxi002

Verger, P., Rotily, M., Hunault, C., Brenot, J., Baruffol, E., & Bard, D. (2003). Assessment of exposure to a flood disaster in a mental-health study. *Journal of Exposure Science & Environmental Epidemiology*, *13*, 436–442. https://doi.org/10.1038/sj.jea.7500290

World Health Organization. (2004). *Promoting mental health: Concepts, emerging evidence, practice* (Summary Report). Geneva, Switzerland: Author.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.