

**HOW MEMORIES OF PAST DISTURBING EVENTS  
PERSIST AND CHANGE OVER TIME**

by

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## Abstract

Stability and change in personal memories of past disturbing experiences were assessed. University students wrote memory narratives about the same upsetting past events on two occasions separated by a three-year delay. While recalling their memories both the first and the second times, the participants also indicated their levels of depression, self-esteem, and mood, and provided appraisals of the experiences they described. By comparing the second memory to the first, I examined the information in the original memories that was the same, new, contradicted, or omitted in subsequent memories. I investigated the stability and transformations over time of the gist of the memory, of contents of the memory in general, and of specific memory content including affect and facts. Participants were moderately consistent in their recall over time. They introduced a considerable proportion of new information to their recollections and omitted a sizeable amount of old content. However, they rarely contradicted their original accounts. I further evaluated how memory stability and change were related to participants': (a) subjective well-being (levels of depression, self-esteem, and positive and negative mood); (b) appraisals of the events (including degree of resolution regarding the event, event significance and severity, negative views of the events, and changed thought and feelings about the event); (c) age and gender; and (d) memory vividness confidence. The patterns of results suggested that the subjective well-being (depression, self-esteem, and mood) when participants initially recalled their memories was predictive of later memory stability with some mood-congruent effects. People's current appraisals of the disturbing personal events were relatively unproductive of memory consistency compared to people's well-being.

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## Dedication

This project is dedicated to all the participants who so generously shared their memories of difficult times.

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## Introduction

How stable are personal negative memories over time? Think for a moment of a past disturbing personal experience. Likely, several come to mind as negative life events are rather memorable. What parts of the experience come to mind – your past feelings and reactions to the experience, details of the event, and/or a general essence of what happened? How consistent is the memory you just generated with previous reminiscing you have done about this same topic? Furthermore, what accounts for your memory remaining the same or its changing?

Some theorists suggest that emotionally charged and personally significant experiences produce durable replicas in one's recollections over time (Brown & Kulik, 1977; LeDoux, 1992; Terr, 1988, 1994; Zajonc, 1980). That is, autobiographical memories are believed to represent life events as those events happened; there is little change in memories with either the passage of time and/or the accumulation of different experiences (Tulving, 1972). In contrast, reconstructionists suggest that each time a memory is recalled it is reconstructed; therefore, your recollection would be unstable and prone to distortions and transformations over time (Bartlett, 1932; Barclay, 1986; Brewer 1996). For instance, inconsistencies or distortion could be incorporated into your memories if relevant attitudes about the event and/or about yourself have changed over time (Ross, 1989, 1997). Perhaps a reconciliation of the reproductive and reconstructive views could explain the fate of memories repeated over time. Bahrick (1998) suggests that both replicative and reconstructive processes are jointly involved in the remembering of autobiographical memories. The two processes could be complementary such that reconstruction is invoked when replication has failed or when episodic content is not accessible.

Adding complications to this picture, some authors propose that memories for emotional or traumatic events differ fundamentally from memories for unemotional events. Traumatic memories are thought to be preserved in memory more accurately and in greater detail than memories of ordinary events, and to be subject to less decay and distortion over time (Terr, 1981, 1988, 1994; van der Kolk 1994). For instance, Terr (1988) described children's recollections of past traumatic events

as (visual) memories ‘burned-in’ the children’s minds forever. Indeed, Brown and Kulik (1997) proposed that receiving news of novel and shocking national events activated a special ‘now print’ mechanism in the brain that preserves in memory whatever happened at the moment when people learn of shocking news.

Numerous studies employing a variety of methods that emotional events, both private and public, are retained longer in memory and in more detail than ordinary, or unremarkable experiences (e.g., Bohannaon, 1990; Brown and Kulik, 1977; Christianson & Loftus, 1990; Heuer & Reisberg, 1990; Rubin & Kozin, 1984, Terr, 1981, 1988, 1994; Wagenaar & Groeneweg, 1990; and Yuille & Cutshall, 1986; see also Christianson, 1992). Clinical work has provided evidence for the persistence of memory for emotionally traumatic personal events. Terr (1983) studied 25 child victims (age 8 to 14) of a group kidnapping. The children were kidnapped at gun point and then buried underground for 16 hours before escaping. Based on her observations, Terr suggested that the children remembered the event with clarity and with fullness one year and five years after their kidnapping: “their ability to give complete remembrances of the events was uncanny” (Terr, 1988, p. 96). High concordance in traumatic memories over time has been found even with very long intervals between subsequent recollections. Wagenaar and Groeneweg (1990) compared testimonies made between 1943 and 1947 by 78 former concentration camp prisoners to their testimonies made almost 40 years later: the authors found remarkable consistency between the 2 accounts despite some discrepancies in the repeated descriptions.

Studies exploring the memories of witnesses and/or victims to crimes also suggest that personally traumatic or negative events are well preserved in memory (Christianson & Huebinette, 1993; Yuille & Cutshall, 1986). For instance, Yuille and Cutshall (1986) interviewed 13 witnesses to a shooting in which one person was killed. Witnesses were interviewed soon after the crime and then again 5 months later. A comparison of the two accounts showed a high degree of consistency in recall over the 5 month interval; there was very little change in the eye-witnesses’ accounts. The participants’ memories of the shooting were detailed, accurate, and persistent, even with reasonably

strict scoring criteria and a 5-month delay. Participants repeated 83 % of their details of the actions, 76 % of their descriptions of the people, and 90 % of their descriptions of the objects involved in their original renderings of the event. The authors suggested that the lack of memory loss over time was due in part to the saliency, personal consequentiality, and meaningfulness of the event (factors sometimes absent in experimental memory research).

Personal memories of public tragedies have been shown to be consistent over time. Brown and Kulik (1977) coined the term 'flashbulb' memories to describe the phenomenon of people often reporting very vivid memories for the emotionally shocking news of a tragic public event and the circumstances under which they learned of the unpleasant news. Aspects of these public emotional and significant events seem vividly retained and fixed in memory. Despite the wide variety of methods used by these different researchers, their findings indicate that memories of highly surprising, emotional, and nationally important happenings show considerable stability over time with regard to the central features of the tragic event and the circumstances under which people heard of the news (Bohannon & Symons, 1992; Brown & Kulik, 1977; Christianson & Safer, 1996; McCloskey, Wible, & Cohen, 1988; Pillemer, 1984).

In particular, 'flashbulb' memories are thought to contain a durable record of features of receiving surprising, consequential, and important news. Where, when, from whom, how and what people learned of such shocking news are referred to as canonical features of flashbulb memories. For instance, Christianson (1989) compared 40 adults' memories for the circumstances under which they learned of the assassination of their Swedish prime minister to memories of an unremarkable event, their most vivid memory from the past Saturday. He probed participants' recollections for canonical aspects of receiving the news (time, place, activity, informant, other persons present, clothes and first thought) at six weeks and one year following the assassination. Even though the accuracy of the participants' memories declined after one year, their memories of learning of the assassination were better retained than their memories of the mundane event. Six weeks after the assassination the participants provided information to answer 90 % of the questions about hearing of

the assassination and 89 % of the questions regarding the previous (mundane) Saturday. One year after the assassination, the participants recalled 80 % of their original reception information regarding the assassination. In contrast, the respondents provided only 22 % of the information they gave a year earlier regarding the ordinary Saturday.

Are memories of public events similar to memories of personal experiences? When Rubin and Kozin (1984) asked 58 participants to record their three clearest and most vivid memories from their past and to characterize the memories on a number of dimensions, 98 % (170 of the 174) of resulting memories were of personal rather than newsworthy past events. These vivid memories were accompanied by high participant ratings of importance, consequentiality, and surprise, criteria used to define 'flashbulb' events. Hence, the authors question the theoretical difference between 'flashbulb' memories and personal memories in general. They present the case that 'flashbulb' memories are a subset of people's most vivid personal memories as both types of memory share elements of importance, consequence, and surprise. Brewer (1992) similarly contends that 'flashbulb' memories are a subset of a broader set of recollections of particular experiences from someone's past, despite some differences in the events being remembered. He concludes that "the description of flashbulb memories is essentially identical to that of ordinary personal memory" (p. 302).

In contrast to those researchers who maintain that personal memories, especially of emotional and disturbing events, are indelible and permanent, several other theorists suggest that memories are subject to deterioration, flaws, distortion, and reconstruction. Ross (1997) suggested that while repeated memories for experiences may be similar, precise copies are unlikely due to three reasons. One is unlikely to be able to pay attention to all particulars of a situation when it is occurring. People do not move all the information remembered in short-term memory into long-term recall. Finally, people use existing knowledge to understand and interpret events. Hence, reconstruction is likely a process many employ while remembering. Barclay (1986) contended that "self-knowledge drives the reconstruction of plausible, but often inaccurate elaborations of previous experiences" (p. 98); hence, memories of events are likely transformed, distorted and/or forgotten over time, often in the interest

of changing and current self-beliefs. One's current attitudes and beliefs could influence recollection; subsequent recollections would contain modifications of past memories that would bring the past into accord with current self-perceptions (Ross, 1997; 1989). Another reconstructive approach suggests that memories are assembled using elements of a hierarchical organization involving knowledge of lifetime periods and transitions, as well as general and specific event knowledge (Conway, 1992). Since personal knowledge and themes are dynamic and changing, personal memories are modified or vary as self themes grow and change.

In his review of memory research, Schacter (1996) concluded "that memories of emotionally traumatic events are generally persistent and often impressively accurate, but also that they are sometimes subject to decay and distortion" (p. 209). While compelling memory stability and durability has been found for emotional, shocking, significant and traumatic events, these memories are not completely free of distortion and change. In her work with the kidnapped children, Terr (1983, 1988) also documented some striking errors and distortions in the children's memories over time. The central core of the children's memories of the kidnapping typically persisted, while noticeable changes in specific details occurred as well. In their comparison over time of concentration camp survivors' memories, Wagenaar and Groeneweg (1990) also found some forgetting and distortion of specific events and facts. The survivors retained memories of the general features of the camp and the gist of what went on. In contrast, survivors forgot specific facts and details that they had provided in their original accounts forty years earlier, such as the exact date of their entry into the camp. Similarly, Neisser and Harsch (1992) found errors as well as accuracy in people's 'flashbulb' memories of a national tragedy, the Challenger explosion. The researchers gathered people's initial accounts of hearing of the explosion within 24 hours of the event. People's accounts given 3 years later varied considerably from their earlier renditions. Twenty-five percent of participants' recall was completely erroneous, while only 7 % of the 44 participants were completely accurate.

What could account for such memory change? Schacter (1996) suggested that an ‘emotional filter’ may influence recall of tragic events; people may recall traumatic events through the filter of their emotional state during retrieval. For instance, Niles, Newman, Erwin, Fisher, Kaloupek and Keane (1999) proposed that changes over time in retrospective reports of adults who experienced combat trauma is not uncommon. The authors point out that the stability of combat recall seems related to the degree of Post Traumatic Stress Disorder (PTSD) symptomatology present at the time of memory retrieval. They suggest that a decrease over time in veterans’ reports of trauma exposure is related to the reduction of psychological distress while an increase over time is related to the presence of symptoms. For instance, although the majority of 38 veterans who described salient traumatic military events were consistent in their reports given four to ten years apart, marked fluctuations were also evident for a subset of the veterans who were experiencing more symptoms of PTSD at the time of recall relative to the other veterans. School personnel’s’ recall of personal threat during a school shooting was also associated with subsequent PTSD symptoms (Schwarz, Kowalski & McNally, 1993). Five months and then again eighteen months after the incident, school staff reported their whereabouts and reactions during the day-long school shooting. Their later recall of personal threat experienced during the tragedy was related to their current emotional state at the time of retrieval. Relative to staff whose PTSD symptom’s worsened over time, those whose PTSD symptoms improved tended to remember the shooting as less threatening during the second interview. Conversely, those with increased symptomatology amplified the personal threat they felt during the incident.

Schacter (1996) also suggested that traumatic memories may be subject to another kind of “emotionally driven retrospective bias” (p. 206); people may reconstruct their memories of past traumatic experiences in ways that address their emotional needs at the time of retrieval. For instance, in his discussion of memory distortions in children’s memories of a group kidnapping and of a sniper attack at an elementary school, Schacter proposes that the children’s later recollections were

self-protective; memories could change over time in order to reduce anxiety and to increase a sense of safety (Pynoos & Nader, 1989, as cited in Schacter, 1996; Terr, 1983, 1988).

Johnson and Multhaup (1992) proposed the Multiple Entry Modular (MEM) system as a theoretical architecture to organize a range of empirical findings and theoretical ideas about emotion and memory. Since memory serves an extraordinary scope of functions, the authors suggested an understanding of cognition, emotion, and memory as several subsystems, (subsumed in perceptual and reflective systems with supervisory and executive levels) working together in different combinations and degrees of flexibility. They indicated that “feelings are a blend of cognitive and autonomic activity and other bodily sensations. ” (Johnson and Multhaup, 1992, pg. 40). Similar emotions are theoretically associated with different subsystems. Hence, memories for similar emotions (for instance, fear of having been speechless at a party and the fear of seeing a fist coming towards you) are not exactly the same, as might be argued by a node (Bower, 1981) or network model of memory. Rather the MEM system suggests the possibility that various qualitative characteristics of memories (eg., perceptual qualities such as visual detail and spatial information, and appreciative qualities such as thoughts and feelings) all contribute to memory formation and retrieval in distinctive, and perhaps idiosyncratic, combinations. This model allows for the examination of memory in terms of perceptual and appreciative information, while also recognizing the likelihood that some flexible or variable relationship exists between the two types of information. Within this framework, perceptual and/or appreciative qualities could influence memories and memory consistency of disturbing life events.

“People are revisionist historians with respect to their personal memories” (Ross and McFarland, 1988, p. 310). Transformations in personal memories have been found to reflect cognitive appraisals and interpretations of events such that changes in memories agree with current knowledge, views, and appraisals when people retrieve their memories (Ross, 1989). This phenomenon has been documented in a variety of settings. To examine the effects of present pain intensity on memory for prior pain, Eich and colleagues (Eich, Reeves, Jaeger & Graff-Radford,

1985) reviewed the pain diaries of patients with histories of chronic headaches who were involved in a pain management program. The headache patients made hourly ratings of pain intensity on a 10-point scale throughout the day. At weekly treatment sessions, patients rated the level of pain they were experiencing at the moment, as well as the minimum, maximum and usual pain levels they experienced in the past week. Patients' recall of minimum, maximum and usual pain levels in the past week varied as a function of present (treatment session) pain level. Individuals experiencing low levels of present pain underestimated prior ratings, whereas those experiencing high levels overestimated earlier pain levels.

Conway and Ross (1984) found that students in a study skills program overestimated their improvement at the end of the course by exaggerating their poor skills prior to the course. After a three week study skills course, both the students in the group and students in a wait-list control group evaluated their current study skills, recalled ratings they made of their skills prior to the course beginning, and predicted their final grades for the semester. Relative to the wait-list control group who showed no biases in their recall, students who just completed the three week study-skills course tended to underestimate the study skills ratings they made prior to beginning the course (They also expected higher final grades. However, these beliefs were not validated: the study skills program did not affect academic grades). Relationship memories show retrospective biases as well. When recalling impressions of their dating partners made two months previously, participants whose impressions of their partner became more favorable over time recalled their initial evaluations as more favorable than they actually were; those participants whose impressions became less favorable recalled less favorable previous evaluations (McFarland and Ross, 1987).

Current views and appraisals also seem to influence people's memories of emotions. Levine (1997) investigated people's memories for their emotional reactions to Ross Perot's withdrawal, subsequent re-entry, and loss in the 1992 American presidential race. Levine found systematic distortions in people's recall of their past emotions about the withdrawal as a function of their current appraisals of Perot. After Perot withdrew from the presidential race in July 1992, Levine asked Perot

supporters to rate how surprised, sad, angry and hopeful they felt. Then, in November 1992, after Perot re-entered the race, the supporters were asked to recall their initial emotional reactions to Perot's withdrawal and whether they wished he had been elected. Relative to supporters whose loyalties changed when Perot withdrew, those people who remained devoted to Perot (those who planned to vote for Perot despite his withdrawal and wished he been elected) underestimated the intensity of their original anger and sadness, and overestimated their initial hopefulness when Perot withdrew from the race.

Why question memory at all? While memory stability is central to the theoretical debate about the reproductive or reconstructive nature of personal recollection, it is also important to determine the stability of people's personal memories and to identify factors possibly associated with memory stability for other reasons. Individuals often think about themselves and make personal decisions based on their memories of relevant past experiences. Sometimes these are life-changing experiences. Besides reinforcing personal identity, memories for past personal experiences give guidance, or act as "recipes" for how to handle current and future difficulties and circumstances. These life "recipes" inform us about how to go about something, what to move towards, or what to avoid (Cohen, 1989). Memories of past failures and successes can inform current and future functioning (Stein and Levine, 1987). Memories contribute to our personal belief systems by informing self-knowledge and stories throughout one's life span (McAdams, 1993; Pillemer, 1998). Memories serve other valuable functions as well. For example, in medical settings, people's accounts of past experiences with symptoms and pain are often relevant guides to further exploration. Mental health workers often base treatment and diagnosis on clients' self-reported past experiences. In legal settings, witnesses are often asked to repeat their observations and experiences over and over.

In recent years, understanding the nature of memories of emotional and disturbing past experiences has become quite important to discussions of past abuse, now part of a major heated social, legal, and scientific debate concerning recovered memory/false memory. "The 1990s brought a blossoming of reports of awakenings of previously repressed memories of childhood abuse"

(Loftus, 1993, p. 533). Loftus discussed a landmark case in the American courts in which a man was tried for a murder that occurred 20 years earlier. This man was accused and tried for murdering his daughter's childhood friend on the basis of his daughter's memory of witnessing the rape and murder. Her memory "surfaced" after having been repressed (inaccessible to the conscious mind) for 20 years. (Also see Terr 1994 for description and discussion of this case). Courts are seeing more and more cases in which an increased understanding of the stability of memories of past abuse or trauma would be valuable.

In their discussion of repression, suggestibility, and other issues involved in memory, Bowers and Farvolden (1996) urged therapists to become informed about the nature of memory and to consider this knowledge whenever childhood abuse is suspected throughout the course of treatment. Additional investigation into the natural variation of disturbing memories over time would be valuable knowledge. While memories of past disturbing events reported by the average adult may not be about the same types of events that reportedly bring about repression, an increased knowledge of how people remember, forget, and change their memories of disturbing life events provides some new and applicable understanding of the nature of memory. However, more knowledge about the stability and change over time of upsetting memories will not inform us about the accuracy or validity of people's reports of the original events. Repeated consistent reports over time seem convincing, nevertheless, they could still be inaccurate.

The persistence and change of memories for past disturbing experiences remains unresolved in past research. Previous investigations of memories of private and public tragedies report both high and low degrees of stability in repeated memories for past experiences. As we have seen earlier, theories favour both memory stability and inconsistency. Researchers have explored recollective consistency in terms of the contents of memory, but have more thoroughly studied public emotional events (e.g., 'flashbulb memories') than personal experiences. In particular, much 'flashbulb' memory research has focused on the consistency of canonical features of the circumstances in which people heard of the unpleasant news of a public tragedy (e.g., Christianson, 1989; Christianson &

Engelberg, 1999; Christianson & Safer, 1996). Many studies have targeted people's memories of personal emotion-laden and traumatic events; however, several of the studies focus on the durability of the memories over time without considering changes and transformations in the specific content of the memory. Few researchers have had the opportunity to study the natural remembering, forgetting, and changing involved in average people's memories of past upsetting personal events. Fewer studies still have been able to examine memory stability and change while concurrently evaluating participant well-being, individual differences, and appraisals. Finally, past investigators have also varied the degree to which they use open-ended, self-directed narrative recollections in their research. Rather, researchers often use the manageable methods of structured questions or evaluator-directed narratives. While these methods generate more easily coded data, they may also influence recollection by providing misleading structure. The practice of remembering within a self-directed narrative is less structured and less intrusive than more manageable methodology, but it is also more reflective of 'ecologically natural memory' (Neisser, 1982) or real-life recollection: people reminisce and share stories of themselves in an open manner all the time.

In hopes of improving our knowledge about the average person's recall for past disturbing experiences, I explored memory persistence and change over time in the present investigation. I studied memory stability within the context of self-directed memory narratives. Briefly, participants wrote about the same past disturbing life events on two occasions separated by a 3 year interval. During the second recall phase, I asked participants to recall the same event exactly the same way they wrote about it 3 years ago. At each of the 2 recall times, participants indicated their subjective well-being (positive and negative mood, and level of depression and self-esteem), and rendered appraisals and views about the historical experiences they reported. I proceeded to address the issue of memory stability and transformation over time by directly comparing the contents of the second written accounts to the initial memories. Furthermore, I examined the degree of memory stability of different types of information within the memories, including gist (essential features of the narrative memory), emotional content, and factual information. To the extent that memories, or elements of the

memories, were persistent and unstable, I explored potential predictors of memory stability and transformation. I mainly targeted participants' well-being (depression, self-esteem, and mood) and appraisals (event resolution, severity and significance, negative views of the events, and perceived change in thoughts and feelings toward the events). Participant age and gender, memory vividness and confidence, and event recency and objective event severity were also considered. Specifically, this study examined the following issues:

(1) What events are remembered as the past upsetting events that people previously described?

I examined participants' current report of exactly which upsetting events they had written about three years previously. Prior research has suggested both considerable stability and also inconsistency when people repeatedly recall personal memories. Indeed, there seems to be variation in which experiences are recalled when people are asked to relate their memories on more than one occasion. For instance, high school students who recalled their earliest memories on two occasions separated by 3 months, identified only 58 % of the same memories on both of those occasions (Kihlstrom and Harackiewicz, 1982). Likewise, when college students were asked to recall all the experiences they remembered up to their eighth birthday and then were unexpectedly retested five to six weeks later, they reported about 50 % new experiences during the second recall while only increasing the number of reported experiences by 9 % (Waldfoegel, 1948). Even when people are given direction about which experiences they previously recalled (e.g., past abuse experiences), recollection may still be limited. For instance, Williams (1994) found that 38 % of 129 women who had previously been interviewed about their abuse experiences did not recall the past sexual victimization that had been

documented 17 years earlier.<sup>1</sup> Based on results from prior research it was suspected that despite current participants knowing (a) when they recalled these memories previously (i.e., three years ago), and (b) the category of experiences (some of the most upsetting and disturbing past events of their lives), participants would correctly identify the experiences they previously wrote about with only moderate consistency.

(2) Does memory for personally significant and upsetting experiences persist?

While a number of studies comment on the persistence of memories over time for significant and upsetting personal and public events, few examine both stability and change, especially of the content of memory narratives over time. For instance, most 'flashbulb' memory research examines the persistence of recall by focusing on the canonical features of one's hearing about unpleasant news. Other studies of traumatic memories comment on memory persistence, but without as much thoroughness as the 'flashbulb' research. Very few studies have directly compared memory narratives given at different points in time.

Fivush and her colleagues have compared children's autobiographical recollections given at several different times and found that children demonstrate transformations and little consistency in their memories over time. In Fivush's work, preschool age children provided memory narratives orally during interviews. Weeks and years later authors chose distinctive events that had been discussed in previous interviews, like 'going to Sea World' or 'when you went to the circus', and asked the children to discuss those events again. (None of the re-recalled memories seemed to be of particularly disturbing experiences.) The narrative memories were parsed into complete thought

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<sup>1</sup> Note that conclusions one can draw from Williams' data are somewhat unclear. Some of the participants were quite young when they experienced the abuse; at the time of the initial interview participants varied from 10 months to 12 years of age. They may have forgotten the incident and hospitalization as a function of normal childhood forgetting. In addition, these women experienced various forms of abuse as children and some were hospitalized for abuse on other occasions by the time they were re-interviewed 17 years later. Others may have chosen not to disclose their abuse histories due to embarrassment. Each of these factors could possibly explain some of the forgetting documented by Williams. See Schacter (1996, chapter 9) and Bowers and Farvolden (1996) for further discussion of these issues.

units: the thought units in the later narratives were compared to the original interviews and categorized as either new or old information. Young children (30 month olds) recalling the same past events on two occasions separated by 6 weeks reported only 35 % of the same information at the two times: approximately 65 % of the second accounts of the events was new information (Fivush, Hamond, Harsch, Singer and Wolf, 1991). Preschool-aged children participating in a longitudinal study of autobiographical memory and narrative development were similarly inconsistent when reminiscing about past events on four separate occasions (Fivush, 1996). At age 40, 46, 58 and 70 months these children repeated between 12 % and 27 % ( $M=20\%$ ) of narrative content from recall time to recall time. The majority of content was new information not presented in their original interview. In a follow-up to Fivush's (1996) work, Fivush and Schwarzmueller (1998) had these same children recall their experiences once again when the children were 8 years old. (Analyses involved events that were discussed during only one of the previous interviews). Again, most of what the children mentioned was different from what was reported at earlier interviews (between 70 % and 87 % of all information was new).

Interestingly, the children's mothers suggested that while the children retrieved mainly new information relative to the original account, the children were still recalling accurate information: very little of the new information was contradictory. Hence, the authors suggest that children's memories from one occasion to the next may have involved different aspects of the memory of the original event. However, the children could also have been responding to conversational norms when adding new aspects to their stories during later interviews, or they may have deliberately focused on different aspects of the memories so as not to bore the listener. Furthermore, the mothers' later memories could have been flawed or decayed. Because the interval between recollections was confounded with children's development, other factors may explain the children relating new information. For example, social, cognitive and oral language gains could have altered what and how information was delivered over time as well as what the children thought was interesting about the memory.

Adults have shown moderate stability in their narrative recall from one occasion to the next of a personally salient event, even for very early memories. Crawley and Eacott (1999) had adults complete a questionnaire regarding the birth of their younger sibling, which they would have experienced between the ages of 2 and 3 years old. The questionnaire contained 33 questions asking about circumstances of the birth event; for example, questions asked who told that their mother was having a baby, and what they saw and did if they had visited their mother in the hospital. One year later, participants completed the same questionnaire. Similar to Fivush's approach, the authors coded the second set of answers as either the same, new, or different when compared to answers given to the original questionnaire. On average, the participants answered 65 % of the questions consistently over time and they did not produce significantly more information at the second recall. Twenty-two percent of the information was new and 13 % was different.<sup>2</sup>

Crawley and Eacott used a questionnaire rather than an open-ended approach to sample people's memories about a common past experience. The questionnaire included a comprehensive set of questions about one common salient event. This comprehensiveness allowed the authors to confidently comment on how much information people repeated and changed in later memories. However, the questionnaire structured and directed the participants' recall, a procedure that may have influenced the degree of consistency and change found in the memories. If participants were asked to recall the birth without the assistance of the structured questions, the resulting percentages of repeated, new, and different information may have been lower/higher than their findings.

Anderson, Cohen and Taylor (2000; experiment 1) also found moderate stability in the repeated memories of young adults. Participants wrote about both an often-recalled memory and an infrequently-recalled memory. Participants selected their topics; any topic was acceptable assuming

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<sup>2</sup> In addition, memory stability was related to the participant's age at the time of her/his sibling's birth. Relative to older participants, those who were younger at the time of their sibling's birth produced less stable answers over time. However, for the purpose of this investigation I report the results as collapsed over the two groups. (The authors' analyses showed no significant differences between the two groups for same, omitted and different information).

the frequency of recall was accounted for. Two months later, the authors unexpectedly asked the participants to reproduce the same memory; the participants were given titles to serve as reminders of their original memories. The authors pointed out that stability can be measured either as a function of the first or the second memory; information appearing in both memories would be considered stable information. However, new information appears only in the second memory and omitted material is provided only in the first memory. (The authors did not code for different information). In their procedure, facts from the original memory were identified and their presence coded in the second memory. Participants reproduced moderately stable memories over the 2 month interval; on average, they repeated 46 % of the material from the original version of the memory in the second rendition given 2 month later. Hence, new information constituted 54 % of those subsequent memories. Also, when the authors considered only the facts from the first memory, the participants omitted 42 % of their original recollections.

The literature reviewed earlier, as well as investigations using narrative approaches to memory collection, suggest that personal memories persist and also change over time. Some evidence suggests that memories of emotional events may be more stable than other personal memories; however, no studies have addressed the persistence and change of disturbing personal memories using a narrative approach. Nor has research sorted the content of repeated recollections and investigated the stability and transformations of different kinds of information within the same memory (see Koriat, Goldsmith, & Pansky, 2000). The present study builds on previous research by examining individual differences in regard to memory consistency and change, in particular to disturbing memories of clinical significance. I provide a very detailed analysis of the contents of participants' disturbing memories and investigate what aspects of the recollections persist and change.

(3) How do the contents of memories persist or change over time?

“It is well known that subjects' memories often turn out to be partly right and partly wrong”

(Christianson and Engelberg, 1999, p. 474). Some elements of personally significant memories may

remain stable over time whereas other aspects may be more vulnerable to transformation. In the present study, I investigated the narrative content of repeated memories. I examined the gist, affective content, and factual subject matter in memories in terms of repeated (same), added (new), omitted, and contradicted information over time.

**(i) Gist:** When Neisser (1981) examined John Dean's memory for the Watergate incident (via courtroom transcripts), he found that despite Dean's often misremembering even the basic content of conversations and his lack of verbatim recall, his testimony was an accurate portrayal of the theme of the conversations about which he was testifying. Fivush and colleagues came to a similar conclusion while studying children's narrative recollections. I proposed that participants in the present study would similarly remain faithful to the gist or essence of their original versions of past memories of upsetting experiences, while perhaps not relating all the specific content in the exact way they had previously (Howe, 1998b; Neisser, 1981).

**(ii) Affect:** In the present investigation, I separated affective content from the factual information in personal disturbing memories. I further categorized affect as positive, negative, and neutral affective tone. In the majority of research about emotional memory, people are asked to recall their original emotional reaction to a shocking event or the intensity of their previous positive or negative emotional states (e.g., Christianson, 1999; Levine 1997; Schrader, Davis, Stefanovic, & Christie, 1990; Thomas & Diener, 1990). For example, Christianson and Engelberg (1999) asked participants to recall their personal reactions and circumstances immediately after, and then 14 months following, a public tragedy (the sinking of the Baltic MS Estonia ferry and subsequent death of 900 passengers). Participants rated their emotional responses to the news and answered questions about the how, when, where, with whom, and what they were doing when they had learned about the sinking. Respondents recalled the degree of their original upset, surprise, uneasiness, worry and anger moderately well; correlations over time varied from 0.31 to 0.59.

As reviewed earlier, Levine (1997) found stability, as well as inconsistency (both overestimating and underestimating) when participants recalled initial emotional intensity in

subsequent recall. The majority of participants gave consistent reports regarding the types and intensity of emotions they experienced 4 months earlier when Perot withdrew from the presidential race. However, further analyses also suggested that recollections were substantially biased by participants' current views. Forty percent of the participants recalled the intensity of previous negative emotion consistently across the two time periods. The remaining 60 %, who were inconsistent, either underestimated or overestimated the intensity of their initial emotional reactions as a function of current appraisals.

While the stability of the intensity of emotional reactions has been researched in the past, virtually no past studies have examined the stability of the affective content of memories. Frijda (1988) suggests that emotions wax and wane over time according to rules; one rule implies that "emotions are changed when events are viewed differently" (p. 350). This rule suggests that the affective content in memories may change as a function of views about the remembered event changing over time. However, Frijda's rules also state that emotions diminish with time, suggesting that affective content in memories may be subject to decay or forgetting. Walker, Vogl and Thompson (1997) found that people's judgements of an event's pleasantness and unpleasantness became less extreme over time and that unpleasant emotion memories faded more rapidly than pleasant ones. Numerous studies suggest that central details of emotional events are better retained in memory than peripheral details; central details of emotional events are also less susceptible to forgetting compared to details of ordinary events (Burke, Heuer, & Reisberg, 1992; Christianson, 1992; Heuer & Reisberg, 1990). Affective information could be central in one's memory of negative life events and, therefore, would remain stable over time. Exact expectations about the stability and change of affective content in memories are unclear from previous research and theory, so the fate of the emotional content found in disturbing memories was explored.

(iii) Factual Information: Previous memory research does not routinely examine the factual narrative content of memories. However, most 'flashbulb' memory research suggests that people retain information regarding the canonical aspects of their hearing of shocking and unpleasant news.

For instance, participants repeated between 47 % and 69 % (when strict and lenient criteria for identifying consistency were applied, respectively) of their original answers to questions about their circumstances at the time of learning of a ferry accident causing the death of 900 people (Christianson & Engelberg, 1999). As discussed previously, Crawley and Eacott (1999) investigated the stability of people's memory for the birth of their younger sibling with a comprehensive questionnaire. Many of the questions asked about factual information and the results demonstrated moderate memory stability over time. Participants answered 65 % of the questions the same way one year after originally completing the questionnaire. In addition, research has shown that relative to peripheral details, central details of emotional events endure longer in memory over time. In the present study, I distinguished between factual and affective content; each category of information likely contained both central and peripheral details of the disturbing memories. Again, the specific expectations about the stability and change of factual content in disturbing memories cannot be derived from previous work and was examined in this study.

(4) How can we understand the resulting patterns of memory stability and change of the contents of disturbing memories?

In the present investigation, I went beyond examining the stability and change over time of disturbing memories and considered factors that may predict memory stability. My primary objective was to examine and contrast the predictive contributions of subjective well-being and participants' appraisals of the recalled events. In addition, I reviewed other qualities of the participants, the memories, and the recalled events, that may predict memory persistence and change over time. In particular, I considered:

(i) Mood: Numerous past studies have shown that mood at the time of assessment is a predictor of memory (Blaney, 1986; Bower, 1981, 1992; Hasher, Rose, Zacks, Sanft & Doren, 1985). Bower (1981, 1992) suggested that mood influences learning, memory formation, and memory retrieval. A considerable body of evidence has found that positive and negative mood have been

associated with recall of mood-congruent content in memory. To-be-remembered material that agrees with the affective valence of one's mood is learned and retrieved better than memory content with different affective valences (Blaney, 1986). Morris (1999) adds that "bad mood...is associated with poorer access to positive memories and heightened access to negative memories" (p. 177). Previous literature also suggests that naturally - occurring mood (i.e., mood not induced by an experimental manipulation) acts as an automatic 'priming' agent that influences memory formation and retrieval. Mayer, McCormick, and Strong, (1995) found evidence for mood-congruent memory in normal (i.e., not depressed or anxious) people experiencing everyday moods. In three studies, the authors demonstrated associations between pleasant mood and pleasant word retrieval, and unpleasant mood and unpleasant word retrieval.

Some theorists (Bower, 1981; see also Mayer, McCormick, & Strong, 1995) describe the human memory system as interconnected nodes in a network. Subsets of these nodes are thought to represent individual moods like happiness and sadness. Mood-congruent memory theory would suggest that "as a person enters a given mood, the mood's correspondent node in memory is activated and that activation spreads to associated concepts, thereby assisting in the encoding and/or retrieval of mood associated ideas" (Mayer et al, 1995, p. 737).

In this study, I assessed participants' naturally-occurring mood at both the first and second telling of their memories. Mood-congruent theory suggested that participant mood at either first and/or second telling of a memory would be associated with the stability of affective content in the memories. Relative to participants in mildly negative moods, participants in more negative moods (at either recall time) were expected to demonstrate greater persistence of negative affective statements and perhaps less persistence of positive affect when recalling upsetting memories over time. However, the predictive power of positive mood was uncertain. Mood-congruent theory suggested that participants in elated moods would show more memory stability of positive affective content and less stability of negative affective content, relative to participants in less positive moods. Since the

remembered events were disturbing memories of negative life experiences that would likely contain little positive affective content, the predictive power of positive mood was uncertain.

Other research shows mood-incongruent effects. Parrott and Sabini (1990) found evidence of mood-incongruent memory recall under natural conditions. For instance, receiving exam grades either higher or lower than expected naturally induced positive and negative moods (respectively) in students. Relative to students in more pleasant moods (after exceeding their exam expectations), those in worse moods recalled more positive content and less negative content when later asked to remember memories from high school. Students in more pleasant moods demonstrated the opposite tendencies. Through a series of studies, Parrott and Sabini examined whether or not mood congruency findings were explained by participants' knowledge of mood as a factor under investigation. They also compared the relative impact of naturally occurring or induced mood, and field and/or laboratory studies of mood. The authors found that mood-incongruent recall occurs when recall tasks do not induce mood regulation and when participants are unaware of any relevance of mood to an experiment. They suggested that if participants believe that their moods are being studied, that perception will inhibit natural mood regulation tendencies. In the current study, it was possible that participants implicitly sensed that mood was a factor under investigation, although this aspect of the study had not been mentioned to the participants. Hence, while mood-congruent findings were expected in the current investigation, mood-incongruency effects were possible.

(ii) Depression: Matt, Vazquez, and Campell (1992) found evidence for mood-congruent memory in their meta-analysis involving varying levels of depression (nondpressed, subclinically depressed, clinically depressed, induced depressed, and induced elated individuals). Other investigators who researched the relation between memory and naturally-occurring unhappy or dysphoric mood have found that dysphoric states are associated with a tendency for people to generate fewer happy thoughts and memories (Hasher et al., 1985; Rothkope & Blaney, 1991). Numerous studies have indicated that depressed participants demonstrate a bias to recall negative information. Relative to non-depressed people, depressed people recollect their negative experiences

more readily than positive ones (Mineka and Nugent, 1992). Clinical depression is associated with negatively biased cognitive functioning (more efficient processing of negative rather than positive or neutral information; Giloba, Roberts and Gotlib, 1997). These biases include better memory for unpleasant than pleasant or neutral information.

As with mood, I assessed participants' naturally-occurring degree of depression prior to the first telling and second telling of their memories. Based on the body of findings about depression and memory, I expected that depression (during either recall stage) would be associated with memory stability in a mood-congruent manner. Relative to less depressed participants, more depressed participants would likely demonstrate more persistence of negative affective content and less persistence of positive content. The reverse was expected with positive affective content.

(iii) Self-esteem: Self-esteem has been shown to moderate the mood-congruent effect. High self-esteem individuals have demonstrated mood-incongruent tendencies while low self-esteem people have shown the mood-congruent effect. Smith and Petty (1995) found that both low and high self-esteem participants exposed to a neutral mood induction (10 minute video of the social behaviour of lions) provided mood congruent autobiographical recall (memories of their high school years). When placed in a sad mood (by watching a 10 minute video about a boy dying of cancer), low self-esteem people were more likely to recall negative high school memories than when they were placed in a neutral mood. However, high self-esteem people who were induced into a sad mood, generated mood-incongruent high school memories by recalling more positive happenings. Hence, high self-esteem people in a negative state or mood tended to engage in counter-emotional thinking and recalled more positive autobiographical memories. Similarly, Dodgson and Wood (1998) found that high self-esteem people receiving failure feedback compensated by recruiting thoughts of personal strengths to a greater degree than when they received no feedback. Low self-esteem people did not demonstrate this compensatory response; rather a sense of their own weaknesses was more accessible.

In the present study, participants rated their self-esteem prior to the first and second times they recalled past upsetting experiences. Previous research suggested that participant self-esteem

would be associated with memory recall and would demonstrate mood-congruent or mood-incongruent tendencies in memory stability dependent on level of self-esteem. Participants with high self-esteem during time 2 recall were expected to show mood-incongruity in their memory stability; those with lower self-esteem were expected to show mood-congruent tendencies.

(iv) Appraisals: Some reconstructive models of personal memory point out that memories are recalled as a function of current knowledge, appraisals, and motivation. For instance, Ross (1989; 1997) emphasized the possibility that the participants' current views and knowledge (about oneself and the to-be-remembered experiences) determine the stability of recollection. Indeed, Levine (1997) found systematic memory distortions in the recall of past emotional intensity as a function of current appraisals. Similarly, Holmberg and Holmes (1994) showed that changes in memories for emotion in relationship interactions reflected changes in partner trustworthiness.

Levine (1997) proposed that cognitive theories of emotion suggest how current appraisals and experience can bias memory. Some cognitive theories submit that people experience emotions when they appraise events as either obstructing or facilitating their goals, and are required to revise their goals (Frijda, 1987; Stein & Levine, 1987). When memories for past emotions are unclear, memory gaps are filled by reconstructing one's memory based on recall of the past experiences as well as past appraisals of the experiences. If appraisals have changed over time, a reconstructive bias may result that prejudices recall in a way that is consistent with current appraisals of the experiences.

The present study assessed the extent to which current appraisals of past disturbing events related to the memory stability and transformation found in people's repeated recollections of these experiences. At both recall times, I considered participants' ratings of event resolution, significance, and severity. In addition, participants were also asked to indicate their current negativity toward the event and their perceived change in thoughts and feelings about the event since writing about it previously. Previous research findings suggested that participants' current views of the past disturbing events would predict memory transformations (both additions of new and omissions of

original information) over time; transformations would coincide with the participants' currently held impressions and appraisals of the remembered events.

The degree to which people ruminate about events may influence the stability of their memories for those events. Some people respond to negative emotions and events by ruminating about them (Lyubomirsky & Nolen-Hoeksema, 1995). Rumination involves passively and repetitively focusing on one's circumstances and symptoms of distress. Rumination makes negative thoughts and memories more accessible and salient, thus possibly enhancing depressed mood and/or memory stability. "Ruminative responses ... are more likely to draw one's attention to the network of negative memories associated with that mood, making such memories more accessible and likely to be easily retrieved" (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998, p. 167). In the current study, participants rated the degree of resolution associated with the past experiences they described: participants indicated how able they are to put the experiences behind them and how much they ruminate about the events. Relative to those who indicated less resolution (and more rumination), those who indicated more resolution (and less rumination) at time 2 were expected to demonstrate less stability in their memories over time.

As reviewed by Schacter (1996) and Brewer (1992), a large body of research studying memories of national events (in different countries) with varying groups of people has suggested the personal significance of 'flashbulb' events "plays a key role in the durability of the memory for that event" (p. 198). Generally, research has suggested that people retain more vivid and detailed memories for personally significant, consequential, and distinctive experiences (Brewer, 1992; Christianson, 1989; Howe, 1998a, 1998b; Rubin & Kozin, 1984). In addition, factors such as importance, surprise, and emotion are associated with memories remaining fixed and stable (Conway, Anderson, Larsen, Donnelly, McDaniel, McClelland, Rawles, & Logie, 1995). Memories of emotional, shocking, meaningful, and/or disturbing experiences are thought to be remembered consistently over time (Reisberg & Heuer, 1992). It was expected that events rated as more

significant and/or severe (at time 2) might show more memory persistence over time, relative to events rated as less significant/severe.

I also assessed the extent of participants' negative views towards the recalled events and the degree of perceived change in their thoughts and feelings about the events. I expected to find evidence of reconstructive bias such that memory instability was influenced by and consistent with (a) current (time 2) views of negativity towards the events and (b) the time 2 degree of believed change in thoughts and feelings about the experiences.

(v) Age and Gender of the Rememberer: The relationship between memory stability and age of the participant is unclear. Memory stability has been shown to vary with age, but the direction of the association has been inconsistent; both young and old adults have demonstrated more consistent memories relative to the other group. For instance, relative to younger people (mean age 36.5), older people (mean age 72.2) produced more consistent repeated recollections when relating personal events (Anderson et al., 2000; experiments 2 and 3). However, Cohen, Conway, and Mayor (1994) found that relative to older adults, young adults generated more stable, complete, and detailed accounts of Margaret Thatcher's resignation; meanwhile 60% of older adults produced almost entirely different accounts from their original. I evaluated age effects in the current investigation to understand the possible contribution of one's age to understanding stability and change in repeated recall of upsetting personal events. However, due to a restricted age range of the participants in the present study, different age effects found in previous research may not be evident here.

As reviewed by Fivush (1998) there is growing evidence of gender differences in personal memories. Relative to adult men, adult women report more memories from childhood, earlier memories, and more detailed, elaborated, emotionally-laden, and vivid memories. For example, Ross and Holmberg (1992) asked couples to describe their first date, a shared vacation, and a mutual argument. Relative to their husbands, women (a) reported more vivid and affective memories, (b) placed greater importance on the remembered events, and (c) reported reminiscing more about the events. I therefore investigated the relationship between gender and memory stability and change.

Previous research has suggested that relative to males, females may have more stable recollections of past upsetting events, possibly due to the tendencies noted above. However, past studies do not consider memory for upsetting events.

(vi) Memory Vividness and Confidence.

Memory vividness and retention are thought to be strongly linked (Rubin & Kozin, 1984; see also Schacter, 1996). Relative to less vivid memories, more vivid memories are thought to be better preserved in one's memory over time and to persist in greater detail. Hence, those past disturbing memories rated as more vivid (at time 2) in the current investigation were expected to predict more memory stability relative to less vivid memories.

Research regarding the association between people's confidence in their memories and the accuracy of their recall has produced mixed results (see Ross, 1997 and Schacter, 1996). Some investigators have found that rememberer confidence predicts recall consistency while others have failed to find a relationship (Neisser & Harsch, 1992; Weaver, 1993). In the present research, participants provided subjective confidence ratings; they rated the degree of (believed) similarity between their accounts over time. I evaluated the relationship between subjective memory confidence and memory stability to examine if participants' confidence was associated with memory stability over time for the contents of their disturbing memories.

(vii) Recency of the Event: Memory fades with time (Ebbinghaus, 1964; see also Walker et al., 1997). Brewer (1996) suggests that memories of recent experiences may be nearly exact reproductive copies of experiences, while older memories are more prone to reconstruction. However, Anderson et al. (2000) has also shown that memories of both recent and for more distant (or earlier) events were quite stable. This finding may be partially explained by the tendency for older memories to become less detailed and more generic over time and therefore, possibly easier to reproduce over time. Thus, memories would appear stable, but only for rather general and generic information. In this work, I evaluated the relationship between memory recency (how temporally distant the event was from the initially recalled memory) and stability. I expected that memories of

more distant events would be less stable over time relative to memories of more recent events. This possibility was examined for the gist of the memories, as well as for more specific content in the recollections.

## Method

### Participants

Thirty eight months ( $M=38.1$ ,  $SD=3.2$ ) after 87 participants took part in Patricia Fergusson's (1993) "writing" study in our lab, I made telephone contact with 76 (87.4 %) of her original sample to invite them to participate in the present memory study.<sup>3</sup> The original Fergusson research investigated written accounts of personal experiences provided by 87 (60 female) students (mean age 19.8 years ) enrolled in a first-year Introductory Psychology course at the University of Waterloo. Sixty-one (42 female) students in Fergusson's 'experimental' group wrote about the most upsetting past events of their lives, whereas 26 (18 female) students in Fergusson's 'control' group wrote about trivial experiences. These original participants were unaware that they would be contacted in the future regarding a memory study.

The majority of participants contacted for the current study were completing their final year of undergraduate studies at the University of Waterloo. I reminded participants of their involvement in the previous writing study and inquired if they continued to be enrolled in post-secondary education. Many recalled their initial participation in the writing study 3 years earlier. I explained that I was interested in examining the long-term stability of memories of past disturbing events. I asked those who previously wrote about upsetting experiences to take part in a memory study involving 5 appointments (4 appointments on consecutive days and the final within a week of the 4<sup>th</sup> appointment) for a \$25 payment. For 4 consecutive days, participants would be required to write about those same disturbing events exactly as they did 3 years ago. On the fifth day they would reflect on their most recent written accounts and on the disturbing events they wrote about. After the study was explained and any questions addressed, potential participants were given one day to make a decision regarding participation, as the investigation involved both reconsidering upsetting issues and

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<sup>3</sup> In order to contact potential participants, I sought (and was granted) special permission from the Office of Human Research for contact information to be forwarded from University of Waterloo registration and/or alumni documentation. This information transfer was conducted in a confidential manner.

a large time commitment. If potential participants declined the next day, I asked if they would complete a 15 minute questionnaire by mail in exchange for \$5. I also asked those who originally wrote about trivial events in the Fergusson study to complete the mail questionnaire for \$5. Eight (13.1 %) of the original experimental group and 3 (11.5 %) of the original control group could not be reached, despite extensive efforts.<sup>4</sup>

Of the 76 participants contacted, 53 previously wrote about disturbing experiences and 23 about trivial events. Twenty-two (41.5 %) of the 53 who previously wrote about upsetting events agreed to write about their experiences a second time. An additional 23 people (43.5 %) declined the option to write about their upsetting memories but completed a mail-in questionnaire instead (consisting of well-being measures). The majority of those who declined to write about upsetting events a second time indicated that they were too busy to make the required 5-appointment commitment to this study or that participating was too inconvenient, as they were no longer at the university on a daily basis. A further 5 people (9.4 %) declined any involvement, citing a busy schedule, and/or lack of interest as the reason. Three additional previous experimental participants (5.7 %) agreed to complete the mail-in questionnaire, but did not return it despite 2 reminder telephone calls. Nineteen of the 23 (82.6 %) participants who originally wrote about trivial events completed mail-in questionnaires. Two others (8.7 %) declined due to lack of interest, and 2 failed to return the questionnaire despite reminder calls.

In summary, 64 (73.6 %) of the 87 participants involved in the Fergusson study participated in the present investigation in some capacity. The participants I focus on here are those 22 (14 females and 8 males; mean age 20.14 years) who agreed to relate their memories of disturbing events a second time. Most impressively, despite (a) a 3 year interval, (b) a big time commitment on both occasions in the study during which participants were asked to write, and (c) a need for participants to

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<sup>4</sup> For those participants who could not be traced through University of Waterloo registration/alumni records, I conducted searches using email addresses, the telephone book, and online telephone number databases. However, as is common with longitudinal research, some of the original sample remain unreachable.

repeatedly consider upsetting memories, 22 participants agreed to write about the upsetting memories that they reported 3 years earlier. Twenty-two returning participants represent 36.1 % of the 61 participants in Fergusson's experimental group (and 42.3 % of the 52 participants recontacted 3 years later). Such a high attrition rate is common in longitudinal memory research. For instance, after a 4 to 9 year delay, Niles et al. (1999) recruited 38 (34.2 %) of 111 veterans to investigate the stability and fluctuation of veterans' reports of combat exposure. Researchers conducting memory studies with shorter time intervals between samplings have somewhat lower attrition rates. After a one year delay, Crawley and Eacott (1999) recruited only 54.8 % of their original participants to repeat questionnaires about memories of a sibling's birth. Similarly, Christianson and Engelberg (1999) recruited 68.5 % of their original sample, after a one year delay. Even Anderson et al. (2000; experiment 1) successfully re-engaged only 42 (75 %) of their original sample after a 2-month interval. The number of participants involved in the current study is low, but reasonable within the area of longitudinal memory research.

#### Procedure (Fergusson's Original Study/The First Recall Phase)

Fergusson (1993) randomly assigned participants to write either about the most upsetting past experiences of their entire lives or about trivial events; participants in both groups were then randomly assigned to conditions in which they wrote about their experiences using only third person or only first person pronouns. Participants wrote for exactly 20 minutes on each of four consecutive days in a quiet, private room and completed questionnaires immediately prior to and following daily writing. (Fergusson's writing study will henceforth be referred to as the first recall phase, or time 1). Those people writing about disturbing experiences could write about the same stressful event, or different stressful experiences during the four writing sessions; those writing about trivial experiences wrote about different assigned topics during each of the four writing sessions.

In addition to the written accounts, Fergusson collected self-report data from participants at various points throughout her study. Prior to their involvement, participants completed the Beck

Depression Inventory, the Rosenberg Self-Esteem Scale, and a mood measure (incorporating the Positive and Negative Affective Schedule)<sup>5</sup> as part of a battery of measures voluntarily filled-out by introductory psychology students. Immediately prior to and following each day's writing, writers also completed a mood checklist. Following each day's writing session, participants filled out a 'daily writing questionnaire' regarding their experiences while writing and their thoughts, feelings, and views about the topic they related during that day's session. On the final writing day, writers rated the value of and their interest in the study, as well as their overall experience of the writing process on a 'post-writing questionnaire'. Finally, participants completed the same pre-study well-being measures and mood checklist one month after the conclusion of the writing study.

#### Procedure (The Current Memory Study/The Second Recall Phase)

Three years later, the present memory study involved having participants return and write about the same upsetting experiences that they wrote about previously. Participants were aware of this request when consenting to take part in the present study. They again wrote about their experiences over four consecutive days; a fifth day of participation took place within a week of completing the writing sessions.<sup>6</sup> (This memory study will be referred to as the second recall phase, or time 2). In general, the procedures during each of the 4 writing sessions in the current investigation paralleled Fergusson's original procedures as closely as possible. Participants wrote in a private and quiet room for exactly 20 minutes. Prior to writing about their disturbing memories a second time, participants completed well-being measures (Fergusson's 2 original well-being measures plus one new one). Immediately prior to and following each writing session, participants completed the same mood checklist (Fergusson's original measure). Immediately following each day's writing,

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<sup>5</sup> The well-being and mood measures are a subset of all the measures Fergusson included. Her original research also included additional measures of physical health and physician visits.

<sup>6</sup> For a few (four) participants, writing for four consecutive days was not possible since they lived out of town and did not attend the University on a daily basis; these participants completed the 4 writing sessions within a span of 5-7 week days.

participants completed a daily writing questionnaire. After the last day of writing, they filled out a post-writing questionnaire (versions very similar to Fergusson's originals). The items on the daily questionnaire asked participants to consider their current thoughts, feelings, and appraisals of their recalled experiences. (I did not ask the participants to recall the answers they gave to these questions 3 years earlier.)

On the first writing day during the second recall phase, I reiterated the study's goal to examine long-term memory stability. I explained to participants that after being given retrieval cues they would be asked to recall and write about the same disturbing experiences they wrote about previously. They would be asked to write about them exactly as they had three years ago. I assured participants that their information was confidential and that while I took part in constructing retrieval cues, all information was anonymous and without any identifying marks. All cues were sealed in envelopes labeled only with a participation number and a day number. In addition, I asked participants to assign false names to themselves and characters in their narratives (as they had previously). After obtaining written consent for participation, participants completed pre-writing well-being measures.

I then read instructions to each participant requesting that she/he remember the upsetting experience(s) written about 3 years ago. I reminded the writers that they previously wrote for 20 minutes on each of four days about past upsetting experiences. I indicated that they may have written about the same event on more than one day, or about different events on different days. Before having people write about their memories a second time, I first wanted to examine how well they recalled the general topics they reported previously without any prompts or assistance reminding them of the content of their accounts from 3 years ago. Hence, on the first day only and prior to seeing any retrieval cues (reminders, created by the investigators, of the core themes participants wrote about previously), participants completed a short 'free recall' form asking them to briefly describe, in sequential order by day, the topics they wrote about on each of the 4 writing days 3 years earlier. They completed the form in privacy and then deposited it into a slotted box.

After participants completed this form, I provided a retrieval cue outlining the fundamental theme(s) of that day's writing 3 years earlier. Retrieval cues oriented participants in a general way to the main theme(s) of what they wrote about previously on a day by day basis in case they did not remember or incorrectly remembered their previous topics. Separate cues were provided on each day and were contained in separate sealed envelopes. For 52 narratives, two researchers had agreed on the appropriateness of all retrieval cues representing the fundamental elements of each narrative. Initially, a second researcher and I independently produced and then compared, retrieval cues outlining the basic topic(s) described on each day 3 years previously. This process involved our reading each narrative and identifying the narrative's fundamental theme(s) without identifying specific content, details or reactions that may have been previously described. The second researcher and I frequently identified (96.3 % agreement with 52 narratives) the same general theme(s) after reading the narratives. As a result of our high agreement rate, I generated the retrieval cues for the remaining accounts, after which the second researcher reviewed them. We settled the few resulting inconsistencies by consensus. A cue also included the first sentence(s) writers used to begin their account that day during the first recall phase. For example, one participant's retrieval cue read:

On the first day, you wrote about the day that you found out about the death of a friend you called Jason, who died when you were 9. You discussed what you had planned to do on that day, and then you told us how the day had gone.

You began your essay with this sentence:

Chris woke up early one morning but lay in bed thinking about what all he was going to do that day.

Participants were asked to begin their current account with the same sentence(s). On each writing day, after participants opened and read the cue privately, I asked if they recalled the event(s) identified by the cue. All participants indicated that they recalled what they were being asked to write about.

The use of a retrieval cue was considered necessary to ensure that all participants at time 2 described the same events they had 3 years ago. Without retrieval cues, some participants at time 2

could have described different experiences than the ones they reported earlier.<sup>7</sup> By providing retrieval cues, I ensured that participants were attempting to relate the same experience at both times.

After reading the retrieval cue each day, participants completed a brief mood checklist prior to the writing session. Each day I recited the written instructions, asking participants to write about experiences exactly as they did 3 years previously. Tulving's (1972) encoding specificity hypothesis suggests that the way in which information is encoded determines what retrieval cues assist information recall. In that case, the conditions in which participants initially recalled their experiences could help with information retrieval. In order to reinstate (as much as possible) the initial conditions under which participants originally recalled their experiences, the daily instructions included verbatim directions from Fergusson's writing study instructing people to write about past upsetting and disturbing experiences in either the third or first person<sup>8</sup>. Furthermore, participants wrote about their experiences for 20 minutes after which they deposited their writing booklets into a slotted box and then completed the mood checklist and daily writing questionnaire. This process of daily writing reproduced exactly the approach Fergusson used based on Pennebaker's (1985, 1990) writing paradigm<sup>9</sup>. Each day, I reminded writers to answer questions from the daily writing questionnaire with current impressions in mind. The order of these procedures (retrieval cue to daily questionnaire) remained virtually constant across all 4 writing days. On the fourth and final writing

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<sup>7</sup> Indeed, as the results will show, without retrieval cues participants on average recalled only 53 % of the topics of their previous writing.

<sup>8</sup> Fergusson examined the possible effects of using either first person or third person pronouns while describing memories of past disturbing events. Since participants initially recalled their experiences in one of these two voices, they were asked to describe their experiences the same way 3 years later. As pronoun use was not a variable of interest in the current study, all memory narratives were typed into a word process in the first person. All other information was typed verbatim. Subsidiary analyses comparing the two groups of pronoun use showed no significant differences in the current study.

<sup>9</sup> Pennebaker (1985, 1990) developed a disinhibition theory to explain the link between inhibition and stress-related illness. He proposed that disclosure or confiding in others facilitate cognitive reappraisal and eventual assimilation of stressful events. In his view, both talking to others and writing about disturbing events are processes that cognitively integrate relatively disorganized thoughts and feelings about traumatic events. However, his research has typically required participants to write about upsetting experiences rather than talking to others about them in order to eliminate the social interaction component involved in talking to others.

day, participants also completed a post-writing questionnaire about their experiences during the writing process.

On the fifth participation day (within a week of the final writing day), participants were given their 4 recent narratives and asked to complete 4 questionnaires (one for each narrative) while reflecting on the changes in their thoughts and feelings about their upsetting experiences during the 3 year interval. Upon completion of this study, participants collected \$25 for their participation and received a contact sheet listing available counseling services should they wish to discuss the experiences they wrote about. In addition, I invited any further questions regarding the study. (Appendix A, pages 85-86, contains one participant's narrative from time 1 and the corresponding account from time 2. The sample retrieval cue mentioned above outlined this person's time 1 account. Whenever possible, I use these 2 narratives for further examples of narrative content.) In order to determine if those participants who agreed to write about their experiences a second time differed from (a) those who declined writing, and (b) previous control-group participants, I asked mail-in participants to complete the well-being measures and a mood checklist. Upon verbal consent (given via telephone) these participants received the follow-up questionnaires in the mail along with a written consent form, an information sheet describing the study, an addressed and stamped return envelope, and a five dollar cheque. I requested that these participants complete the questionnaires privately and return them, along with a signed consent form, within a week of receiving the envelope in the mail.

### Measures

During the first recall phase, participants completed measures of well-being (the Beck Depression Inventory (BDI) and the Rosenberg Self-Esteem Scale (RSES) prior to and 4 weeks after the completion of the writing study. During the second recall phase, respondents once again completed the BDI and the RSES, as well as a measure of Positive States of Mind (PSOM) prior to the 4-day writing period. As with Fergusson, participants involved in the second recall phase completed a

mood checklist immediately prior to and following writing on a daily basis, the daily writing questionnaire after each writing session, and the post-writing questionnaire at the end of the fourth day's participation.

Measures of Subjective Well-Being.

Beck Depression Inventory (BDI). The BDI (Beck, 1967) consists of 21 items measuring the degree of cognitive, affective and somatic symptoms of depression a respondent experienced during the past week. Higher scores suggest higher degrees of depressive symptoms. The BDI's validity and reliability as a measure of depression is well-established (Beck, Steer, & Garbin, 1988).

Rosenberg Self-Esteem Scale (RSES). The commonly used RSES (Rosenberg, 1965) assesses self-esteem using 10 items answered in a 4-point format (varying from 1=strongly agree to 4=strongly disagree); these 10 items are summed and higher total scores indicate higher levels of self-esteem.

Positive States of Mind (PSOM). On the PSOM measure (Horowitz, Adler and Kegeles, 1988), respondents endorse the occurrence of 7 desirable states of mind within the last week using a 4-point scale (varying from 1=unable to have it to 4=have it well); higher total scores indicate a higher recent positive state. Validity and satisfactory internal consistency ( $\alpha=0.77$ ) have been demonstrated (Horowitz et al., 1988).

Mood Checklist: Positive and Negative Affective Schedule (PANAS). The PANAS (Watson, Clark & Tellegen, 1988) includes 20 adjectives describing positive (10 items) and negative (10 items) mood. Respondents rate the extent to which they experienced these moods during the past week on a 5-point scale (ranging from 1=very slightly or not at all to 5=extremely). Participants completed the PANAS immediately before and after daily writing in reference to their immediate experiences and not relative to the past week. The internal consistencies of the positive and negative mood factors are adequate (alphas exceeding 0.83) and valid (Watson et al., 1988).

As Fergusson utilized the PANAS immediately prior to and following daily writing in addition to before and after the completion of the original writing study, she added 6 additional

positive and 4 additional negative items to the PANAS in an effort to acquire a more comprehensive estimate of affective experience. The resulting overall positive and negative mood scales were internally consistent (alphas exceeding 0.84); consequently, Fergusson's composites of negative and positive mood were used in this study.

#### Writing Session Measures.

Daily Writing Questionnaire. Immediately following each writing session, participants indicated their impressions and appraisals of their writing topic on the daily writing questionnaire. (I used a similar version to Fergusson's original questionnaire, see Appendix L). Using 7-point scales, participants responded to items assessing: resolution of the events, memory vividness for the experiences, current views of the events, significance of the events, and severity of the experiences.<sup>10</sup> In an open-ended fashion, participants also reported when the events occurred (thus, indicating the age of the memory). Although many of the items included in the daily writing questionnaire were designed to measure a single underlying construct, whenever possible I combined items on an a priori basis<sup>11</sup> to reduce the total number of analyses conducted.

I combined seven items from the daily writing questionnaire to indicate event-related resolution, or the extent to which participants had resolved or been able to put events behind them. Participants rated: how much they wonder why an event occurred; how often they search for a reason for or a meaning in the event; how often memories of the event come to mind; their ability to get thoughts of the event out of their minds; how much they get caught up or absorbed in memories of the event; the degree to which they understood or made sense of the event, and their ability to put the event behind them. Higher scores on this derived scale indicated higher degrees of resolution. The

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<sup>10</sup> The daily questionnaire also assessed people's view of why the event occurred (i.e., due to chance, destiny, God, etc), their evaluation of the writing process, and the degree to which they had shared the memory with others. I combined items regarding the writing process into two composites and used the derived measures when comparing returning writers to those who did not return. Internal consistencies for these derived scales were adequate (Cronbach's alphas > 0.75).

<sup>11</sup> I grouped items conceptually, and in part, on combinations used by Fergusson.

scale resulted in Cronbach alphas of 0.79 and 0.78, for the first and second recalls respectively. These estimates suggested adequate internal consistency.

Five items assessed participants' memory vividness and accuracy of their experiences. The returning writers rated: the extent to which their memory was highly detailed; the accuracy of their memory; the degree to which they thought others would agree with their memory of the event; the degree their story reflected what actually occurred; the clarity and vividness of their mental image of the event; and the vividness of the emotional recall of the event (alphas=0.87 and 0.83 for the first and second recall phases respectively). Higher scores on this composite indicated higher self-rated memory vividness.

During the second recall phase, I also asked participants to rate memory confidence. They rated the degree to which they believed their second narrative was similar to the account they had written 3 years previously; higher ratings on this item indicated more perceived similarity.

Two groupings of items measured participants' current views of their experiences. Two items assessed the degree to which participants believed their thoughts and feelings about the events had changed during the 3 year interval; higher scores indicated more perceived change. (Resulting alpha=.90, second recall phase only). I combined another two items to assess the degree to which participants viewed their reported events to be negative/positive; higher scores indicated more negative views. (Resulting alphas=0.78 and 0.71, at time 1 and time 2 respectively).

I evaluated participants' views of the significance or importance of the events by combining the following two items: "indicate the degree to which the event played a significant role in your life"; and, "indicate the degree to which the event plays a significant role in your life right now". Higher scores on this derived scale suggested more personal significance or meaningfulness of the events. (Alphas=0.71 and 0.80 at time 1 and time 2 respectively).

While participants did not rate the severity of their past disturbing experiences during the first recall phase, they did so during the second recall phase by indicating how personally psychologically stressful the event was for them when it occurred. The rating scale ranged from 1 (not stressful at

all), to 7 (catastrophically or severely stressful). During the first recall phase, Fergusson obtained a severity rating independent of how participants described their experiences. A rater used the “Severity of Psychological Stressors Scale” from the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1987) to assess the severity of topic(s) participants reported each day. These objective ratings were made using a 5-point scale ranging from 0 (a mild stressor; e.g., difficulty adjusting to a disappointment) to 4 (a catastrophic stressor; e.g., chronic illness or sexual abuse). Inter-rater reliability for the this scale was satisfactory (coefficient  $\alpha=.91$ ) and was established on writing topics from 10 % of the people writing about disturbing past events.

#### Coding Procedures and Measures for the Narrative Memories

I developed several coding schemes to evaluate what specific content of the narrative memories was repeated (or not repeated) over time. I targeted gist, affective tone, and factual detail to identify both general and specific information within the narratives at both times. In addition to coding the content of the narratives with each of the schemes, I then ‘matched’ the content from corresponding narratives in order to identify what content was maintained, added, or omitted over time. For the purposes of coding all the memory narratives were typed verbatim into a word processor . Unless indicated otherwise, I served as the principal coder for the coding schemes described below. Co-rater reliability of all the coding schemes was conducted on 10 % to 25 % of the narratives. Whenever possible, I used the narratives of participants who did not return to write about their upsetting experiences a second time to construct the coding schemes and to train a second rater for reliability purposes.

Coding for Gist or Essential Elements of the Narratives. Coding for the gist or central elements of the narratives involved 2 steps. First a research assistant (who had never read the essays before) generated a short outline of the original (time 1) narrative for each day for each participant. This outline highlighted plot-relevant or central elements pertaining to the basic story line of the memory; these elements were defined as ones that could not be changed or excluded without

changing the basic story line or overall narrative theme of the memory. The resulting outlines represented the original narrative and the sequence of events as reported in the narrative, and were more specific and detailed than the retrieval cues (described earlier) given to the participants each day. For example, the gist outline corresponding to the time 1 narrative provided in Appendix A (page 85) reads as follows:

1. author describes laying in bed thinking about his day
2. describes morning routine
3. day proceeds as planned (i.e., a typical day) with swimming lesson
4. but disrupted (i.e., no Jason to swap bikes with)
5. parents deliver news of
6. Jason's death

I based this gist coding scheme on Neisser's (1981) and Burke, Heuer, and Reisberg's (1991) approaches to classifying 'gist'. The reliability with which gist or central elements were identified was high. For 10 % of the original, or time 1, narratives I also generated outlines. The correlation between the research assistant and myself for the number of identified central elements was  $r=.953$  ( $p=.000$ ). Percent agreement between us for the same identified elements was 90.0 %.

During the second step of coding for gist, the research assistant identified the presence or absence of the gist elements from the time 1 outline in the corresponding time 2 narrative. A gist element from time 1 was coded as present if that element was reproduced/represented at time 2 in some satisfactory capacity, such that the reader felt that the element was a part of the time 2 narrative. The element did not need to be repeated verbatim, in as much detail, in exactly the same sequence, with exactly the same amount of dominance, or with exactly the same description. However, the coder had to sense in general that the identified time 1 element was a part of the time 2 story. For the illustrative outline mentioned above, elements #1, #5 and #6 are present in the corresponding time 2 narrative (as seen in Appendix A, page 85). The inter-rater reliability for the presence/absence of gist over time obtained a reliable Cohen's kappa of 0.92 (and percent agreement was 96.6 %) for the 10 % of the narratives sampled.

Coding for Affective Tone and Factual Information. Prior to coding for affective tone and factual information in the narratives, I parsed the narratives from both times into thought or idea units. This is a common practice used to code narrative data (see Wood, Saltzberg, & Goldsamt, 1990; Fergusson, 1993; Holmberg & Holmes, 1994)<sup>12</sup>. I defined idea units as phrases that represented one complete idea or meaning. Often the resulting narrative segment contained a subject (or inferred subject) and a predicate, and communicated one complete idea, action, thought, feeling, or detail. For example, the idea units in the following sentence are separated by slashes ('/'): I felt so alone./ so lost./ so confused/ and I thought no one would ever help me /and that my parents were gone forever. The reliability of parsing the narratives was adequate. An independent rater parsed 25 % of all the narratives (44 narratives of the 176 from both time 1 and time 2). The correlation between the two coders for the resulting total number of thought units was  $r=.99$ , ( $p=.000$ ). The resulting Cohen kappa for the agreement on thought units was 0.83, with an agreement rate of 89.22 %.

Together with another researcher and a computer consultant<sup>13</sup>, I developed a comprehensive computer coding scheme that could differentiate specific negative, positive and neutral affective descriptors in narrative segments<sup>14</sup> (in this case the parsed thought units). For instance, words and expressions representing happiness, hope, pride, relief, sadness, anger, fear, anxiety, disgust, jealousy, or sadness (to mention a few categories) could be identified. The coding program, written in Perl, operated on a DEC Alpha model 21000 Server running Digital V4.0D and used a categorized dictionary to target words and expressions in 83 comprehensive categories.<sup>15</sup> (These 83 categories are listed in Appendix B page 87). Each target category in the program's dictionary included multiple

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<sup>12</sup> All retrieval cues and first sentences provided to the participants as memory prompts were not included in any affective tone, factual information, or memory stability coding.

<sup>13</sup> I extend special thanks to Mr. B. Eickmeier and Mr. S. Rueffer for their irreplaceable assistance with developing the computer coding scheme.

<sup>14</sup> An emotional taxonomy provided by Dr. Nancy Stein acted as an initial outline for the affect descriptors.

<sup>15</sup> This computer program is available for general research use and can be obtained by contacting either Ms. Mira Drugovic or Dr. Michael Ross at the University of Waterloo.

words, expressions and descriptors to exhaust narrative ways to describe that condition. For example, the specific category 'anger' included a total of 110 words like 'enraged', 'furious', 'outrage', 'malice', 'lash out', 'spiteful' and 'animosity'. The dictionary was carefully constructed to include all tenses and forms of the words of interest. I consulted written and computerized dictionaries and thesauruses to generate the program's dictionary and all words included in the dictionary were reviewed and agreed upon by two independent judges prior to inclusion. Any disagreement about how to categorize a word was resolved by a third independent judge. The dictionary was developed using the time 1 narratives of the writers who did not return to the study as well as a subset of oral narratives taken from a study dealing with self-esteem narratives.

Three important capabilities were built into the computer program to better mimic human interpretation of narrative text. First, I identified words that people frequently used in an unclear manner. These are words that could be interpreted as either containing affective tone or factual information. Examples of such words include 'fair', 'okay' and 'blue'. As seen in the following phrases, these words have more than one meaning that needed to be distinguished in the current coding scheme: "it wasn't fair", "it was a fair day" or "I was lost at the fair grounds"; "I was okay" or "okay, next I looked for my mom"; and: "it was a blue car", or "I felt blue". I recognized problematic multiple uses of such words by tracking the error rate (the frequency of idea units coded incorrectly by the computer) if these words were categorized incorrectly. I grouped these unclear words into their own category, which the computer used to identify idea units that required a human judge to correctly interpret. Due to the nature of the written accounts in this research, 11.18 % of the thought units coded by the computer included words with multiple interpretations and required human clarification to best capture the meaning behind the words. Hence, the computer successfully sorted approximately 89 % of the idea units that required affective tone/factual coding.

The computer program also took into account two other important linguistic considerations when coding. The program considered negations (words like 'not', 'wasn't', 'hasn't', 'never') when conducting its coding. For instance, when people wrote they were "not happy", this phrase would be

coded as 'negated happiness', a negatively toned statement, rather than being misidentified by the word "happy", a positively toned statement. The program could take negations into account even if they appeared up to five words prior to the targeted affectively toned word or expression. Additionally, if a double negation was used, for instance "I never stopped hoping", the computer took this into account and coded for hope rather than negated hope. The computer program was also capable of tracking intensifiers of affective tone, for instance the words 'very' and 'really' in the phrase "I was really, very angry". By combining these two aspects of language (negations and intensifiers) into the program, we could successfully code phrases like "I was not very happy" without introducing unnecessary coding error. As with the list of words included in each affective category in the program's dictionary, the computer worked from a comprehensive list of negations and intensifiers.<sup>16</sup>

Using 25 % of all the narratives (44 narratives), I conducted a reliability analysis with the 89 % of the idea units that the computer sorted. The agreement between the computer and me was 82.1 %, with a resulting Cohen's kappa of 0.77 for the 83 specific coding categories discussed above (81 categories containing affect and 2 categories for unclear terms). (The majority of disagreements between the computer and myself were a result of the computer 'misinterpreting' the narrative intent of the text. Other minor disagreements were due to typos and human error.)

In the present research I utilized the computer program to code the content of the narratives. Using the 83 categories described above, I created composites of affective tone such that the thought units were coded as containing either positive, negative, or neutral affective tone, or factual information. This coding approach was consistent with the coding procedures used by Holmberg and Holmes (1994) who targeted affective and descriptive statements within meaning units. Affectively toned segments were defined as any thought units containing a description of a positive, negative or

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<sup>16</sup> Additionally, the program incorporated flexibility into its dictionary; individual words or entire categories of expressions can be easily removed from or added to the existing glossary if necessary without compromising the integrity of the program.

neutral emotion, affective state, mood state, mental state, disposition, preference, appraisal, physical expression, or metaphor for emotion. (See Appendix B, page 87, for a detailed listing of the specific categories of descriptors that comprised positive, negative and neutral affective tone). For instance, expressions of anger, sadness, fear, anxiety, disgust, guilt, shame and embarrassment were among some of the specific categories for negative affective tone. “I was scared”, “he angered me”, and “I boiled over with rage” are examples of thought units containing negative affective tone. The positive tone category included language describing positive affective experiences, like descriptions of happiness, hope, and relief; for instance, the phrases “I sighed with relief”, “I smiled”, or “I was happy” would be coded as representing positive tone. Neutral affective tone included idea units that were neither positive or negative in tone, but often implied some internal reaction that was not simply factual, for instance, “I was baffled”. or “he was indifferent”. Factual descriptors were those idea units that did not contain any affectively toned language. Factual idea units often described a character’s action(s), the situation, or the event, for example, “so I got out of bed”, “and went about my morning”, and “that it was over”.

Thus, although the computer program categorized the idea units based on 81 very specific descriptors of negative, positive, or neutral tone (for instance anger, happiness and neutral mental states respectively), I combined these specific categories of words conceptually to create three composites, each measuring a general construct of either positive, negative or neutral tone. (Woody, Drugovic and Oakman (1996) used a similar additive approach to scale construction). As noted in research about conversational norms (Schwartz, 1978), “studying single words in isolation has failed to reveal very much about language in general” (Schwartz, 1984, page 750). It would be linguistically redundant for people to use the same grouping of words to express their affect regarding events. Specifically, while a person could have used only words of anger to describe an event, research about conversational norms suggests that she/he would be more likely to use words from multiple categories of descriptors, say anger, sadness, and disgust, to describe negative tone or feelings about an experience. Similarly, another person could describe negative affect using words of

shame, fear and embarrassment. A composite approach to examine positive, negative, and neutral tone seemed appropriate to better capture common narrative content both within an individual's narrative and across participants' accounts. Two independent judges agreed on the appropriateness of each category of words being included in either the negative, positive, or neutral tone composites.

Since I constructed the measures in an additive fashion to account for conversational norms, Cronbach's alpha would be an inappropriate and misleading estimate of internal consistency of the composites I derived. Rather, I used the correlations between the computer and my count of the number of idea units coded as either positive, negative, or neutral tone, or factual information as indicators of internal consistency. While this approach was not ideal, it reflected the extent to which the computer and I agreed on the occurrence of positively, negatively, and neutrally toned statements, as well as facts, that occurred in 25 % of the narratives. All the correlations were high and significant, suggesting adequate internal consistency (0.943, 0.935, 0.781, and 0.921 respectively for positive, negative, and neutral tone and factual information). A reliability analysis of coding for positive, negative and neutral tone, or factual information for 25 % of the narratives (using the 89 % of the idea units that the computer sorted) was also adequate. Rater agreement was 84.7 % and Cohen's kappa was 0.81. (Recall also that an additional 11 % of the content of the narratives was then interpreted by a person rather than by computer).

Once idea units were coded for affective tone or factual content, I directly compared parsed narratives from time 1 with the corresponding parsed narrative from time 2. I categorized the idea units from the two versions of the memories for memory stability. I classified the idea units in the second set of memories as either the same, new, or contradictory. Same information was content that was repeated over time; content in the idea units was similar or nearly the same in both narratives. While the expression of 'same' information over time did not need to be identical in both narratives, the meaning of the thought unit from time 1 needed to be preserved and maintained over time. Contradictory information was content that in the time 2 narrative was deemed to be completely inconsistent with what was expressed at time 1. New information was material present in the time 2

narrative that was not present in the time 1 narrative in any form. This information was added or incorporated into only the memory at time 2. Additionally, I coded idea units from the time 1 narratives that were not repeated or contradicted at time 2 as 'omitted'. Omitted idea units contained information that was only present in the original narrative; this information was not present in any form in the time 2 narrative. While the memory classifications were applied to the specific content of the idea units, the information contained in the idea unit was still considered within the context of the entire narrative. I illustrate coding idea units as either same, new, contradicted or omitted in table 1 below. I conducted a reliability analysis of coding thought units as either same, new, contradicted, or omitted information with another coder rating 25 % of the narratives (22 narratives) independently. Reliability was satisfactory with Cohen's kappa at 0.95 and percent agreement at 96.65 %.

Table 1.

Coding Idea Units for Same, New, Contradicted and Omitted Information over Time.

Time 1 Narrative	Time 2 Narrative	Memory Code
Well, like every morning,		omitted
I stayed in bed	So I got out of bed,	contradictory
'til my brother Steve woke up.		omitted
Still, our mom and dad insisted		omitted
so we followed them into the family room	When I entered the family room,	same
	my dad didn't look very happy.	new
Well, my dad took my hand		omitted
and my mom, Steven's		omitted
and my dad said "Boys, I have some really bad news.	He said "Boys, I've got some bad news.	same
last night, Jason died".	Jason passed away last night."	same
	Steve [and I] responded with shock	new
	[Steve] and I responded with shock.	new
	Steve started crying,	new
	but not me.	new
	Dad was wrong.	new

## Results

I report the results of this investigation in five sections. First, I consider participant characteristics to address possible selection bias in the sample. I then address ways to represent the collected memory data. In the third section, I outline participant and memory characteristics as well as participant appraisals of their remembered experiences at both recall times. In the fourth section, I examine if memory for personally upsetting experiences persists. I consider (a) how well participants specify the personally disturbing topics they wrote about 3 years earlier, (b) if the gist of memories is maintained over time, and (c) what specific memory content (affect and facts) is repeated, omitted, added, or contradicted over time. In the final section, I consider predictors of memory stability and change. My main focus is the predictive contribution of subjective well-being (mood, depression and self-esteem) and of participants' appraisals of the experiences they described (event resolution, significance, and severity, as well as current negativity and perceived change in thoughts and feelings towards the events). I also review participants' age and gender, memory vividness and accuracy, and confidence, as well as event recency and objective event severity as possible predictors.

### (1) Participant Characteristics.

My unexpected invitation to have participants write again about past memories after a 3 year lag introduced the possibility of selection bias; participants may have taken part in this study based on features that systematically set them apart from those who declined. Despite the common reasons given for declining to write about memories a second time (i.e., having a busy schedule or inconvenience), other factors could explain reluctance (or agreement) to participate. I checked for several possible selection biases using pertinent data from both times 1 and 2. Only one finding suggested selection bias; participants who agreed to take part in this study were significantly more likely to be enrolled in school than those who did not participate. Twenty-one of the 22 returning writers continued be enrolled in school, by in large at the University of Waterloo, while only 9 of the 23 mail-in (previous experimental group) participants, 3 of the 8 (previous experimental group)

decliners, and 11 of the 19 mail-in (previous control group) participants were enrolled. Three further chi-square tests found that significantly more returning writers were enrolled in school than each of these other three groups ( $\chi^2=16.1$ ,  $\chi^2=12.3$ ,  $\chi^2=8.4$ , respectively, all  $ps<.005$ ). These findings suggest that convenience (i.e., being on campus or not) was a consideration in participants deciding how/if they would take part in this memory study.

Otherwise, on all other comparisons, the 22 returning writers did not differ systematically from (a) those 23 participants who previously wrote about upsetting events and completed only mail-in questionnaires, (b) those 16 who previously wrote about disturbing events but did not participate in the current study, or (c) those 19 who previously wrote about trivial events and completed mail-in questionnaires. I obtained no differences across a variety of criteria including: participant age and gender, recency of the events, levels of depression, self-esteem and positive states of mind (at both recall times), positive and negative mood (at both recall times), event severity, length of written accounts, how personal previous accounts were, how upsetting it was to previously write about these events, or the number of events participants described previously (reported in detail in Appendix C, page 88).

## (2) Analyzing Memories: Approaches and Issues.

Prior to averaging data across the four writing days for further analyses, I considered how I collected the data. During the first recall phase (Fergusson's 1993 writing study), participants chose what disturbing experiences to report, as well as how extensively to describe their experiences. As a result, the number of topics that participants described in each writing session varied among participants. Meanwhile, all participants provided appraisals of the disturbing experiences they described on a daily basis, regardless of whether they intended to continue writing about the same or new experiences the next day. Although this approach of allowing people to decide how much time they required to describe an experience was a natural way of exploring memories, it also allowed

participants to provide differing amounts of material for each memory. The majority of the returning writers wrote exclusively about one distinct experience during each writing session (i.e., one event per day), while a few described the same experience during all 4 sessions. A few others described several events during one writing session.

This variability in the number of events described during the 4 writing sessions required some consideration to ensure that any collapsing of the differing amounts of material offered by participants was representative of the memories. Two obvious options included either examining the memory narratives by event or by day. If I analyzed the memories by event, the number of experiences that individuals described would vary among participants, and impressions of those events would be an average over days for some people, whereas for others it would be a single estimate. On the other hand, if I analyzed the memories by day, the narrative data collected from each participant on each day was consistent; however, some daily impressions about experiences would be about the same experience for more than one day for a few participants, but not for most others. Using a subset of the data, I examined and contrasted these 2 possible ways of collapsing the data to investigate if the order of events (first event, second event, and so forth) or the order of days' writings (day one through four) suggested any systematic differences. Such differences would suggest that the events or the days' writings were not all from a similar sample of disturbing past events.

Contrasts across events or days indicated very few relevant differences. Results from comparisons involving the recency of the events, personal significance of the experiences, event resolution, and memory vividness and accuracy were not significant (see Appendix D, pages 90-93 for specific results).<sup>17</sup> A chi-square test indicated that the participants' ability to correctly specify (without the aid of a retrieval cue) the events they related 3 years earlier was not independent of the order of the events ( $\chi^2=11.34, p<.025$ ). It seems that participants were more likely to correctly

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<sup>17</sup> These patterns of results did not differ when I conducted the same comparisons with the 3 participants who wrote about multiple events on a day removed.

specify the first event than the third event. However, a chi-square test indicated that the percentage of participants correctly specifying (without cues) their previous writing topic from a certain day was independent of the order of the days ( $\chi^2=5.00$ ,  $p>.10$ ). Also, the last event written about and the topic of the final writing day were objectively rated (by research assistants) as significantly less severe than the preceding events/days; however, participants' personal ratings of event severity did not differ across either days or events. Since the participants provided impressions on a daily basis, and so few differences were apparent in the analyses contrasting these 2 possible approaches, I examine the memory data by day below. Because all the comparisons yielded only one difference across days, I averaged all data over the 4 writing days, allowing for more reliable measures.

### (3) Participant Characteristics, Memories, and Evaluations of Experiences Over Time.

As I outline in table 3, in addition to age and gender of the participants, I chose several features to characterize participants, their memories, and their appraisals of the reported experiences. (I consider these factors later when examining predictors of memory stability). Participants wrote about experiences that occurred on average 4.13 years before the first recall phase (SD=3.10; M=7.27 years SD=3.08 at time 2). The findings in table 2 show many expected results when comparing participants, appraisals, and memories over time. Participants' level of depression, self-esteem, and positive and negative mood did not change significantly over time. As a group (and at both times) participants noted few depressive symptoms and little negative mood; they endorsed positive self-esteem, moderately positive states of mind, and moderately positive mood. Over time, participants indicated more resolution and less memory vividness and accuracy regarding the events. However, participants indicated that at both times their memories for the experiences were quite strong and they were moderately confident that their time 2 memories were similar to their time 1 recollections. Participants' self-ratings at time 2 indicated that during the 3 year interval their thoughts and feelings about the events had changed a moderate amount. Regardless of their own opinions of change, participants continued to view the past disturbing experiences they selected to report as upsetting and

stressful, personally significant, and negative. Objective judges rated the events participants described as very mild stressors ( $M=.54$ , using a scale ranging from 0 to 4); however, participants' subjective ratings of the severity of the events ( $M=4.53$ , using a scale ranging from 1 to 7) indicated that they considered their experiences to be more severe and upsetting than did objective judges.<sup>18</sup>

Table 2.

Comparing Variables at Time 1 and Time 2

Mean Variable	Time 1	Time 2
<b>Participant Subjective Well-being:</b>		
Depression	7.19 (7.39)	6.14 (4.48)
Self-esteem	33.10 (5.66)	34.86 (3.57)
Positive states of mind	n/a	15.68 (3.56)
Positive mood	2.61 (0.59)	2.53 (0.39)
Negative mood	1.29 (0.21)	1.29 (0.31)
<b>Appraisals of the experiences:</b>		
Degree of event resolution ***	4.70 (0.83)	5.62 (0.72)
Personal significance of the experiences	4.58 (0.95)	4.38 (1.10)
Personal Severity Rating	n/a	4.53 (1.13)
Negative view of events	4.70 (1.34)	4.65 (1.16)
Degree that thoughts and feelings about the events have changed during 3 year interval	n/a	4.30 (1.49)
<b>Memory:</b>		
Memory vividness and accuracy of the events ***	5.75 (0.66)	4.62 (0.81)
Believed similarity to first written accounts	n/a	3.00 (1.05)
Objective Severity Rating	0.54 (0.66)	n/a

Note: Higher means indicate a high degree of the measured variable. Standard deviations are reported in parentheses. \*\* $p < .05$ ; \* $p < .01$ ; \*\*\* $p < .001$ ; (using paired-sample t-tests, 2-tailed).

<sup>18</sup> Participants wrote about a variety of topics including death of loved ones, parental divorce, physical and sexual abuse, relationship break-ups, and being lost when children. While these experiences may seem 'less severe' when objectively comparing them to experiences like excessive abuse and torture, the participants indicated that these events were extremely personally upsetting when they occurred (see pages 91-94). It seems that objective severity ratings do not always reflect the personal distress people experience in disturbing situations. For that reason, objective ratings of someone's personal distress seem impractical. The severity rating scale found in the DSM-III was omitted from the later edition (DSM-IV), presumably due to impracticality.

Table 3 summarizes the correlations of each time 1 variable with its counterpart measured at time 2. Time 1 variables were not always predictive of their counterparts at time 2. However, participant self-esteem, negative mood, and negative view of the events were positively and significantly correlated over time. In contrast, participant depression, event resolution, event significance, and memory vividness and accuracy were not correlated over time. (I present the correlations of all these variables with each other at each time in Appendix E, page 94).

Table 3.

Correlations of Variables at Time 1 With Their Counterparts at Time 2

Time 1 Variable	Correlation With Time 2 Counterpart (N=22)
Depression	.005
Self-esteem	.471 *
Positive mood	.382 †
Negative mood	.423 *
Degree of event resolution	.331
Personal significance of the experiences	.312
Memory vividness and accuracy of the events	.213
Negative-positive view of events	.645 ***

† <.10; \* p <.05; \*\* p <.01; \*\*\* p <.001

(4) Does Memory for Personal Upsetting Experiences Persist?

In short, yes and no. In this section, I examine what features of personal memory persist over time and what aspects are transformed. First, I investigate how well participants specify (without the aid of a retrieval cue) the topics they wrote about previously. Then, I present findings regarding memory stability and change (after participants were given retrieval cues) by considering repeated gist over

time, as well as same, new, contradictory and omitted information in general, as well as affective tone and facts.

Specifying What Experiences Were Described 3 Years Previously. At the onset of the second recall phase, participants indicated the main topics that they had described during each of the 4 writing sessions 3 years previously. They did so prior to receiving any retrieval prompts. I then categorized participants' answers as either correctly identifying, incorrectly identifying, or not identifying at all (i.e., 'I don't know') their previous writing topic from each day.

Without any assistance other than the knowledge that three years ago they described upsetting past events, participants correctly specified previous themes about 53.4 % (2.28 of 4 themes) of the time. Participants were more likely to be accurate than inaccurate or non-responsive while trying to identify previous writing topics ( $F(1.96,41.20) = 7.46, p = .002$ ; LSD tests  $p = .001$  and  $p = .057$ )<sup>19</sup>. Writers indicated incorrect themes 31.8 % (1.27 of 4 themes) of the time and did so about as often as not specifying any topic, 14.8 % (0.59 of 4 themes) of the time ( $p > .05$ , LSD test, 2-tailed).

The participants' accuracy rate of 53.4 % appears rather weak if one considers that at time 1 the participants wrote about their memories of the most disturbing and upsetting events of their lives. A larger percentage, 77 % of participants (17 of the 22), correctly specified the theme from their first days' writing 3 years ago; however, this rate was not significantly different from the overall rate of correctly identifying themes (53.4%;  $\chi^2 = 2.53, p > .10$ ). Similarly, the recency of the recalled experience was not a distinguishing consideration; 41 % of participants correctly identified the most recent memory ( $M = 1.38, SD = 1.42$  years at first recall) that they had written about previously, whereas 59 % correctly identified the earliest memory ( $M = 4.16, SD = 4.16$  years at first recall) they described 3 years ago (each  $\chi^2 = 0.82, p > .10$ ). No variables included in the current study predicted people's ability to correctly specify the topics they wrote about 3 years previously.

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<sup>19</sup> I report the Greenhouse-Geisser adjustment for degrees of freedom for all analyses using repeated measures anovas. This adjustment results in a more conservative test while accounting for any departure from sphericity in the data set being used.

Characterizing the Content of Memories of Past Upsetting Experiences. The content of the memories given at both occasions was distilled into coding schemes emphasizing gist, affective tone, and factual information<sup>20</sup> that were then matched on the two occasions.

A research assistant outlined the gist or central features of the original memories and then examined if these gist elements appeared in the time 2 memories. A repeated gist score reflects the percentage of total gist elements in an original narrative that were also present in the time 2 narrative.

The second coding approach involved parsing narrative accounts into thought units and categorizing each unit as either an affective or factual statement. I further sorted affect into 3 categories, positive, negative, and neutral affective tone. Subsequently, I matched affective and factual material from the time 1 and time 2 narratives to identify same, new, omitted, and contradictory content. Although the amount of information (number of idea units) contained in the memories did not differ significantly across the four writing days at either the time 1 or time 2 ( $F's < 1.03$ ,  $p's > .10$ ), the average number of idea units per day did differ significantly between time 1 and time 2. On average, relative to their first accounts ( $M=59.6$  units per day), participants wrote significantly shorter accounts during the second recall phase ( $M=52.8$  units per day;  $t(21)=4.12$ ,  $p=.000$ , 2-tailed). I take this tendency into account in later analyses by proportionalizing variables from this coding scheme by the total number of idea units elicited per session.

(In this results section I focus on direct comparisons of the content from narrative memories over time. However, I also examined the narrative content of the memories at each point in time. I present the findings from comparisons within the memories at each point in time as well as comparisons of the averages of content variables over time in Appendix F.)

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<sup>20</sup> The data was also characterized by an additional coding scheme focusing on personal goals and outcomes. These features of the memory narratives were a secondary research interest and are discussed in Appendix G along with corresponding analyses.

How stable are memories of disturbing experiences over time?<sup>21</sup> Over the 3 year interval between memory sampling, the participants successfully maintained the gist or essential features of their disturbing memories; central features of the disturbing recollections were quite stable. On average, participants repeated 61 % (SD=8.84%; range .44 to .71) of the central elements of their original memories in their second accounts, although, as noted earlier, participants wrote shorter accounts later on. It appears that participants tended to summarize when relating their memories at time 2, as they communicated the gist of their original memories despite writing briefer stories on the second occasion.

After parsing narratives into thought units, I directly compared the general content (facts and affect considered together) of each day's writing from the first recall phase to its counterpart produced 3 years later. I categorized information in the time 2 narratives by memory type (as either the same, new, or contradictory information). Same information is defined as content similar or nearly exactly the same in both narratives; contradictory information is material in the second recollection that is completely different than what was expressed in the first memory. New information is content present in the second memory that was not written about in the first narrative. I also examined memory stability and change in terms of more specific memory content including facts, and positive, negative, and neutral affect.<sup>22</sup>

Direct comparisons of memories over time revealed both stability and also evidence of change (see table 4). Consistent with the finding of moderate stability of gist (61 % of essential features of the memories repeated over time), participants presented a fair degree of stability of information (M=.39 proportion of same thought units) as well as considerable change (M=.59

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<sup>21</sup> Henceforth, unless indicated otherwise, effects for gender were non-significant and I collapse over this variable in the analyses.

<sup>22</sup> As a result of coding criteria, it was not practical to code contradictions as specific affect (positive, negative or neutral). Contractions were coded only as either general affective tone or factual information. Affective tone contradictions were idea units that were originally coded as either positive, negative or neutral affect but then changed to another affect over time. Factual contradictions represent facts at time 1 and time 2 that completely contradicted one another.

proportion of new thought units) in subsequent recollections of upsetting events. Participants rarely, if ever, contradicted themselves ( $M=.02$  of contradictory thought units). While participants added a considerable degree of new information to their accounts over time, this new information was compatible with the original version of their experiences.

Table 4.

Proportions of Same, New and Contradictory General Information in the Time 2 Memories

	Same	New	Contradictory
Mean	0.39 <sub>a</sub>	0.59 <sub>b</sub>	0.02 <sub>c</sub>
Std.D.	0.07	0.06	0.01
Range	0.29 - 0.53	0.45 - 0.70	0.00 - 0.05

Note: Proportions were calculated using the total number of idea units for the second set of memories. Different subscripts in a row indicate significant differences,  $p < .05$ , using the LSD test (2-tailed).

Participants were significantly more likely to add new information to their recollections than to either repeat, or contradict, original content ( $F(1.05, 21.95)=446.95, p=.000; p's < .001$ , 2-tailed LSD tests). They also related significantly more same information than contradictory information over time ( $p < .001$ , using LSD tests, 2-tailed).<sup>23</sup> As seen table in 5, participants added significantly more new affect ( $M=.36$ ) and facts ( $M=.23$ ) than they maintained ( $M=0.22$  and  $M=.17$  respectively) or contradicted ( $M=.01$  each). This same pattern was also found with positive, negative and neutral affect (although the narratives contained very little neutral affect overall; all  $p's < .001$ , using LSD tests and paired samples t-test, 2-tailed).

<sup>23</sup> I calculated proportion scores for all the memory categories and performed arcsine transformations on the resulting data. These transformations did not influence the outcome of any of the reported analyses. In addition, analyses using the incidence of responses while controlling for the length of narratives showed a similar pattern of results. Hereafter, I report untransformed proportionalized data unless otherwise specified.

In addition to examining people repeating, adding to, or contradicting their memories in subsequent recollections, it is important to consider what content they forgot or omitted from their original remembrances of disturbing experiences. Omitted information is defined as content present in a participant's first version of the memory, but absent in their second version. Omissions can only be examined in reference to content from the first set of memories, as it occurs only at time 1. Hence, I coded thought units from the time 1 memory narratives as either the same, contradictory or omitted information and used these data for analyses involving omitted information.<sup>24</sup>

In their subsequent recollections, participants (on average) forgot or omitted a sizeable proportion of the general content from their original narrative memories of past upsetting experiences ( $M=.68$ ,  $SD=0.07$ ; range 0.50 - 0.77). Indeed, participants left out much more information from their original accounts than they later recalled consistently ( $M=0.30$  of the original thought units) or contradicted ( $M=0.02$ ;  $F(1.03, 21.63)=515.92$ ,  $p=.000$ ; all  $p$ 's $<.001$ , using LSD tests, 2-tailed). Even though (a) participants were twice as likely to omit information than to recall it consistently in their later versions of upsetting memories, and (b) they added a great deal of new content into their subsequent accounts (as seen in Table 4), participants tended to preserve the gist of their original memories, providing a reasonable portrayal of their original memory. Despite considerable transformations over time in memories of past disturbing events, people communicated the central and essential features of their original accounts, apparently by repeating only  $M=.39$  of the same thought units they presented originally, and by rarely contradicting themselves.

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<sup>24</sup> In all further comparative analyses concerning omitted information I used the proportions of same and contradictory information from the time 1 memory narratives. In contrast, analyses and discussion of same, new and contradictory content involved comparisons of these proportions from the time 2 memory narratives.

Table 5.

Proportions of Same, New and Contradictory Affect and Facts in the Time 2 Memories

Content Coding	Same	New	Contradictory
Affective Tone: ***	0.22 <sub>a</sub> (0.04)	0.36 <sub>b</sub> (0.05)	0.01 <sub>c</sub> (0.01)
Positive ***	0.08 <sub>a</sub> (0.03)	0.14 <sub>b</sub> (0.04)	n/a
Negative ***	0.12 <sub>a</sub> (0.04)	0.21 <sub>b</sub> (0.05)	n/a
Neutral ***	0.01 <sub>a</sub> (0.01)	0.02 <sub>b</sub> (0.01)	n/a
Facts***	0.17 <sub>a</sub> (0.05)	0.23 <sub>b</sub> (0.06)	0.01 <sub>c</sub> (0.01)

Note: All proportions are of total idea units in the second set of memories. Different subscripts within a row indicate significant differences (using LSD tests or paired-sample t-tests, 2-tailed). Standard deviations are reported in parentheses.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

Table 6.

Proportions of Affect and Facts Omitted from the Time 1 Memories

Content Coding	Omitted
Affective Tone:	0.44 (0.07)
Positive	0.16 (0.05)
Negative	0.26 (0.06)
Neutral	0.03 (0.01)
Facts	0.24 (0.05)

Note: All proportions are of total idea units in the first set of memories. Standard deviations are reported in parentheses.

### (5) Predicting Memory Stability and Change.

In this section, I examine possible predictors of memory stability and change. My main objective was to evaluate the relative predictive strength of subjective well-being (depression, self-esteem and mood) and participants' appraisals of the remembered events (event resolution, severity and significance, negative views, and perceived change in thoughts and feelings towards the events). Of secondary interest were possible predictors including participant age and gender, memory vividness and accuracy, and confidence, event recency, and objective event severity. To examine predictive power, I conducted a series of hierarchical regression analyses exploring the relationships between these factors and the following measures of memory stability (used as the criterion variables): (1) repeated gist over time; (2) same or repeated information (affective tone and facts) found in the narratives over time; and (3) transformed information (added and omitted affective tone and facts) over time.<sup>25,26</sup> I entered predictor variables in the same order for each regression analysis. When the predictor variables had a time 1 and a time 2 estimate (as outlined in table 3), I entered the earlier estimate in the first step, followed by later estimate in the next step. In these cases, the regression analyses were essentially partial correlations. For these analyses, I report both the initial correlation (the relationship between the criterion variable and the time 1 estimate of the predictor variable) and the partial correlation (the relationship between the criterion variable and the time 2 estimate of the predictor after controlling for time 1) in addition to the respective changes in  $R^2$ . In some instances there is only one estimate of a predictor variable (either at time 1 or time 2) and the regression was basically a correlation that indicated a change in  $R^2$ .<sup>27</sup>

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<sup>25</sup> As contradictory information accounted for such a small proportion (<0.02) of memories over time (see tables 5 & 6), it did not warrant further analyses.

<sup>26</sup> I also examined the consistency over time of (1) goals and outcomes, (2) the order of information in the memories, and (3) participants recalling when their experiences occurred. Findings regarding these additional features of memory are reported in Appendices G, I, and J respectively.

<sup>27</sup> For each criterion variable, t-tests were conducted first to appraise for gender effects. No interactions between gender and (a) well-being or (b) appraisal variables were significant. For those few criterion variables included in the appendices for which gender made a difference, gender was entered as the first step in regression analyses, followed by the estimate(s) of the predictor variable, and completed by the interaction(s) of gender with the predictor(s).

What predicts people's maintaining information in subsequent memories of upsetting past experiences over time? No variables included in this study predicted participants maintaining the gist (central features) of their memories over time. However, participant subjective well-being at time 1 was associated with memory stability of more specific contents of the memories. Furthermore, there was some evidence of mood-congruent recall. Higher levels of depression and negative mood, and lower levels of self-esteem and lower positive mood at time 1 were associated with more stable recall of information in general, facts, and affect, in particular negative emotion. Surprisingly, there was little evidence of reconstructive biases. Few participant appraisals were associated with memory stability. Contrary to expectations, more event resolution (less rumination) was associated with greater retention of affect in general, particularly negative expressions.

Participants' subjective well-being (depression, self-esteem, and mood) during the first telling of the memories predicted what general content in the memories was preserved over time; subjective well-being at time 2 did not predict memory stability. Relative to participants reporting better subjective-well being, those endorsing poorer well-being (more depression and negative mood, and less self-esteem and positive mood) during the original recall of the memories repeated more of the same information, in particular more facts and negative affect, in their subsequent recall of upsetting experiences (as seen in table 7 & 8). These results suggest evidence of a mood-congruent effect predicting the retention of negative affect over time. For example, a participant would be more likely to reiterate the initial anger discussed in her/his original version of a disturbing memory in a subsequent rendition if she/he was experiencing poor subjective well-being when relating the original version of that memory. A similar relationship between better well-being and positive affective content was not evident.

In addition, relative to less vivid original recollections, more vivid memories at time 1 were related to less persistence of negative affect in subsequent memories. Very few variables predicted the stability of factual information in these memories over time. Participants in a more positive mood

Table 7.

**Factors Predicting Repetition of the SAME General Information in Memories Over Time**

Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
<b>Depression; time 1</b> time 2	<b>.53</b> .02	<b>.73</b> .23	<b>.000</b> ns
<b>Self-esteem; time 1</b> time 2	<b>.32</b> .00	<b>-.59</b> -.03	<b>.001</b> ns
<b>Positive mood prior to writing; time 1</b> time 2	<b>.18</b> .05	<b>-.42</b> .24	<b>.050</b> ns
<b>Negative mood prior to writing; time 1</b> time 2	<b>.15</b> .07	<b>.39</b> -.28	<b>.071</b> ns

Note. Significant findings are highlighted in the table.

Table 8.

**Factors Predicting Repetition of the SAME Affect and Facts in Memories Over Time**

SAME Specific Information	Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
GENERAL AFFECTIVE TONE:	<b>Depression; time 1</b> time 2	<b>.37</b> .03	<b>.64</b> -.19	<b>.004</b> ns
	<b>Self-esteem; time 1</b> time 2	<b>.24</b> .06	<b>-.49</b> .27	<b>.024</b> ns
	<b>Degree of event resolution; time 1</b> time 2	<b>.05</b> <b>.28</b>	<b>.22</b> <b>.55</b>	ns <b>.011</b>
SPECIFIC AFFECT: Negative:	<b>Depression; time 1</b> time 2	<b>.18</b> .00	<b>.43</b> .02	<b>.054</b> ns
	<b>Degree of event resolution; time 1</b> time 2	<b>.07</b> <b>.24</b>	<b>.26</b> <b>.50</b>	ns <b>.020</b>
	<b>Memory vividness and accuracy; time 1</b> time 2	<b>.22</b> .03	<b>-.47</b> .17	<b>.028</b> ns
FACTS:	<b>Depression; time 1</b> time 2	<b>.31</b> .09	<b>.56</b> .27	<b>.008</b> ns
	<b>Positive mood prior to writing; time 1</b> time 2	<b>.18</b> .00	<b>-.43</b> .01	<b>.047</b> ns

Note. Significant findings are highlighted in the table.

(relative to those in a less positive mood) during the time 1 recall phase retained less factual information over time.

Few variables at time 2 predicted the persistence of factual and affective content in memories over time. Among them, the retention of facts and negative affect over time was predicted by the degree of event-related resolution endorsed during the second retrieval (after controlling for initial resolution). Relative to participants reporting less resolution, participants reporting more event resolution (less rumination) at time 2 repeated more of the same affective information, in particular negative affect, in their subsequent recollections.

People's views of their disturbing experiences at time 2 failed to illustrate the reconstructive biases found in previous memory research. Most participant appraisals were not predictive. The absence of retrospective biases when discussing memory stability may not be surprising. Rather these biases may be more evident and applicable when discussing memory change (new and omitted information) over time.

What predicts people adding new or omitting original information in subsequent memories of upsetting past experiences over time?

As with the persistence of the same information in memories over time, participants' subjective well-being when relating the memories of past disturbing events at time 1 was associated with their incorporating new content into the memories over time (see table 9). Participants with greater levels of initial depression and negative mood, and lower self-esteem and positive mood at time 1, were less likely to introduce new general information over time into their memories of upsetting experiences. Initial subjective well-being overall did not predict the addition of specific negative, positive or neutral affect into memories over time (as seen in table 10). However, higher depression and poorer negative mood at time 1 predicted participants introducing fewer new affective statements and facts in subsequent remembrances than did those participants with lower depression scores and better negative mood.

Self-esteem and positive states of mind were relevant time 2 predictors of memory change. Participants with higher self-esteem during the second recall, presented less new affective tone, and more new factual information into their recollections over time relative to people with lower self-esteem. Those in a more positive state of mind at time 2 also added less neutral affect. Time 2 event resolution was related only to positive affective content. Participants reporting more event resolution (less rumination) at time 2 added less positive content to their subsequent memories.

As seen in table 12, depression during time 1 recall was the only variable that predicted participants omitting information in general from upsetting memories over time. Relative to participants who endorsed more depression at time 1, those endorsing less depression left out more original information in general from their memories of upsetting events over time. As well, self-esteem and mood ratings at either time 1 or time 2 were not predictive of content omission over time. Subjective well-being was not predictive of participants omitting specific content (e.g., positive or negative affect, or facts) that was given in their original memories.

With the exception of event resolution, few appraisals demonstrated reconstructive biases in memory change over time of upsetting events. Event resolution was related to omissions of affective content and facts. Relative to those who reported less resolution, participants who reported greater event resolution (less rumination) at time 2 omitted more previous affective content, in particular negative affect. Personal significance of the event, personal severity of the distress related to the event, negative views of the event, and perceived changes in the thoughts and feelings about the event failed to predict memory transformation or decay.

Table 9.

**Factors Predicting the ADDITION of General Information in Memories Over Time**

Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
<b>Depression; time 1</b>	<b>.47</b>	<b>-.69</b>	<b>.001</b>
time 2	.03	-.24	ns
<b>Self-esteem; time 1</b>	<b>.32</b>	<b>.57</b>	<b>.007</b>
time 2	.01	.08	ns
<b>Positive mood prior to writing; time 1</b>	<b>.14</b>	<b>.38</b>	<b>.086</b>
time 2	.03	-.19	ns
<b>Negative mood prior to writing; time 1</b>	<b>.23</b>	<b>-.48</b>	<b>.025</b>
time 2	.02	.13	ns

Note. Significant findings are highlighted in the table.

Table 10.

**Factors Predicting the ADDITION of Affect and Facts in Memories Over Time**

NEW Information Over Time	Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
AFFECTIVE TONE:	<b>Depression; time 1</b>	<b>.26</b>	<b>-.51</b>	<b>.018</b>
	time 2	.02	.15	ns
	<b>Self-esteem; time 1</b>	<b>.11</b>	<b>.34</b>	<b>ns</b>
	time 2	<b>.23</b>	<b>-.50</b>	<b>.023</b>
Positive	<b>Degree of event resolution; time 1</b>	<b>.05</b>	<b>-.21</b>	<b>ns</b>
	time 2	<b>.19</b>	<b>-.44</b>	<b>.046</b>
Neutral	<b>Memory vividness and accuracy; time 1</b>	<b>.19</b>	<b>.43</b>	<b>.046</b>
	time 2	.14	.42	ns
FACTS:	<b>Positive states of mind (time 2)</b>	<b>.23</b>	<b>-.48</b>	<b>.024</b>
	<b>Self-esteem; time 1</b>	<b>.13</b>	<b>.36</b>	<b>ns</b>
	time 2	<b>.20</b>	<b>.47</b>	<b>.036</b>
	<b>Negative mood prior to writing; time 1</b>	<b>.25</b>	<b>-.50</b>	<b>.015</b>
	time 2	.02	.18	ns

Note. Significant findings are highlighted in the table.

Table 11.

**Factors Predicting the OMISSION of General Information in Memories Over Time**

Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
<b>Depression; time 1</b>	<b>.20</b>	<b>-.44</b>	<b>.045</b>
time 2	.09	-.32	ns

Note. Significant findings are highlighted in the table.

Table 12.

**Factors Predicting the OMISSION of Affect and Facts in Memories Over Time**

OMITTED Information Over Time	Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
AFFECTIVE TONE:	Degree of event <b>resolution</b> ; time 1	.00	-.05	ns
	time 2	<b>.21</b>	<b>.45</b>	<b>.039</b>
Positive	<b>Recency of the memory (at time 1)</b>	<b>.38</b>	<b>-.62</b>	<b>.002</b>
	<b>Objective Severity rating</b>	<b>.27</b>	<b>-.52</b>	<b>.013</b>
Negative	Degree of event <b>resolution</b> ; time 1	.05	.23	ns
	time 2	<b>.44</b>	<b>.68</b>	<b>.001</b>

Note. Significant findings are highlighted in the table.

Supplementary Analysis. Contrary to expectations, participants' time 2 appraisals of the recalled events rarely predicted content stability or change (additions or omissions) in memories of past disturbing events. To ensure that this surprising lack of findings was not due to the order in which variables were entered into the hierarchical regressions (i.e., time 1 followed by time 2), I conducted a series of commonality analyses to determine the extent of the predictive contribution of the unique and shared variance of the time 1 and time 2 predictors. Commonality analysis "can be used for decisions about which variables may be eliminated while sacrificing little in overall

predictability” (Pedhazur, 1982, p. 208-209). This approach was a more advantageous and reasonable way to address this issue of time 1 and time 2 influences of variables than using first-order correlations between the time 2 predictor variables and memory stability and change. First-order correlations would have required that I conceptually ignore relevant data. (i.e., knowledge of a previous estimate of the relationship between the variable and memory stability).

For each potential predictor discussed above, a second hierarchical regression analysis was performed, thus resulting in a pair of regression analysis for each predictor variable. As is the procedure for commonality analysis, the order of entry for the time 1 and time 2 predictors was reversed within each pair of analyses (Bluck & Li, 2001; Pedhazur, 1982, chapter 7). Commonality analysis allowed me to simultaneously consider the unique contribution of time 1 and time 2 estimates of a predictor as well as the shared variance. The unique variance of the predictor at each time was indicated by the change in  $R^2$  when that predictor (time) was entered last in the regression analysis. For instance, the regressions presented earlier indicated the unique variance of each predictor at time 2. Regressions in which the order of variable entry was reversed indicated the unique variance of each predictor at time 1 (see tables in Appendix K, page 118<sup>28</sup>). Shared variance was computed by subtracting the change in  $R^2$  when a factor was entered last in one regression, from its  $R^2$  when the factor was entered first in the reverse regression.

The results of the commonality analyses (provided in Appendix K) did not provide any further support for appraisals influencing memory stability and suggest that the regressions and results discussed previously are not the results of the order of variable entry in the regressions. In general, results were consistent with previous findings. Variables that had been significant at time 1 and time 2 in previous regressions were also significant when the reverse regressions were run.

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<sup>28</sup> I completed commonality analyses for all the potential variables discussed earlier. However, the tables in Appendix K display only the variables included in tables 7 through 12. These variables had produced significant findings in the first set of regression analysis and, for the purpose of continuity, results of the commonality analyses for these same variables are displayed in the appendix. Variables that are not displayed in the tables in Appendix K did not produce significant findings in either the commonality analyses or the first set of regression analyses.

Furthermore, no additional variables at either time 1 or time 2 variables were predictive that had not been previously.<sup>29</sup> Some shared variance was relevant. For instance, self-esteem systematically demonstrated relevant shared variance. In addition to higher reports of self-esteem at time 1 (relative to lower reports of self-esteem) predicting less repetition and more addition of information in general in later memories, the shared variance between self-esteem scores over time was also predictive of repeating and adding material in subsequent memories. Similarly, the commonality between memory vividness and accuracy at times 1 and 2 in addition to time 1 memory vividness and accuracy was also predictive of introducing new positive affect into later memories. In each case, the direction of the correlations/partial correlations in the pair of regressions remained consistent: this consistent pattern suggests that the significant shared components of the variables (self-esteem and memory vividness and accuracy) over time predict memory stability in the same direction as the significant time 1 findings. The commonality analyses suggest that the original set of hierarchical regression analyses in which time 1 variables preceded the entry of time 2 variables provide a reasonable and adequate interpretation of the variables' relationships with memory stability. (The subsidiary analysis confirmed that the elimination of the factors found do be non-significant in the first set of regression analyses did not sacrifice predictability.)

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<sup>29</sup> One exception included the relationship between self-esteem at times 1 and 2 and the addition of affective statements. The commonality analysis suggested significant shared variance between time 1 and time 2 self-esteem when predicting additions to affective tone. Furthermore, the commonality analysis suggested a suppression phenomenon in which the significant negative relationship between self-esteem at time 2 and the addition of affective tone in later narratives disappeared in the reverse regression. The reverse regression introduced a significant positive relationship between time 1 self-esteem and later addition of affective descriptors that had not been evident earlier.

## Discussion

Memories of past traumatic experiences have recently become part of a major heated social, legal and scientific issue, the recovered memory – false memory debate (Loftus, 1993). Recovered memories are reportedly repressed memories of childhood abuse or harm that have been uncovered several years after the alleged crime. Understandably this process can be quite traumatic for the alleged victims and their families, and can lead to court proceedings. For instance, in one landmark case a man was tried for the murder of his daughter's childhood friend after his daughter reported remembering witnessing the crime, a memory seemingly repressed for 20 years. When the recovered memory is believed to be a false memory, the situation becomes more complicated and hurtful for all parties involved. The complicated and disconcerting state of affairs of recovered/false memories urges that more be learned about the nature of memory and about memory persistence (Bowers & Farvolden, 1996). A better understanding of the natural forgetting and remembering of disturbing memories over time would be valuable as one step in that direction.

One aim of this study was to investigate memory persistence and change over time of average adults' memories for past disturbing personal experiences. Memory theorists differ in their views about how people's memories for negative life events persist over time. On the one hand, emotionally charged experiences are thought to produce long-lasting memories that are replicas of the original experience: it is thought that these duplications undergo little change over time (Brown & Kulik, 1977; Terr, 1994; Tulving, 1972, Zajonc, 1980). In contrast, other theorists contend that each time a personal memory is recalled, it is reconstructed, making remembrances unstable and prone to distortion, decay, and transformation (Bartlett, 1932; Barclay, 1986; Ross, 1989, 1997).

I studied the natural evolution of memory persistence over time and examined memory stability and change in a natural and ecologically-valid manner. People described memories of past disturbing events on 2 occasions separated by a 3 year gap. Although participants did not relate experiences as traumatic as the ones thought to bring about repression, they were asked to describe the most difficult and distressing experiences of their lives. Participants chose what past disturbing

events they would share. Three years later I asked them to recall those same events exactly as they had 3 years earlier.

Without retrieval cues to assist them, people were somewhat weak in their ability to correctly identify what topics they previously described. The participants in this study correctly specified about 50 % of the topics they shared 3 years earlier. This seems to be a weak hit rate for events that were once considered the most upsetting and disturbing in people's lives. However, similarly low identification rates have been found in previous research with both more distressing and less distressing events (Waldfogel, 1948; Williams, 1995). No variables predicted participants correctly specifying the events they wrote about 3 years previously.

By directly comparing the content of the two versions of the remembered experiences, I examined memory stability and change over time. Specifically, I focused on material from the original memory that participants repeated, added, omitted, and contradicted in their later version. I considered the gist of the memories, in addition to general content, affective tone, and facts found in the memories.

The findings indicated evidence of both duplicative and reconstructive memory processes. Participants presented a fair degree of stability as well as considerable change in the contents of their subsequent memories. Although participants tended to condense their later memories, they maintained 61 % of the gist or essential features of their original recollections in these briefer accounts. In their later accounts of the recalled experiences, participants repeated a moderate proportion of the same information they initially gave 3 years earlier; most of the remaining information was new material added to the second rendition of the memories. People rarely introduced contradictory content into their later recollections. However, participants also omitted and/or forgot a sizeable amount of the content contained in their previous reminiscing. Participants demonstrated similar patterns of stability and change for affective content, in particular negative affect. Despite adding new information, leaving out old content, and repeating a moderate amount of the original material, participants communicated the gist of their original accounts to some degree.

How do these results compare to previous research examining memory stability? Various factors differed among previous investigations preventing direct comparisons with the results found in this study (Anderson et al., 2000; Crawley & Eacott, 1999; Fivush, 1996; Fivush et al., 1991; Fivush & Schwarzmueller, 1998). For instance, in previous research the types of recalled events were often salient, but not disturbing. Some past researchers worked with children, while others worked with adults. In addition, the interval between recall times varied between 6 weeks and 5 years. Regardless of the differences, some comment is possible. Not surprisingly, adults recalling high frequency experiences that they described 2 months earlier provided somewhat more stable recall than participants in this present study (Anderson et al, 2000). Nonetheless, participants in the current study (who recalled a salient, negative event after a 3 year delay) were somewhat in line with Anderson et al's stability findings. However, current participants omitted much more of their original material than Anderson's participants. Relative to findings in this study, estimated memory stability was higher when adults recalled memories of their sibling's birth a year after their initial description (Crawley & Eacott, 1999). However, the authors used a questionnaire to structure the narrative recall. Fivush and her colleagues worked with children who produced rather inconsistent memories over time; stability estimates varied but remained moderately low with recall intervals varying between 6 weeks and 5 years. Obviously, even at short intervals, memory stability is far from perfect for both adults and children. People of all ages, recalling various experiences, tend to incorporate new information and omit old information.

The finding that participants added new information to their recollections over time without introducing contradictions or sacrificing too much of the gist of their previous recall suggests that they may have accessed and related different aspects of the event at time 2. Indeed, Fivush and her colleagues suggested that same interpretation when (a) children's subsequent recall was nearly 80 % inconsistent with previous renditions given years earlier, but (b) the children's mothers indicated that the most recent accounts were still accurate versions of the event in question. On a cautionary note,

the mother's recall could have been flawed or distorted, thus not providing an adequate source of corroboration.

In the present study, I did not have any external sources to corroborate the validity of the inconsistencies found in participants' later memories. However, it is possible that the participants themselves matured over the course of the study in a way that made them more likely to reflect upon their remembered experiences differently, but not necessarily inaccurately. For instance, one participant originally related a period in her life during which she felt extremely angered by her parents' decision to undergo a trial separation. Her original memory contained anger, frustration, and misery about the impact of her parents' actions on her life. Her subsequent version of this experience (given 3 years later) successfully reiterated the anger, frustration, and misery, as well as the details of the situation, but she added impressions about how selfish and self-focused she had been during that time. In the later memory narrative, it seemed that she believed that she had written about her selfishness in the previous narrative; but she had not. Indeed the new information she added was not contradictory; it may very well have been an accurate aspect of the experience. In short, the participant may have matured over the 3-year interval in a way that made the added content more accessible to her memory during the later rendering. On the other hand, the added information may have represented later insights misremembered as occurring earlier. One can see that the issues of memory accuracy, validity, and consistency/stability are not straightforward.

It is somewhat difficult to interpret the findings regarding the virtual absence of contradictions in these upsetting memories over time. At times previous memory research has found striking errors and flaws in memories of traumatic events like kidnappings and concentration camps (Schacter, 1996; Terr, 1988; Wagenaar & Groeneweg, 1990). Investigations about the consistency of 'flashbulb' memories over time have documented a much higher error rate than found here. Neisser and Harsch (1992) found that 25 % of their participants provided completely erroneous repeated accounts of their hearing of the Challenger explosion. In comparing previous work with my study, it is worth noting that I examined considerably more widespread memory content than the canonical

features of 'flashbulb' events that have been investigated in previous research. Also, the current participants reported what they remembered at time 1 while, Neisser and Harsch may have probed for information that participants did not remember. It is possible that the instructions I gave participants influenced how they related possibly mistaken information. In brief, I instructed participants to recall their experiences exactly as they did 3 years ago. These directions may have reduced the rate of contradictions by inducing a strenuous search strategy while participants worked to remember previous reports. The directions introduced demand characteristics that errors were not tolerable. If so, participants may have held back information they felt uncertain about rather than risk making a mistake. In the event that participants refrained from relating information of which they were uncertain, the potential contradictions may have been coded as omissions. Another possible contributing factor is strict coding criteria for contradictions. In this study, information had to be completely contradictory to qualify for this scoring code. Finally, it is possible that the retrieval cues given to participants to prompt their memories provided too much information and kept people from contradictions. In summary, recall instructions, coding criteria for memory content, and retrieval cues are important considerations in memory research that may inadvertently influence findings.

The high incidence of participants omitting previously recalled content is interesting as well. It could mean that participants' original memories of the upsetting experiences have in fact decayed, but other explanations exist. For instance, changes in the participants (as discussed earlier) could explain their overlooking information that seemed important before but 3 years later did not. In this case, omissions may not be 'forgotten' information. Forced-choice strategies for personal recall (rather than the open-ended narrative approach used here) may have led to lower rates of omissions and greater recall levels. For example, Crawley and Eacott (1999) used a structured questionnaire to gather memories and to learn about the consistency of people's memories for their sibling's birth. The authors' findings (after a one-year recall interval) included higher rates of stable information than I found in the current study. Regardless of the uncertainty in the actual extent of forgetting and the

nature of omissions, this study gives an index of how much information could be forgotten from memories when they are recalled in a naturalistic and less structured way.

In the present investigation, I examined the potential for subjective well-being and participants' appraisals of the upsetting events to predict memory stability and change in the contents of people's disturbing memories over time. Overall, the findings suggested that well-being (depression, self-esteem and mood) during time 1 recall was predictive of the persistence of memories of past upsetting events. In contrast, people's current (time 2) appraisals predicted little memory stability or change and showed slight evidence of reconstructive biases.

Initial (time 1) subjective well-being predicted the retention of memory content in subsequent (time 2) reminiscing in a mood-congruent manner. Relative to those endorsing better emotional health, those with higher levels of depression and negative mood, and lower levels of self-esteem and lower positive mood during time 1 recall retained more content from their time 1 memory in their subsequent (time 2) memory. Evidence for mood congruent recall was also found within this investigation. Depression and the stability of affective content from memories were positively associated. Specifically, participants endorsing higher levels of depression during the initial sharing of their upsetting memories maintained more of their originally-expressed negative affect in their future remembrances. Naturally-occurring depressive or dysphoric states seemed to reinforce mood-congruent information so that it remained in memory for future recall. Prior research suggesting that naturally-occurring mood primes mood-congruent memories and retrieval supports this observation (Mayer et al., 1995). (Although in the present investigation subjective well-being was measured prior to people recalling past negative events, the results also introduce the possibility that perhaps the stable features of disturbing memories influence people's well-being. For instance, consistently expressing the negative emotions associated with past disturbing events could reinforce depression and negative mood.)

Most interesting in this body of findings is the striking lack of evidence of reconstructive biases in relation to stability and change in people's disturbing memories. It had been expected that

participants' current (time 2) appraisals about the past upsetting events would be related to transformations (additions and omissions) and perhaps not associated with memory stability. Current appraisals were expected to bias changes in memory such that transformations in the content of the memory narratives would be consistent with participants' current appraisals and views of their past disturbing events. However, with the exception of the counter-intuitive findings encountered in the event-resolution measures (discussed below), current appraisals including event resolution, negative view of the event, event significance and severity, and changed thoughts and feelings towards the events, tended not to be related to the amount or type of information participants repeated, added, or omitted over time. Ratings of personal significance and severity of the event, of negative views, and of perceived change in thoughts and feelings towards the events did not show the expected repetition, addition or omission of information over time.

The reconstructive biases found in previous memory research involving recall of emotions (Levine, 1997), recall of pain (Eich et al., 1985), and recall of skills and attitudes (Conway & Ross, 1984; McFarland & Ross, 1987; Ross, 1989) was not found in people's repeated recall of past disturbing events. The lack of reconstructive biases is surprising since this effect has been found in several memory studies. The absence of such findings suggests limits to the idea of reconstructive biases. Despite numerous previous studies consistently finding evidence of reconstructive biases, these biases may not be applicable to the comprehensive content of narrative memories, or to personal memories about such salient and disturbing past events. There is little doubt that many of the experiences that the participants shared were ones that have contributed to the self-understanding and self-knowledge that make up life stories. In fact, many of the participants' experiences seemed similar to accounts heard in psychotherapy explaining how experiences in life have been unsettlingly and destructive. In theory, the events were the very life experiences that are expected to be remembered with bias. It is possible that the absence of reconstructive biases was due to not asking the 'right' questions about people's views about the events, or assuming that these events have had consequential influences in the participants' lives. Furthermore, perhaps, these impressions about the

upsetting life events may influence memory stability and change in the future. There may have been an earlier time during which reconstructive bias was present, but any effect on memory was already settled and integrated into both the samples of the memories that the participants gave. Alternatively, these events may have been so salient and consequential, that memories of the experiences might be resistant to any biases reconstructive influences of current appraisals. Additionally, perhaps the instructions to recall events exactly as they had been previously described assisted participants to resist possible influences of current views of their experiences on their recall. For instance, participants might have deliberately engaged in a reconstructive process focusing on self-knowledge other than current appraisals in hopes of producing consistent recall.

People's degree of resolution (putting upsetting events behind them) was associated with memory stability and change in both expected and unexpected ways. It was expected that greater resolution (and less rumination) about past negative events would be related to less memory stability and more memory change over time. However, relative to those recalling less resolved events, participants who described more resolved events at time 2, recalled more stable and less changed affective content. In particular, they repeated more negative affect and added less positive affect to their memories over time. These findings were contrary to what theories about rumination and resolution would predict (Lyubomirsky & Nolen-Hoeksema, 1995). However, participants who described more resolved events at time 2 also omitted more affective statements, in particular of negative affect in their subsequent recollections. This finding is consistent with theoretical predictions. Indeed, it seems that resolution does assist people in putting certain aspects of disturbing memories, in particular negative emotions, behind them, but not to the extent that people completely fail to recall the associated negative emotions when explicitly instructed to recall memories exactly as they had previously. When instructed to recall events in this way, people also generally failed to add new information into their memory descriptions, despite remembered events reportedly having become more resolved. It seems possible that the instructional set prevented the expected memory

changes in regards to event resolution from being evident in people's memory narratives for past disturbing events.

Other findings involving variables of secondary interest failed to show evidence of some of the expected results. For instance, gender was not a variable that predicted memory stability despite previous research suggesting that females possess better memories. However, the sample size was small (N=22) and included only 14 women and 8 men. Personal and objective ratings of severity of the distress associated with the recalled event was also not predictive of memory stability. Theory and past research suggest that more upsetting and stressful events might be better retained in memory over time. Perhaps, such an effect is evident in comparisons between disturbing events and mundane events. However, this study lacked an appropriate control condition to test that hypothesis. The current sample of memories also contained very little evidence that the recency of the event affected memory stability and change. Generally, it is thought that memory, especially of emotions, fades over time. This was not the case in the present study, even though the memories varied considerably in terms when the remembered event occurred.

A major contribution of this investigation involved the methodology used to assess memory stability. I employed a very comprehensive, systematic, and novel means of examining memories. The comprehensiveness of the content coding allowed for a breakdown of the specific content of disturbing memories, as well as a more generalized examination. The findings add knowledge to prior work about memory stability and change by commenting on these processes in terms of the narrative content in memories. Such specific content analysis, absent in previous research, compliments other methods of studying memories. Previous work has relied on personal ratings about memory consistency, targeted recall of specific features of the memories in a less comprehensive manner, or commented on memory stability in a less systematic and more subjective style. Furthermore, the comprehensive and flexible computer coding program developed in this study is potentially a valuable tool for future narrative as well as memory research.

### Limitations of the study

In this study, I hoped to investigate memory in an ecologically valid fashion. As do most naturalistic studies, the design created a number of difficulties that were taken into consideration (e.g., memories of idiosyncratic events, self-selected memory topics, number of days spent recalling an event). Other limitations continue to need to be addressed. I did not involve a control group and therefore, was not able to compare the memory stability of these personal and salient negative events with memory stability of either less distinctive experiences, or other personal salient happenings. Without such comparison conditions, it is difficult to comment on the relative standing of the findings regarding memory stability and change. I cannot be certain that the participants remembered the emotional and disturbing events they wrote about any differently than they would have a less emotional and distinctive event (although past research strongly suggests this possibility). Unfortunately, the options regarding possible control group memories were limited to the topics that Fergusson's (1993) original control group wrote about: what they had done the previous day; what they planned to do the next day; the last social event they attended; and features of their living accommodations. Some of the previous control group participants could have written about one or more of these topics the same way they had previously to provide a comparison for the participants recalling past upsetting experiences; however, it was not clear that any of these topics would have been an appropriate control as all but one of the topics were not events. In addition, the Fergusson control group originally wrote about the topics without including any emotions or opinions, thus limiting any meaningful comparison of the stability of specific aspects of the memories. As is common in memory research, it is not always clear what past event would provide the appropriate control condition (Brewer, 1992).

It is arguable that the written narrative approach utilized in the present study may not capture an ecologically valid remembering process. Gathering data via written narratives was meant to imitate the real-life sharing of memories. However, internal, natural memories may be more incoherent, disorganized, visual and less language-based (Howe, 1998a) than recollections expressed

in written form. Requiring participants to write out their memories may have structured recall somewhat and possibly influenced the findings. When people share their memories with others it is usually communicated orally and involves some back and forth interaction that may help structure (or distort) the memory. Also, despite the confidentiality and anonymity built into the study, participants may not have shared all features of the memories they had regarding the target events. This possibility would also limit the ability of written memories to represent internal memories.

The possible effect of the experimenter-provided retrieval cue on memory stability is a potential concern. In memory studies, participants are typically provided with a title or statement to orient them when recalling events or previous memories. However, there is no standard approach to deciding how much information to provide. It is possible the retrieval cues participants received in this study influenced the findings. To the extent that the retrieval cues were more specific than necessary, the degree of memory stability found in the memories over time may have been inadvertently enhanced. However, less specific cues introduced the risk that participants would have had trouble recalling the events or distinguishing them from other similar events, thus promoting memory omissions and forgetting. With such a small sample size, it was important to ensure that participants were indeed trying to recall the events that they described 3 years earlier. Possibly, over-specified retrieval cues artificially inflated stability estimates, particularly of participants' gist recall, and limited the generalizability of the results. Under more ideal research conditions, I could have provided retrieval cues with varying amounts of information and evaluated if cue-specificity influenced results.

The gist of people's recall could have unintentionally been influenced by the retrieval cues. To the extent that the retrieval cues given to participants were systemically overly explicit, the range of the gist variable could have been restricted. Restricted range of the gist variable could explain the lack of findings when examining possible predictors of the gist. However, this potential oversight (overly explicit retrieval cues) did not similarly restrict the range of variables included in the more

detailed coding of the memory narratives, nor did it limit the major findings regarding the predictive value of subjective well-being and memory consistency.

It is also possible that the repeated recall of the same memories over time influenced people's memories of those events. Having written about past upsetting events may have made the events more memorable, thus strengthening future recall and memory stability. It is also possible that time of writing helped participants reconcile and settle their thoughts and feelings regarding the events, thus possibly influencing resolution about the events and impressions of the events.

The small size of the sample involved in this study is a further concern. Although small sample sizes are not unusual for memory research involving long intervals between memory gathering, it does necessitate cautious interpretation of the results. Null findings may have been related to low power rather than due to memory stability and change. The results that were uncovered in the analyses need to be replicated with a larger sample to strengthen their applicability.

One possible important selection bias was not addressed in this study. When I recruited potential participants to take part in this study, I informed them that they would be asked to write about the upsetting experiences they had written about 3 years ago and that I would provide a brief retrieval cue to remind them of their previous writing topic. During the recruitment, all the people I contacted suggested that they remembered the previous writing study; however, at that point they did not indicate if they also recalled the topics they previously described. Potential participants could have been influenced by their knowledge of the nature of this study when making their decision about whether to participate. That is, participants may have made the decision to participate because they recalled the events they wrote about earlier. People who declined the invitation to write about their past experiences again may have refused because they could not recall the events. Hence, those people who decided to participate may have already had a better memory of the past experiences they wrote about previously. If this was the case, then my findings about memory stability and change need to be considered with caution.

Some of the limitations of this study restrict the degree to which the results can be generalized. For instance, it is unclear if these results can be generalized beyond young-adult-aged university students. Previous research has suggested differing memory abilities between older and younger adults that have not been considered in this investigation due to the restricted age range of the sample. Given that the research involved only 22 people, any generalizations must be made with caution. In particular, any generalizations made to “repressed memory” events would be inappropriate without qualifiers. For instance, the present research dealt with past disturbing events, in fact, some of the most stressful and difficult experiences the participants had ever had to deal with. But these events are not typically the types of events that are described in repressed memory literature. (Although some participants described past abuse experiences.) The results are at the very least suggestive of the persistence and change in memories of past upsetting experiences and provide a starting point for further investigation.

Participants described salient and negative life events, but not one common experience. However, all the participants’ experiences shared important common elements despite the variety of described topics: the events were some of the most salient, disturbing, and upsetting of their lives. The findings of the current investigation may be limited to generalizations about only certain types of negative life experiences. However, prior research has suggested that the consequentiality, importance, and distinctiveness of the remembered events are relevant features by which to group memories (Conway et al., 1995; Howe, 1998b).

Naturally-occurring depression, self-esteem and positive and negative mood were factors considered in the present study. However, the majority of the ‘depressed’ participants in this study were probably only moderately depressed or dysphoric. Therefore, it is unclear if the results regarding subjective well-being and memory stability would generalize to a clinically depressed population.

As with most studies of highly emotional personal memories, the original circumstances of the shared past disturbing events were unknown. It is therefore quite difficult to comment on the

accuracy and validity of the memories over time. In fact, while I have been able to estimate memory stability and change, it was perhaps over a rather brief period in the lifespan of a memory. Many memories do last a lifetime in some form or another. However, in this study, I was able to sample that evolution of memory stability over only a 3 year span. Ideally, sampling memories of emotional, significant, and important events should begin immediately after they occur and then continue over a long period, with several memory samples gathered over time. Also, varying the length of the sampling intervals with different people would provide additional valuable comparisons. Perhaps a life-long diary study would be useful to this end. Of course any study focusing on important life events would be difficult to carry out as often the meaningfulness, consequentiality, and importance of an event is not evident until sometime later and also the importance of an event may change over time (Neisser, 1982). People change over time as well. As Rubin (1987) points out, researching autobiographical memory forces us to view memory and memory research "in a more realistic way as part of a functioning person. It makes clear the limitations and artificial boundaries we impose on our science" (p. 255-256).

### Future Directions

In this study, I examined memory stability and change mainly by observing 3 memory phenomena over time: (1) repetition, (2) addition, and (3) omission of memory content. A fourth process, contradicting original memory content, was also considered. One can see that memory stability is a complex concept that potentially involves several important processes. These processes operated at differing rates for various kinds of information in the studied memories. Generating one composite representing memory stability would have been an ideal way to comment on the stability of the different narrative elements I identified in the memories. However, deciding how to possibly combine these memory processes brings up several important issues. For instance, how do the processes relate? Are the processes measured in a way that determines their relationship? Is one

composite representative of such distinctive processes? Such issues require consideration in any future research.

Even though the original design of this study created some problems for interpretation of the findings and despite the limitations discussed above, this research suggests directions for future study. Obviously, due to the small sample size of the present study, future investigations would be required to replicate the results. Ideally, larger samples would also be involved as attrition is always a concern. Most importantly, continuing the study of memory while simultaneously considering the influences of multiple and varied factors is valuable. When studied in isolation, variables cannot provide a complete picture of the possible dynamic interplay between factors serving as a basis for predicting long-term retention of personal memories (Howe, 1998b).

In future research, investigators might assess memories for a variety of life-changing events, to further consider the possible influences (or limits) of reconstructive biases and subjective well-being. Appraisals and current views may bias recall of life-changing, but perhaps not disturbing past events. Future work could also target memories for past pleasant experiences. Such an investigation would be valuable (a) to understand the stability of pleasant and positive memories, (b) to examine if a mood congruent memory effect (as found in this investigation) would be found with pleasant events, and (c) to investigate if pleasant memories would be more susceptible to the reconstructive biasing effects of current appraisals (as found in previous research). Howe (1998b) suggests that both unpleasant and pleasant experiences include distinctive personal incidents that deserve further attention in memory research. Furthermore, a host of theories address the issue of the functionality of long-term recollection of pleasant and unpleasant memories. For instance, Walker et al. (1997) discuss Freud's proposal that unpleasant events are forgotten (or repressed into the unconscious) while pleasant experiences are not. They also discuss Taylor's (1991, as cited in Walker et al., 1997) short-term mobilization and long-term minimization hypothesis in which the affective component of negative memories are thought to be minimized while the overall memory remains intact. The literature suggests that memory stability involves dynamic processes and functionality issues (Howe,

1998b; Stein, Wade, & Liwag; Walker et al., 1997) that may differ in one's remembering pleasant and unpleasant events.

Appropriate control memories or conditions should be considered in future study as well. As it is quite difficult to identify one appropriate control event when examining past emotional events, perhaps a series of control memories could be considered. Multiple comparisons with several control conditions would be valuable. It would be informative to conduct memory research with participants recalling a variety of different events over time, thus allowing relative comparisons about memory stability and change over time. For instance, people could remember past negative, positive, and neutral experiences. Varying the possible events studied within these broad categories could provide numerous interesting comparisons and controls. For instance, by varying (1) the type of positive, negative, or neutral events (e.g., embarrassing, pleasant, euphoric, anxiety-provoking, fear, exciting), (2) the degree of significance, (3) types of common salient events (e.g., deaths, weddings, births, abuse), (4) timing of, number of and duration between recall phases, and (5) age of the rememberers, a rich and comprehensive understanding of memory persistence would follow. Such a design varying multiple factors at once would provide fruitful research ground in which to further consider and compare mood-congruent/incongruent effects and reconstructive biases.

## Appendix A

### **Sample of a time 1 narrative for a memory of a past upsetting experience:**

Chris woke up early one morning but lay in bed thinking about what all he was going to do that day. His nine-year-old mind had visions of biking to swimming lessons, coming home and watching T.V., eating a "monstro" peanut-butter and jelly sandwich for lunch. (which still happens to be his favourite meal) and then heading up the street to his friend Jason's house to spend the day reading comic books and imagining different worlds as the "Wildcat Clubhouse" (Jason's garage).

Well, like every morning, Chris stayed in bed 'til his brother Steve woke up. You see, Chris was afraid to go downstairs in the morning because there still might be monsters or thieves hanging around from the night before. So he always waited for his older brother to awaken so he could walk down the stairs with him and the intruders would be frightened away.

Well Chris and Steve made their usual breakfasts of Cheerios and Shreddies (respectively) and then plumped themselves down in front of the T.V. to watch cartoons. Of course, the ritual fight began over whether the two should watch "Scoobie-Doo" or "Rocket Robin Hood", but as was usual, Steven and "Robin Hood" won the battle.

The day was going as planned, and Chris hopped on his bike and went to his swimming lesson. When the lessons were over Chris looked for his friend Jason to swap bikes and ride home with because Jason had the coolest bike in town. But Chris couldn't find him so he settled on riding home with his brother. From this point on, the day Chris had planned changed.

When Chris and Steven got home, their parents told them they'd like to speak to them in the family room. Chris and Steven didn't know why. It had been over a week since they'd broken the garage window (which by the way, was Steve's fault) and they hadn't had a "real fight in days". Still, their mom and dad insisted so they followed them into the family room.

Well, Chris's dad took his hand and Chris's mom, Steven's and his dad said "Boys, I have some really bad news ... last night, Jason died".

**Sample of the corresponding time 2 narrative:**

Chris woke up early one morning but lay in bed thinking about what all he was going to do that day. He thought he'd go downstairs, have breakfast, watch T.V. and play with his toys until it was time for swimming lessons. Then, he'd go pick up Jason and the two would ride to swimming lessons together just as they did every morning. Maybe they'd even swap bikes on the way down. Chris liked riding Jason's bike, it was way cooler than his.

So Chris got out of bed, and went about his morning. Then, his mom and dad called him and his brother Steve into the family room - they had something they had to tell them. Chris and Steve tried to think what they'd done wrong, but couldn't. When he entered the family room, Chris' dad didn't look very happy. He said "Boys, I've got some bad news. Jason passed away last night." Chris and Steve responded with shock and disbelief. Steve started crying, but not Chris. Dad was wrong. He had to be wrong because kids don't die.

"He's not dead" said Chris "kids don't die". Finally, however, Chris thought his dad might be telling the truth. So he asked "How did he die? Was he killed! Did he get hit by a car?" His dad told him that he just died. He came home from the show, told his dad he wasn't feeling well, and went to bed. When his dad went in to check on him, he was dead. So his dad called the ambulance, but Jason was dead before he got to the hospital.

Chris couldn't believe it, Jason was dead. Yesterday they traded bikes to go to the pool, and today he was dead. All he could think was kids don't die.

Chris, to this day, doesn't remember much about the funeral, but he remembers the funeral reception at Jason's grandparents house.

A few days later, Jason's dad brought over a bunch of old goalie stu...

## Appendix B

Table B.1

### Specific Categories used in the Computer Coding Scheme of Affective Tone

Negative Tone	Positive Tone	Neutral Tone
Sadness	Happiness	General Affective States
Anger	Hope	Negated General Affective States
Fear	Negated Hopelessness	Neutral Mental State
Negated Negated Fear	Pride	Negated Neutral Mental States
Anxiety	Relief	Neutral Appraisal of Worth
Negated Relief	Positive Preference	Negated Neutral Appraisal of Worth
Disgust	Negated Negative Preference	Neutral Physical Expression
Jealousy	General Positive Affective States	Negated Neutral Physical Expression
Shame	Negated General Negative Affective States	
Negated Pride	Positive Mood States	
Guilt	Negated Negative Mood States	
Regret	Positive Mental States	
Embarrassment	Negated Negative Mental State	
Hopelessness	Positive Dispositions	
Pity	Negated Negative Dispositions	
Metaphor--sadness	Positive Appraisals of Worth	
Metaphor--anger	Negated Negative Appraisals of Worth	
Metaphor--fear	Negated Sadness	
Metaphor--disgust	Negated Anger	
Negative Preference	Negated Fear	
Negated Positive Preference	Negated Anxiety	
General Negative Affective States	Negated Shame	
Negated General Positive Affective State	Negated Disgust	
Negative Mood States	Negated Spent of Emotion	
Negated Positive Mood State	Negated Jealousy	
Negative Mental State	Negated Guilt	
Negated Positive Mental State	Negated Regret	
Negative Dispositions	Negated Embarrassment	
Negated Positive Dispositions	Negated Pity	
Negative Appraisals of Worth	Positive Physical Expression	
Negated Positive Appraisal of Worth	Negated Negative Physical Expression	
Negated Happiness	Positive Event	
Spent of Emotion	Negated Negative Event	
Metaphor--spent of emotion	Esteem	
Negative Physical Expression		
Negated Positive Physical Expression		
Negative Event		
Negated Positive Event		
Negated Esteem		

\*The computer identified two additional categories: "to be checked" and "negated to be checked"; these codes indicated that a human coder was required to read the material over to determine appropriate content coding. A final coding category labeled those idea units absent of affective tone as factual information.

Appendix C

Table C.1.

Comparing Returning Writers to Mail-in Participants and Non-participants.

Variables of Comparison	Originally Wrote about Upsetting experiences			Originally Wrote about Trivial experiences
	Returning writers (N=22)	Mail-in participation only (N=23)	Non-participants (N=16)	Mail-in participation only (N=19)
Females	14 <sub>a</sub>	17 <sub>a</sub>	11 <sub>a</sub>	12 <sub>a</sub>
Mean participant age (time 1)	20.14 (3.47) <sub>a</sub>	19.43 (1.24) <sub>a</sub>	21.00 (3.76) <sub>a</sub>	19.26 (1.81) <sub>a</sub>
Depression prior to time 1 writing	7.19 (7.39) <sub>a</sub>	6.57 (5.52) <sub>a</sub>	6.17 (4.76) <sub>a</sub>	6.21 (4.79) <sub>a</sub>
Self-esteem prior to time 1 writing	33.10 (5.66) <sub>a</sub>	32.70 (4.90) <sub>a</sub>	31.08 (4.92) <sub>a</sub>	31.84 (5.79) <sub>a</sub>
Positive mood prior to time 1 writing	2.61 (0.59) <sub>a</sub>	2.53 (0.56) <sub>a</sub>	2.52 (0.75) <sub>a</sub>	2.47 (0.61) <sub>a</sub>
Negative mood prior to time 1 writing	1.29 (0.21) <sub>a</sub>	1.49 (0.48) <sub>a</sub>	1.54 (0.55) <sub>a</sub>	1.41 (0.36) <sub>a</sub>
Positive mood after time 1 writing (controlling for initial mood)	2.14 (0.08) <sub>a</sub>	2.23 (0.08) <sub>a</sub>	2.41 (0.09) <sub>a</sub>	2.42 (0.09) <sub>a</sub>
Negative mood after time 1 writing (controlling for initial mood)	1.80 (0.06) <sub>a</sub>	1.72 (0.06) <sub>a</sub>	1.70 (0.07) <sub>a</sub>	1.38 (0.06) <sub>b</sub> <sup>30</sup>
Depression level at end of time 1 (adjusted mean controlling for initial depression)	6.99 (1.15) <sub>a</sub>	7.76 (1.12) <sub>a</sub>	6.42 (1.58) <sub>a</sub>	8.01 (1.19) <sub>a</sub>
Self-esteem level at end of time 1 (adjusted mean controlling for initial self-esteem)	32.83 (0.91) <sub>a</sub>	33.01 (0.89) <sub>a</sub>	31.04 (1.21) <sub>a</sub>	32.04 (0.92) <sub>a</sub>

*Continued*

Note: Means with different subscripts are significantly different at  $p < .05$ . Standard deviations in parentheses.

<sup>30</sup> While previous control participants who mailed in questionnaires at time 2 reported significantly less negative mood after time 1 writing sessions, negative mood after writing did not differ among the 3 previous experimental groups (those who wrote, completed questionnaires, or did not participate at time 2). The finding suggests that those who previously wrote about upsetting events experienced more negative mood after writing relative to people writing about trivial events. This finding does not suggest a selection bias at time 2.

Table C.1 continued.

Variables of Comparison	Originally Wrote about Upsetting experiences			Originally Wrote about Trivial experiences
	Returning writers (N=22)	Mail-in participation only (N=23)	Non-participants (N=16)	Mail-in participation only (N=19)
Recency of the events (mean years)	3.81 (2.91) <sub>a</sub>	4.15 (3.26) <sub>a</sub>	5.17 (2.86) <sub>a</sub>	n/a
Length of original written accounts (mean words over 4 days)	489.00 (60.2) <sub>a</sub>	438.04 (112.5) <sub>a</sub>	480.31 (91.0) <sub>a</sub>	n/a
How personal written accounts were (7 point scale 1 to 7; 1=not personal)	5.45 (1.11) <sub>a</sub>	5.68 (0.93) <sub>a</sub>	5.31 (0.78) <sub>a</sub>	n/a
How upsetting it was to initially write about events (7 point scale 1 to 7; 1=not upsetting)	3.55 (1.24) <sub>a</sub>	3.65 (1.14) <sub>a</sub>	3.95 (0.93) <sub>a</sub>	n/a
Number of events written about over 4 days	3.23 (1.19) <sub>a</sub>	2.48 (1.04) <sub>a</sub>	2.75 (1.34) <sub>a</sub>	n/a
Objective rating of severity of events (5 point scale 0 to 4; 0=not severe)	0.55 (0.66) <sub>a</sub>	0.93 (0.83) <sub>a</sub>	0.97 (0.94) <sub>a</sub>	n/a
Depression level prior to time 2 recall (adjusted mean controlling for previous depression)	6.26 (1.34) <sub>a</sub>	7.41 (1.14) <sub>a</sub>	n/a	7.71 (1.17) <sub>a</sub>
Self-esteem level prior to time 2 recall (adjusted mean controlling for previous self-esteem)	34.76 (0.75) <sub>a</sub>	35.48 (0.75) <sub>a</sub>	n/a	33.25 (0.88) <sub>a</sub>
Positive states of mind level prior to time 2 recall	15.68 (3.56) <sub>a</sub>	15.87 (3.75) <sub>a</sub>	n/a	14.89 (3.87) <sub>a</sub>
Positive mood prior to time 2 recall (controlling for previous mood)	2.50 (0.12) <sub>a</sub>	2.70 (0.12) <sub>a</sub>	n/a	2.71 (0.13) <sub>a</sub>
Negative mood prior to time 2 recall (controlling for previous mood)	1.38(0.11) <sub>a</sub>	1.58 (0.11) <sub>a</sub>	n/a	1.52 (0.12) <sub>a</sub>

Note: Means with different subscripts are significantly different at  $p < .05$ . Standard deviations in parentheses.

Appendix D

Table D.1

Examining Memories by Event at TIME 1 (original writing phase)

Variable of Interest	First EVENT (n=22)	Second EVENT (n=19)	Third EVENT (n=19)	Forth EVENT (n=14)
Mean % of participants who correctly identified previously described event	77% <sub>a</sub> (17 of 22)	53% <sub>a</sub> (10 of 19)	26% <sub>b</sub> (5 of 19)	43% <sub>a</sub> (6 of 14)
Recency of the events in years	4.22 <sub>a</sub> (4.68)	3.23 <sub>a</sub> (3.37)	4.45 <sub>a</sub> (5.15)	3.19 <sub>a</sub> (3.22)
Objective Severity (5 point scale: 0 to 4)	0.82 <sub>a</sub> (0.99)	0.58 <sub>a</sub> (0.89)	0.36 <sub>a</sub> (0.47)	0.11 <sub>b</sub> (0.28)
Personal Severity (using a 7 point scale)	n/a	n/a	n/a	n/a
Upset caused by the event (using a 7 point scale)	6.64 <sub>a</sub> (0.85)	6.63 <sub>a</sub> (0.83)	6.37 <sub>a</sub> (0.96)	6.21 <sub>a</sub> (1.31)
Personal significance of the event (using a 7 point scale)	5.22 <sub>a</sub> (1.21)	5.46 <sub>a</sub> (1.16)	5.32 <sub>a</sub> (1.81)	4.80 <sub>a</sub> (1.75)
Resolution of the event (using a 7 point scale)	3.31 <sub>a</sub> (1.14)	3.35 <sub>a</sub> (1.39)	3.21 <sub>a</sub> (1.29)	3.18 <sub>a</sub> (1.19)
Memory vividness and accuracy of the event (using a 7 point scale)	5.89 <sub>a</sub> (0.69)	5.37 <sub>a</sub> (1.43)	5.33 <sub>a</sub> (0.99)	5.20 <sub>a</sub> (1.05)

Note. As only 3 participants wrote about more than 4 events (between 5 and 9 in total) analyses considered only the first four events. Standard deviations in parenthesis. Different subscripts within a row indicates a significant difference at  $p < .10$ .

Table D.2.

Examining Memories by Event at TIME 2 (original writing phase)

Variable of Interest	First EVENT (n=22)	Second EVENT (n=19)	Third EVENT (n=19)	Fourth EVENT (n=14)
Mean % of participants who correctly identified previously described event	n/a	n/a	n/a	n/a
Recency of the events in years	n/a	n/a	n/a	n/a
Objective Severity (5 point scale: 0 to 4)	n/a	n/a	n/a	n/a
Personal Severity (using a 7 point scale)	4.18 <sub>a</sub> (1.59)	4.47 <sub>a</sub> (1.27)	4.59 <sub>a</sub> (1.32)	4.35 <sub>a</sub> (1.58)
Upset caused by the event (using a 7 point scale)	6.68 <sub>a</sub> (0.45)	6.26 <sub>a</sub> (0.99)	6.05 <sub>a</sub> (1.35)	6.14 <sub>a</sub> (1.17)
Personal significance of the event (using a 7 point scale)	5.14 <sub>a</sub> (1.60)	5.16 <sub>a</sub> (1.83)	4.76 <sub>a</sub> (1.63)	4.73 <sub>a</sub> (1.71)
Resolution of the event (using a 7 point scale)	2.23 <sub>a</sub> (0.68)	2.58 <sub>a</sub> (1.11)	2.32 <sub>a</sub> (1.08)	2.14 <sub>a</sub> (0.90)
Memory vividness and accuracy of the event (using a 7 point scale)	4.45 <sub>a</sub> (1.16)	4.47 <sub>a</sub> (1.32)	3.63 <sub>a</sub> (1.41)	4.36 <sub>a</sub> (1.95)

Note. As only 3 participants wrote about more than 4 events (5, 7, and 9 events) analyses considered only the first four events. Standard deviations in parenthesis. Different subscripts within a row indicates a significant difference at  $p < .10$ .

Table D.3.

Examining Memories by Day at TIME 1 (original writing phase)

Variable of Interest	First DAY (n=22)	Second DAY (n=22)	Third DAY (n=22)	Forth DAY (n=22)
Mean % of participants who correctly identified previously described event	77 % <sub>a</sub> (17 of 22)	50 % <sub>a</sub> (11 of 22)	50 % <sub>a</sub> (11 of 22)	50 % <sub>a</sub> (11 of 22)
Recency of the events in years	3.85 <sub>a</sub> (4.41)	3.36 <sub>a</sub> (3.79)	5.32 <sub>a</sub> (5.29)	3.00 <sub>a</sub> (3.70)
Objective Severity (5 point scale: 0 to 4)	0.77 <sub>a</sub> (0.92)	0.63 <sub>a</sub> (0.95)	0.57 <sub>a</sub> (0.89)	0.21 <sub>b</sub> (0.40)
Personal Severity (using a 7 point scale)	n/a	n/a	n/a	n/a
Upset caused by the event (using a 7 point scale)	5.23 <sub>a</sub> (1.38)	5.59 <sub>a</sub> (1.18)	5.36 <sub>a</sub> (1.50)	4.86 <sub>a</sub> (1.83)
Personal significance of the event (using a 7 point scale)	3.32 <sub>a</sub> (1.12)	3.39 <sub>a</sub> (1.44)	3.26 <sub>a</sub> (1.32)	3.23 <sub>a</sub> (1.21)
Resolution of the event (using a 7 point scale)	3.32 <sub>a</sub> (1.12)	3.39 <sub>a</sub> (1.44)	3.26 <sub>a</sub> (1.32)	3.23 <sub>a</sub> (1.21)
Memory vividness and accuracy of the event (using a 7 point scale)	6.06 <sub>a</sub> (0.60)	5.54 <sub>a</sub> (1.29)	5.65 <sub>a</sub> (0.95)	5.58 <sub>a</sub> (0.81)

Note. Standard deviations in parenthesis. Different subscripts within a row indicates a significant difference at  $p < .10$

Table D.4.

Examining Memories by Day at TIME 2 (second writing phase)

Variable of Interest	First DAY (n=22)	Second DAY (n=22)	Third DAY (n=22)	Forth DAY (n=22)
Mean % of participants who correctly identified previously described event	n/a	n/a	n/a	n/a
Recency of the events in years	n/a	n/a	n/a	n/a
Objective Severity (5 point scale: 0 to 4)	n/a	n/a	n/a	n/a
Personal Severity (using a 7 point scale)	4.14 <sub>a</sub> (1.64)	4.59 <sub>a</sub> (1.50)	4.82 <sub>a</sub> (1.26)	4.59 <sub>a</sub> (1.79)
Upset caused by the event (using a 7 point scale)	6.64 <sub>a</sub> (0.49)	6.45 <sub>a</sub> (0.74)	6.14 <sub>a</sub> (1.28)	6.14 <sub>a</sub> (1.08)
Personal significance of the event (using a 7 point scale)	5.32 <sub>a</sub> (1.52)	5.50 <sub>a</sub> (1.79)	4.91 <sub>a</sub> (1.60)	4.77 <sub>a</sub> (1.88)
Resolution of the event (using a 7 point scale)	2.25 <sub>a</sub> (0.66)	2.53 <sub>a</sub> (1.05)	2.40 <sub>a</sub> (1.08)	2.33 <sub>a</sub> (1.14)
Memory vividness and accuracy of the event (using a 7 point scale)	4.65 <sub>a</sub> (1.10)	4.51 <sub>a</sub> (1.32)	4.18 <sub>a</sub> (1.29)	4.36 <sub>a</sub> (1.72)

Note. Standard deviations in parenthesis. Different subscripts within a row indicates a significant difference at  $p < .10$ .

Appendix E

Table E.1.

Correlations of Predictor Variables at Time 1.

Time 1 Variables (N=22)	Age	Recency of events	Depression	Self- esteem	Positive mood	Negative mood	Event resolution	Personal significance	Objective severity	Memory vividness	Negative- positive view
Age	1.00										
Recency of events	.260	1.00									
Depression	-.118	-.023	1.00								
Self-esteem	.101	.068	<b>-.820***</b>	1.00							
Positive mood	.049	.009	<b>-.412†</b>	<b>.383†</b>	1.00						
Negative mood	-.172	.075	.297	-.255	-.194	1.00					
Event resolution	<b>.378†</b>	.306	.161	-.131	.091	.133	1.00				
Personal significance	.274	-.102	.009	.158	.181	.102	-.189	1.00			
Objective severity rating	<b>.557**</b>	<b>.650***</b>	.129	-.221	-.035	-.083	<b>.396†</b>	-.152	1.00		
Memory vividness and accuracy	-.081	-.026	-.226	.225	.316	-.111	-.259	-.174	-.224	1.00	
Negative-positive view	-.305	-.102	-.192	.175	-.142	.168	<b>-.499*</b>	-.184	-.071	.357	1.00

Note: Significant results are highlighted; † < .10; \* p < .05; \*\* p < .01; \*\*\* p < .001

Table E.2.

## Correlations of Predictor Variables at Time 2.

Time 2 Variables (N=22)	Depression	Self-esteem	Positive states of mind	Positive mood	Negative mood	Event resolution	Personal significance	Personal severity	Memory vividness and accuracy	Believed similarity between accounts	Negative-positive view	Changed thoughts and feelings
Depression	1.00											
Self-esteem	<b>-.389<sup>†</sup></b>	1.00										
Positive states of mind	<b>-.691<sup>***</sup></b>	.243	1.00									
Positive mood	-.214	.243	<b>.429<sup>*</sup></b>	1.00								
Negative mood	.282	-.340	<b>-.567<sup>**</sup></b>	-.161	1.00							
Event resolution	-.307	.274	.215	.057	<b>-.580<sup>**</sup></b>	1.00						
Personal significance	.260	-.367	.015	.018	.328	<b>-.645<sup>**</sup></b>	1.00					
Personal severity rating	.054	-.074	.103	.068	-.06	<b>-.398<sup>†</sup></b>	<b>.419<sup>†</sup></b>	1.00				
Memory vividness and accuracy	.181	.117	-.119	-.080	-.056	-.093	.199	-.349	1.00			
Believed similarity between accounts	-.097	.069	.105	-.057	-.260	.045	-.344	-.327	<b>.400<sup>†</sup></b>	1.00		
Negative-positive view	-.275	.056	.137	-.073	-.039	-.026	-.091	.179	<b>-.451<sup>*</sup></b>	-.116	1.00	
Changed thoughts and feelings	-.148	.095	.285	.074	-.281	<b>.389<sup>†</sup></b>	-.322	.012	-.028	-.172	-.049	1.00

Continued

Note: Correlations after controlling for time 1 variable(s) where applicable. Significant results are highlighted; <sup>†</sup> < .10; <sup>\*</sup> p < .05; <sup>\*\*</sup> p < .01; <sup>\*\*\*</sup> p < .001

## Appendix F

Gist elements were recorded only for time 1 recollections. On average, a gist outline contained 10.33 elements ( $SD=1.85$ ) highlighting a participant's narrative memories at time 1. With the exception of objective severity, no concurrent time 1 variables were associated with the mean number of gist elements in time 1 narratives. Relative to those narratives that judges objectively rated as less severe, time 1 memories of more severe experiences contained more central elements in their gist outlines ( $r=.430, p=.046$ ).

Table F.1 below contains a breakdown of the proportions of affectively toned and factual thought units contained in the recollections at both points in time.

Table F.1.

### Proportions of Affective Tone and Factual Content at the Two Recall Times

Content of Memories	Time 1	Time 2
Affect-toned statements	0.61 ( 0.07)	0.59 ( 0.05)
Breakdown of affective tone:		
Positive	0.22 (0.06)	0.22 (0.06)
Negative	0.36 (0.08)	0.34 (0.07)
Neutral	0.03 (0.02)	0.03 (0.01)
Factual statements	0.39 (0.07)	0.41 (0.05)

Note: Proportions were calculated using the respective total number of idea units in either the time 1 or time 2 memories. Results from paired-sample t-tests, 2-tailed. Standard deviations are reported in parentheses.

•  $p < .05$ ; ••  $p < .01$ ; •••  $p < .001$

Comparisons Within the Memories. As might be expected when writing about upsetting events, participants included significantly more affective tone than factual information in their accounts at both times ( $t(21)=7.70, p=.000$  for time 1;  $t(21)=7.56, p=.000$  for time 2). The pattern of proportions of affective tone ( $M=.61$  for time 1 and  $M=.59$  for time 2) versus factual information ( $M=.39$  for time 1 and  $M=.41$  for time 2) is similar in both sets of recollections. At both times, participants included significantly more negative tone in their accounts than either positive or neutral

tone ( $F(1.18, 24.82)=152.46, p=.000$  for time 1;  $F(1.14, 23.92)=170.18, p=.000$  for time 2). Writers also included more positively than neutrally toned statements (all  $p$ 's=.000 using LSD tests, 2-tailed). Overall, participants included very few neutral descriptors ( $M=.03$ ) in their remembrances at either time.

Comparisons Over Time. Comparisons of change in the proportions of positive, negative and neutral affect over time were non-significant. Despite participants writing about past disturbing experiences, there was neither a decrease nor an increase of affective descriptors over time.

Factual/affective content in the second memory was moderately positively associated with the affective tone/factual content in the first memory ( $r=.409, p=.059$ ). The association over time of the proportions of negative, positive and neutral affect differed for males and females. In males' accounts, positive, negative and neutral tone were positively correlated over time ( $r=.796, p=.018, r=.906, p=.002$ ; and  $r=.690, p=.058$ , respectively). In contrast, in females' narratives, neither original positive or neutral tone were not associated with its' counterpart over time. However, negative affect was positively correlated over time. ( $r=.613, p=.020$ ).

Analyses indicated that relatively few time 1 variables were associated with the affective and factual content of time 1 remembrances. Relative to older memories, more recent memories contained more positive affect ( $r=-.595, p=.003$ ). I found no other variables associated with affective tone and facts in time 1 narratives. Specifically, neither subjective well-being (depression, self-esteem and positive and negative mood) nor participant appraisals were associated with positive, negative, neutral tone or factual content.

After I controlled for corresponding time 1 content and time 1 variables, very few variables were associated with time 2 content. Beyond time 1 content, as participants rated lower memory vividness and accuracy over time, they also wrote more negative content into their time 2 recollections ( $r=-.47, p=.034, \text{change } R^2=.08$ ).

I also coded the memories for goal processes (stated desires and wishes, and their outcomes either successes, failures, partially achieved or unknown outcomes; explained in detail in Appendix

G). Goals were first categorized as either authors' goals (personal desires and wishes of the writer) or others' goals (goals of other character(s) involved in the accounts). Table F.2 highlights the narrative goal content of the memories at both times. Both female and male participants were self-focused and wrote mainly about personal goals at both recall times; on average they included very few goals for other characters in their accounts. At each recall time, participants wrote significantly more about their own desires and wishes than those of others ( $p$ 's<.001 using paired sample t-tests). Participants expressed significantly fewer personal goals in time 2 memories ( $M=18.23$ ) than time 1 memories ( $M=23.95$ ), but just as many other characters' goals. Since the total number of goals reportedly decreased over time, the proportion of other characters' goals increased significantly over time, but others' goals still remain a much smaller proportion (0.189) of the time 2 memory than author goals (0.811).

Table F.2.

Narrative Goals at the Two Recall Times

Content of Memories	Time 1	Time 2
Average number of goals (per day) **	27.75 (7.08)	22.38 (5.57)
Average number of <u>author goals</u> (per day) ***	23.95 (7.02)	18.23 (5.34)
Proportion of author goals (proportion of all coded goals) **	0.857 (0.070)	0.811 (0.085)
Average number of <u>other characters' goals</u> (per day) ***	3.80 (1.80)	4.15 (2.05)
Proportion of others' goals (proportion of all coded goals) **	0.143 (0.070)	0.189 (0.085)

Note: Results from paired-sample t-tests, 2-tailed. Standard deviations are reported in parentheses.

\*\* $p < .05$ ; \*\*\* $p < .01$ ; \*\*\*\* $p < .001$

Larger proportions of time 1 author/other goals predicted higher proportions of time 2 author/other goals ( $r=.67$ ,  $p=.001$ , change  $R^2=.44$ ). Again, few time 2 variables were associated with time 2 goals. A stronger belief that narratives were similar over time and reportedly less change in thoughts and feelings regarding the events (in 3 years) were both related to fewer goals at time 2 ( $r=-.49$ ,  $p=.026$ , change  $R^2=.17$ ,  $r=-.52$ ,  $p=.015$ , change  $R^2=.20$ , respectively). No additional variables predicted the proportion of author/other goals at time 2.

Table F.3.

Proportions of Outcomes for Author Goals at the Two Recall Times

Goal outcomes:	Time 1	Time 2
Success	0.24 (0.14)	0.23 (0.12)
Failure **	0.45 (0.16)	0.58 (0.13)
Partial achievements	0.10 (0.07)	0.08 (0.05)
Unknown **	0.22 (0.11)	0.12 (0.06)

Note: All proportions of total author goals at respective times. Results from paired-sample t-tests, 2-tailed). Standard deviations are reported in parentheses. \*\* $p < .05$ ; \*\*\* $p < .01$ ; \*\*\*\* $p < .001$

Comparisons Within the Memories. In table F.3, I consider the personal goals and respective outcomes that participants included in their narratives at both times.<sup>31</sup> At both recall times, participants wrote about failed goals,  $M=.45$  for time 1 and  $M=.58$  for time 2, more often than all other outcomes, ( $F(2.30, 48.35)=13.42$ ,  $p=.000$  for time 1 memories;  $F(1.53, 32.82)=62.709$ ,  $p=.000$  for time 2, all  $p$ 's $<.05$  using 2-tailed LSD tests). In time 1 narratives, failures, but not successes were significantly more common than unknown outcomes, which were more common than partially

<sup>31</sup> As author goals were the variable of interest and goals for other characters accounted for only a small number (3-4) of all identified goals, others' goals were removed from further analyses.

achieved outcomes. In the time 2 memories we see a slight change in this pattern of goal outcomes. It seems that with the passage of time, previously unknown outcomes of goals became settled, mainly as failures. At time 2 people recalled higher proportions of successfully achieved goals than either unknown or partially achieved outcomes, which did not differ from each other. (All  $p$ 's < .05, using 2-tailed LSD tests).

Comparisons Over Time. Over time, participants tended to become more focused on failures. Relative to time 1 narratives, participants recalled more failed personal goals in their time 2 memories and fewer unknown personal outcomes. The amount of successes and partial achievements remembered over time did not change.

As participants wrote about increasingly more severe events (objective rating of severity), they included higher proportions of personal goals in their writing at time 1 ( $r = .44$ ,  $p = .040$ ), in particular unknown personal goals ( $r = .57$ ,  $p = .006$ ). Higher levels of initial depression in participants were related to participants writing about fewer failed, more partial achieved, and more unknown goals at time 1 ( $r = -.47$ ,  $p = .03$ ;  $r = .49$ ,  $p = .024$ , and  $r = .55$ ,  $p = .01$  respectively). Participants with lower initial self-esteem wrote about more unknown goals in their original accounts of past upsetting events ( $r = -.59$ ,  $p = .005$ ). Other variables were not predictive of time 1 goal and outcome content. No other variables besides the time 1 proportion of personal goals predicted the proportion of author goals participants described in later narratives ( $r = .67$ ,  $p = .001$ , change  $R^2 = .44$ ). Those participants who wrote about more successes at time 1, also wrote about more successes at time 2 ( $r = .59$ ,  $p = .013$ , change  $R^2 = .36$ ). In addition, males wrote about more successes and fewer failures and fewer goals at time 2 ( $t(20) = -3.43$ ,  $t(20) = 2.46$  and  $t(20) = 2.67$ , all  $p < .05$ ). Higher initial depression and lower initial self esteem predicted participants describing fewer unknown goals in time 2 narratives (after controlling for the proportion of time 1 unknown goals,  $r = -.58$ ,  $p = .008$ , change  $R^2 = .32$ ;  $r = .46$ ,  $p = .042$ , change  $R^2 = .20$ ).

## Appendix G

Stein, Wade and Liwag (1997) advance a theory for remembering emotion that is “driven by a person’s goals and desires as well as by dynamic knowledge about external reality and the ways in which this reality constrains or facilitates goal achievement” (p. 15). They suggest that it is necessary to characterize both the constructive processes of memory and the nature of the experience being remembered to comment on memory consistency. They argue that the degree to which a person understands their experiences and can infer causal links between events are important in determining what information is added and deleted when memories are retold. Memory for emotional events depends on how the events were interpreted and is structured around prior knowledge, goals, outcomes, and actions (see Howe, 1998b). Stein, Wade and Liwag suggest that these elements are almost always better recalled for emotional events than non-emotional events.

While examining thematic consistency in personal narratives and self-identity, Thorne, Cutting and Skaw (1998) recruited university-aged young adults to tell stories about their relationships with others during 2 interviews separated by 6 months. At each time participants described themselves to an interviewer by relating relationship stories. Thirty of 46 returning participants told the same relationship narrative twice. By coding for relationship episodes (a description of what the participant wanted from another in a specific encounter) and the participant’s assessment of the outcome (positive, negative, or mixed), the authors evaluated the ‘thematic consistency’ (author motivation, beliefs, and concerns) within the content of these repeated memories. Overall, 71 % of the repeated narratives involved the same basic storyline at the second telling as the first. The repeated memories were very similar in content for theme and outcome (90 % and 85 % respectively). Regarding outcomes, 92 % remained negative, 86 % remained positive and 50 % remained mixed. (However, these authors failed to clearly outline the criteria they had used to identify consistent or same content over time).

As a subordinate interest in emotional recall, I evaluated the memory stability and change over time in terms of goals and outcomes in addition to gist, affect and facts. I employed a goal-

process coding scheme (Belanger, 1999; Folkman & Stein, 1995, 1997) to examine how consistently participants recalled not only what they wanted to happen during their past upsetting events, but also the success/failure of those desires. This coding approach identifies what participants wanted as well as the outcome (success, failure, partial, unknown) of those desires. If the findings of Thorne et al. (1999) are an indication of expected memory consistency, then considerable consistency across time is expected for the goals and outcomes participants reported. However, Stein et al. (1997) suggest that memory of emotion events is more complex and that perhaps there will be some inconsistency and change over time based on a people's changing understanding of the event as well as their ability to establish causal links.

Coding for Personal Goals and Their Outcomes. I coded narratives for goal processes (stated desires and wishes and their outcomes, either successes, failures, partial achievements or unknown outcomes). This coding scheme was based on the work of Stein, Folkman, Trabasso, and Richards (1997) who collected narrative accounts of caregivers of partners suffering from AIDS and identified goal processes within the narratives. According to Stein and her colleagues, a goal refers to "a desire to go from one state to another or a desire to maintain a current state" (p. 880). I followed the specific coding procedures used by Belanger (1999, appendix H) to identify goal processes in narratives. First, the narrative was read in order to generate a list of explicitly stated or implied goals. I focused on the personal goals participants expressed for themselves.<sup>32</sup> A goal was often identified by means of key words or phrases suggesting a desire. For instance, the phrases "I wanted it to stop", "I wished this hadn't happened" and "I needed some closure", contain key words suggesting a desired goal. Other examples of keywords used to signal the presence of an explicit goal included 'liking', 'loving', 'missing', 'hating', 'avoiding', 'disliking', and 'unfortunately'. Similar to Belanger, I also identified goals implied by stated failures or by questions. For instance examples include "I couldn't get her off my mind", "I never let go", "I wasn't handling it at all", and "why did he die".

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<sup>32</sup> Analyses suggested that 81 to 86 % of the goals expressed in narratives were personal goals. Participants spent very little time describing goals for other characters included in their accounts.

Based on information given as the narrative unfolded, I then coded the outcome of each goal as either a success, failure, partial achievement, or unknown. I reread the narratives until each goal in the developed list was accounted for in terms of an outcome. Language in the narrative sometimes signaled outcomes with specific words like “now”, “currently”, “just”, “but”, and “at this point” or with an overlap in language like “Chris looked for Jason to swap bikes” (goal) and “but Chris couldn’t find him” (outcome). Successes involved goals that were achieved in their entirety. For instance, the stated goal “I wanted it to stop” was coded a success if the author indicated in the narrative that situation ceased, for example “it was over!”. A goal was coded a failure if the narrator was not able to achieve any part of the goal, for example, “it never stopped”. Partially achieved goals occurred when the author achieved part, but not all of an identified goal. For example, if someone wrote “I needed her to calm down” and then later indicated “she stopped sobbing for a little while, but started again when she saw the accident”, the goal was coded as a partial achievement. When a narrator stated a goal in a narrative, but did not include any reference about the outcome of that goal, I coded this goal as an unknown outcome.

For the purposes of establishing reliability, a senior graduate student (Belanger ) independently read 15 % of the narratives and identified goals. The number of goals we identified in the narratives was highly correlated ( $r=.99$ ,  $p=.000$ ). To determine if the same goals had been identified, I divided this subset of narratives into clauses and tallied the number of clauses in each narrative containing the same goals identified by both of us. Inter-rater reliability was acceptable with Cohen’s kappa at 0.80 (and percent agreement at 90.12 %). We then settled any inconsistencies regarding goal identification by consensus and agreed upon a common pool of goals that we coded for outcomes. Inter-rater reliability for goal outcome (successes, failures, partial achievements, and unknowns) was again acceptable at kappa =.94 and percent agreement at 95.66 %.<sup>33</sup>

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<sup>33</sup> I coded goals for other dimensions including explicitness (explicit or implied), appeal (wanting to approach or avoid a stated goal) and verb tense (past, present, or future). These coding categories and resulting reliabilities are discussed in Appendix H.

Similar to content coding involving affect and facts, I coded for the memory stability of goals over time. After rereading the time 1 and time 2 memory narratives, goals from time 1 were directly compared to goals stated at time 2. Narrative goals from time 2 stories were coded as either same or new. If a goal at time 2 was similar or nearly the same as a goal stated at time 1, it was considered the 'same'. New goals were ones that appeared in the time 2 narrative but were not present at time 1. Additionally, any time 1 goals that were not present in any form at time 2 were considered omitted goals. An independent rater followed this same procedure for 15 % of the narratives and reliability was adequate with kappa= 0.91 and percent agreement = 94.2 %. (The contradictory category mentioned earlier does not apply to the memory stability of goals over time. As a result of coding criteria, it was not practical to code goals as contradictions. Differences in goals over time were categorized as a new goal at time 2 as well as an omitted goal at time 1, as contradictory goals were almost non-existent).

I also examined the memory stability of the outcomes of the same, new, and omitted goals by coding them as same or different, successes, failures, partial achievements and unknowns. I proportionalized this data by using the total number of personal goals in a memory narrative. For example, if a goal was repeated over time and also had a consistent outcome over time, it was coded as the same goal with the same outcome (either success, failure, partial achievement or unknown). Since some repeated goals over time had different outcomes at time 2 than the outcomes indicated at time 1, I took this into account. For instance, a time 1 goal repeated at time 2 that was a previous success but at time 2 had a different outcome (either a failure, partial achievement or unknown) was coded as the same successful goal with a different outcome. I applied this same approach to previous failures, previous partial achievements, and previous unknown outcomes. (This approach was only necessary for same goals over time). New and omitted goals over time were also categorized by their outcomes.

What goals and outcomes are repeated, added, or omitted over time? Participants added a sizeable (and significantly larger) proportion of new personal goals ( $M=.62$ ) to their narratives rather than repeating the same ones ( $M=.38$ ) described previously ( $t(21)=-5.42, p=.000$ ; seen in table G.1). Participants omitted a very large proportion ( $M=.71$ ; table G.2) of the personal goals they originally described in their memories and were much more likely to omit their original goals in subsequent versions of the memories than to repeat them ( $t(21)=13.51, p=.000$ ). Writers were also significantly more likely to omit goals with all categories of outcomes from their first memories than to repeat the same outcomes later on (all t-test with  $p's<.10$ ).

If participants repeated the same personal goals in their memory narratives over time, they were much more likely to repeat the original outcome ( $M=.27$ ) than to introduce a different outcome ( $M=.11$ ;  $t(21)=6.08, p=.000$ ; see table G.1). Failures were the most repeated outcome of reiterated goals ( $F(2.15, 45.20)=50.36, p=.000$  and  $p's<.10$  for 2-tailed LSD tests controlling for type II error rate<sup>34</sup>). Successes and unknown outcomes were repeated significantly more often than partially achieved outcomes. Participants also incorporated more of the same goals from their time 1 recollections into their time 2 memories, but with different endings to these goals that had previous successful and unknown outcomes. When participants repeated the same original goal but changed their outcomes over time, they most likely changed previous unknown outcomes. Unknown outcomes were changed more often than failures, successes and partial failures (which did not differ from each other;  $F(2.09, 43.82)=7.344, p=.001$  and  $p's<.10$  for 2-tailed LSD tests). However, the proportions of all changed outcomes for repeated goals were fairly low. According to tables G.1 and F.3 (appendix F, page 99), one would suspect that over time these previously unknown outcomes became remembered as, or resolved as, failures.

Other transformations in memories over time involved participants adding new and omitting outcomes to original goals repeated over time. People introduced new failed personal goals into their

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<sup>34</sup> I controlled for type II error rate in all subsequent LSD tests comparing more than 3 groups.

Table G.1.

Proportions of SAME and NEW Goals and Outcomes in Time 2 Memories

Content Coding	Same		New
Author Goals	0.38 <sub>a</sub> (0.11)		0.62 <sub>b</sub> (0.11)
Outcomes:	Same Outcome as time 1	Different Outcome from time 1	
	0.27 <sub>a</sub> (0.11)	0.11 <sub>b</sub> (0.05)	
Success	0.06 <sub>a</sub> (0.07)	0.01 <sub>b</sub> (0.02)	0.15 <sub>c</sub> (0.08)
Failure	0.18 <sub>a</sub> (0.07)	0.03 <sub>b</sub> (0.03)	0.35 <sub>c</sub> (0.09)
Partial Achievement	0.01 <sub>a</sub> (0.02)	0.02 <sub>a</sub> (0.02)	0.05 <sub>c</sub> (0.03)
Unknown	0.02 <sub>a</sub> (0.03)	0.05 <sub>b</sub> (0.04)	0.07 <sub>b</sub> (0.05)

Note: Proportions of all author goals in the second set of memories. The lower case subscripts represent comparisons for the second memory. Different subscripts in a row indicate significant differences.  $p < .05$ , using LSD test (2-tailed) or paired-samples t-test (2-tailed). Standard deviations in parentheses.

Table G.2.

Proportions of OMITTED Goals and Outcomes from Time 1 Memories

Content Coding	Omitted
Author Goals	0.71 (0.07)
Outcomes:	
Success	0.19 (0.10)
Failure	0.29 (0.15)
Partial Achievement	0.07 (0.05)
Unknown	0.16 (0.10)

Note: Proportions of all author goals in the first set of memories. Standard deviations in parentheses.

memories of upsetting experiences significantly more often than all other outcomes ( $F(1.78, 37.43)=78.82, p=.000$ , and all  $p's < .10$  for 2-tailed LSD tests). New successes were more common than either new unknowns or new partially-achieved goals (which did not differ from each other). Authors omitted both original failures and successes most often relative to other outcomes, and they left out more previously unknown goals than partially achieved goals ( $F(2.00, 42.00)=13.50, p=.000$ , and  $p's < .10$  for 2-tailed LSD tests).

What predicts memory stability in narrative goals and outcomes? People endorsing greater depression and lower self-esteem at time 1 were more likely to reiterate the same goals from their time 1 memories in their later memories. These participants were more likely to duplicate the same partially achieved goals and to change previously failed and unknown outcomes in later recall.

In addition, mood-incongruent recall was present when considering time 2 subjective well-being. Greater positive mood and positive state of mind were related to more retention of previously related failed goals. It seems that those in a more positive state during the time 2 recall of the events were better able to tolerate reiterating their failures than participants in a less positive state. However, a similar effect with negative affective content was not found. Nevertheless, this finding is similar to the counter-emotional thinking Petty and Smith (1995) found with self-esteem and induced sadness.

Participants who endorsed more vivid and clear memories at time 2 provided both consistency and inconsistency in their descriptions of goals. They included more of the same partially-achieved goals that they had written about previously. However, these participants included different outcomes (at time 2) to the same goals that previously had unknown endings.

Few appraisals of the experiences at time 2 were predictive of memory stability for goals and outcomes; there was little evidence of reconstructive biases (see tables G.3 & G.4). Relative to others rating less change, participants with a greater belief that their thoughts and feelings about the events had changed reiterated fewer of the successes they had mentioned in their prior writing. However, some time 1 appraisals were predictive. Relative to less significant events, more significant

Table G.3.

Factors Predicting the Repetition of SAME Goals (with Same Outcomes) in Memories Over Time

SAME PERSONAL GOALS Over Time	Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
SAME PERSONAL GOALS:	<b>Positive mood prior to writing; time 1</b>	<b>.04</b>	<b>-.19</b>	<b>ns</b>
	<b>time 2</b>	<b>.38</b>	<b>.62</b>	<b>.003</b>
With SAME outcomes:				
Successes	<b>Changed thoughts and feelings during 3 year interval</b>	<b>.23</b>	<b>-.49</b>	<b>.021</b>
Failures	<b>Positive states of mind (time 2)</b>	<b>.18</b>	<b>.42</b>	<b>.051</b>
	<b>Positive mood prior to writing; time 1</b>	<b>.00</b>	<b>-.07</b>	<b>ns</b>
	<b>time 2</b>	<b>.33</b>	<b>.57</b>	<b>.007</b>
	<b>Significance of experiences; time 1</b>	<b>.17</b>	<b>-.42</b>	<b>.050</b>
	<b>time 2</b>	<b>.00</b>	<b>-.04</b>	<b>ns</b>
Partial achievements	<b>Depression; time 1</b>	<b>.28</b>	<b>.53</b>	<b>.013</b>
	<b>time 2</b>	<b>.01</b>	<b>-.03</b>	<b>ns</b>
	<b>Self-esteem; time 1</b>	<b>.31</b>	<b>-.56</b>	<b>.008</b>
	<b>time 2</b>	<b>.00</b>	<b>.03</b>	<b>ns</b>
	<b>Degree of event resolution; time 1</b>	<b>.20</b>	<b>.44</b>	<b>.039</b>
	<b>time 2</b>	<b>.03</b>	<b>.18</b>	<b>ns</b>
	<b>Memory vividness and accuracy; time 1</b>	<b>.00</b>	<b>-.04</b>	<b>ns</b>
	<b>time 2</b>	<b>.25</b>	<b>.50</b>	<b>.029</b>
	<b>Objective Severity rating</b>	<b>.20</b>	<b>.45</b>	<b>.035</b>

Note. Significant findings are highlighted in the table.

Table G.4.

**Factors Predicting the Repetition of SAME Goals (with Different Outcomes) in Memories Over Time**

SAME PERSONAL GOALS Over Time	Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
With DIFFERENT outcomes: Successes	Degree of event resolution; time 1	.09	-.32	ns
	<b>time 2</b>	<b>.18</b>	<b>-.45</b>	<b>.042</b>
	Memory vividness and accuracy; time 1	.29	.54	.010
	time 2	.00	.06	ns
Failures	<b>Believed similarity to first written account</b>	<b>.25</b>	<b>-.50</b>	<b>.018</b>
Partial achievements	<b>Depression; time 1</b>	<b>.17</b>	<b>.46</b>	<b>.037</b>
	time 2	.03	-.13	ns
	<b>Self-esteem; time 1</b>	<b>.18</b>	<b>-.43</b>	<b>.052</b>
	time 2	.06	.28	ns
Unknowns	<b>Depression; time 1</b>	<b>.37</b>	<b>.61</b>	<b>.003</b>
	time 2	.04	-.26	ns
	<b>Self-esteem; time 1</b>	<b>.29</b>	<b>-.54</b>	<b>.012</b>
	time 2	.07	.31	ns
	Degree of event resolution; time 1	.03	.17	ns
	<b>time 2</b>	<b>.29</b>	<b>.55</b>	<b>.010</b>
	<b>Changed thoughts and feelings during 3 year interval</b>	<b>.19</b>	<b>.44</b>	<b>.041</b>

Note. Significant findings are highlighted in the table.

events were recalled with fewer of the same failures in subsequent reminiscing. Relative to those endorsing less event resolution (more rumination), participants who rated events as more resolved at time 1 later recalled the experience with more of the same partially achieved goals that they had included in the memory 3 years ago. The general absence of reconstructive biases when discussing memory stability may not be surprising. Rather these biases may be more evident and applicable when discussing memory change over time.

What predicts added and omitted goals and outcomes? Higher positive mood, self-esteem and positive states of mind during the time 2 recall predicted less addition of new goals into people's memory narratives; in particular, relative to others reporting less positive state of mind and self-esteem, participants added fewer new successes in subsequent narratives. Gender also predicted goal additions. Relative to females, males added significantly more new successful goals in the memories over time; females added significantly more failures over time. No time 1 variables, subjective well-being or appraisals, were associated with the addition of new goals and outcomes into subsequent memories of disturbing events.

Some evidence for reconstructive biases was found when reviewing the results of omitted personal goals over time. Participants who suggested their thoughts and feelings had changed little during the 3 year interval omitted fewer goals, specifically unknown outcomes, in their subsequent memories of these upsetting events. Event resolution was related to omissions of goals, and outcomes. Participants who reported greater event resolution (less rumination) at time 2 (relative to those who reported less resolution) omitted more goals from their previous memories. Specifically, those participants reporting more resolution left out fewer successes and more failures over time. Also, participants who at time 2 recalled more personally significant experiences omitted more successes and fewer unknown outcomes over time, relative to people endorsing less personal significance. One's negative view of the reported events at time 1 predicted the omission of goals

and outcomes over time. People holding more negative views of their past experiences at time 1 omitted fewer successes and unknown outcomes, but more failures, in subsequent recall.

Table G.5.

**Factors Predicting the Addition of NEW Goals in Memories Over Time**

NEW PERSONAL GOALS Over Time	Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
NEW PERSONAL GOALS: Successes	<b>Positive mood prior to writing; time 1 time 2</b>	.04 <b>.38</b>	.19 <b>-.62</b>	ns <b>.003</b>
	<b>Gender: female (X=.12, SD=.06) male (X=.20, SD=.10)</b>	<b>.22</b>	<b>(.46)</b>	<b>.030</b>
	<b>Self-esteem; time 1 * time 2</b>	.03 <b>.23</b>	.19 <b>-.56</b>	ns <b>.014</b>
Failures	<b>Positive states of mind (time 2) *</b>	<b>.16</b>	<b>-.45</b>	<b>.039</b>
	<b>Gender: female (X=.38, SD=.08) male (X=.29, SD=.08)</b>	<b>.22</b>	<b>(-.46)</b>	<b>.029</b>
Unknowns	<b>Memory vividness and accuracy; time 1 time 2</b>	.00 <b>.19</b>	-.02 <b>.44</b>	ns <b>.048</b>

Note. Significant findings are highlighted in the table. \*result after controlling for gender

Table G.6.

**Factors Predicting the OMISSION of Goals in Memories Over Time**

Criterion Measure of OMITTED Information	Predictor and Time Frame	Change in R <sup>2</sup>	Correlation or Partial Correlation	Sign. Level (p value)
OMITTED PERSONAL GOALS:	<b>Memory vividness and accuracy; time1 time 2</b>	<b>.19</b> <b>.00</b>	<b>-.44</b> <b>.00</b>	<b>.042</b> <b>ns</b>
	<b>Changed thoughts and feelings during 3 year interval</b>	<b>.35</b>	<b>.59</b>	<b>.004</b>
	Degree of event resolution; time1 <b>time 2</b>	.01 <b>.16</b>	-.10 <b>.40</b>	ns <b>.072</b>
Successes	Degree of event resolution; time1 <b>time 2</b>	.00 <b>.37</b>	-.02 <b>-.61</b>	ns <b>.004</b>
	<b>Negative-positive view of event; time1 time 2</b>	<b>.21</b> <b>.00</b>	<b>-.45</b> <b>.06</b>	<b>.035</b> <b>ns</b>
	<b>Significance of experiences; time 1 time 2</b>	.15 <b>.21</b>	.39 <b>.49</b>	ns <b>.020</b>
Failures	Degree of event resolution; time1 <b>time 2</b>	.15 <b>.22</b>	-.39 <b>.51</b>	ns <b>.017</b>
	<b>Negative-positive view of event; time1 time 2</b>	<b>.27</b> <b>.00</b>	<b>.52</b> <b>-.28</b>	<b>.013</b> <b>ns</b>
	<b>Significance of experiences; time 1 time 2</b>	.03 <b>.39</b>	-.17 <b>-.63</b>	ns <b>.002</b>
Unknowns	<b>Age of the rememberer</b>	<b>.42</b>	<b>.64</b>	<b>.001</b>
	<b>Negative-positive view of event; time1 time 2</b>	<b>.21</b> <b>.04</b>	<b>-.46</b> <b>.22</b>	<b>.032</b> <b>ns</b>

**Note.** Significant findings are highlighted in the table.

## Appendix H

The focus of a goal was coded by identifying who was responsible for carrying out the action in order to achieve a desired state. Self-focused goals included ones that had to be completed by the author or by the author in addition to some other character, for example, "I wanted to stop crying" or "I wanted us to leave". Other -focus goals included only those goals that others had to carry out in order for the desire to be satisfied, for example, "I wanted her to stop crying". (Resulting kappa=.93; percent agreement = 96.37 %).

Goal explicitness referred to how an author stated or put forward a goal in a narrative. For instance, sometimes the language a narrator used was very explicit and clearly stated a goal (usually with the use of a key word) as in: "I wanted her to leave", "I needed more time", or "I had to understand". In contrast, implied goals were ones implied by the author in their writing, usually with the use of negations or questions: "I didn't get it", "she didn't budge", or "why do kids die?". (The resulting kappa for coding goals as either explicit or implied was 0.93, with percent agreement at 97.77 %)

I also classified the goal's appeal as either approach (a desire to move towards a particular state, activity, or object) or avoid (a desire to avoid a particular state, activity or object). Usually an approach goal was one that would improve someone's well-being if it were achieved, as in "I wanted to be happy". An avoid goal would contribute to someone's well-being if they avoided that state, as in "I needed to stop crying". (Resulting kappa=.91; percent agreement = 95.66 %).

Finally, I coded for the verb tense (either past, present or future) used by the author when stating the goal. Present goals involved the present tense (e.g., "I want to stop crying"). Past goals were stated in the past tense (e.g., "I wanted to stop crying"). Future goals were stated in the future tense (e.g., "I will need to overcome this fear"). (Resulting kappa=.96; percent agreement=99.18 %). Commonly goals were written about in the past tense, as most participants chose to write about their past experiences using the past tense. The future tense was rarely used in any of the narratives. A few participants used the present tense, usually for only a small portion of the narrative.

## Appendix I

The Stability of Order of Information in Subsequent Memories. Anderson et al. (2000, experiment 2) examined the stability of the order of repeated details when comparing lists of memory details participants generated about the same personal memories on 3 separate occasions, each separated by a 4 week delay. Output order of the information given at the second and third recall times was compared with information sequencing in the original memory list by recording the number of shift and no-shift details. Overall, percentages of consistent sequencing of information across time varied considerably for older and younger participants (44-49% and 5-12% respectively). Results indicated that relative to younger participants, older people produced a significantly higher percentage of no-shift details. It also appeared that as time between recall intervals increased (the third recall relative to the original recall vs. the second recall relative to the original recall), consistency in sequencing decreased. In the current investigation, I examined the ordering of information given at two recall times to explore how consistently participants ordered information given in personal memories.

Content presented earlier in the original memory narratives of past upsetting events was also delivered earlier in the second memory accounts; information relayed later in the original version tended to be similarly presented later in the second remembrance. The stability of the order in which participants originally related information and then reported it again 3 years later could only be examined for the repeated or 'same' information in both sets of narratives. Similar to a procedure used by Wegner, Quillian and Houston (1996), I numbered thought units in each narrative at each time prior to determining what same information was repeated across time. Once I matched the thought units for repeated content, I correlated the resulting pairs of numbers, producing 4 correlations for each participant (one for each day), resulting in a total of 88 correlations. The number of paired thoughts units used to generate the correlations varied from day to day and from participant to participant (ranging from 8 to 38 pairs). Of the 88 correlations, all were positive and only 7 were not significant. As well, no participants had more than one non-significant correlation in their set of four. I used the mean correlation over the 4 days in later analyses. The resulting overall

correlation for the group of participants was  $r = .77$  ( $SD = .12$ ), suggesting that the sequence with which participants related the same information over time was well-preserved over time.

What predicts people relating information in a similar order over time? Participants were adequate judges of the consistency of the order of information in their memories over time. Their believed similarity between the accounts predicted the order in which repeated information was delivered. It appeared that participants tended to relate their memory narratives in a chronological sequence, a sequence that they seemed to repeat 3 years later. Participants writing about experiences rated by objective judges as more severe also presented less consistent order of repeated information over time. As seen in table I.1, few additional factors predicted the order in which repeated information was recalled over time.

Table I.1.

Factors Predicting the Order of Information in Memories Over Time

Predictor and Time Frame	Change in $R^2$	Correlation or Partial Correlation	Significance Level (p value)
<b>Believed similarity to first written accounts</b>	<b>.25</b>	<b>.50</b>	<b>.019</b>
<b>Objective Severity rating</b>	<b>.24</b>	<b>-.49</b>	<b>.019</b>

Note. Significant findings are highlighted in the table.

## Appendix J

The Stability of Recalling When Past Upsetting Events Occurred. As Cohen (1989) points out dating memories (indicated when the event occurred) is crucial to the chronological organization of one's past. "Memories are stored within a temporal frame of reference, and are linked to landmark events in public life and in personal life." (p. 119). Memories occur along a time line. The consistency of dating personal events becomes even more interesting if retrieval of memory is conducted through some form of chronological search. Previous research has found variable results regarding people's consistency in dating experiences. For instance, 74 % of the events for which participants later recalled dates (after having previously recorded the events in their diary) were accurately dated (within a month) when compared to participants' own diary entries (Rubin, 1982). Indeed, Larsen, Thompson, and Hansen (1996) suggest that studies about the dating of autobiographical memories have found that people indicating when a past event occurred are on average correct. Yet, other studies (as cited by Brown, Shevell, and Rips, 1986) report poorer consistency, with accuracy rates ranging between 3 % and 12 %.

When I examined the consistency of dating past upsetting events in the current investigation, males tended to less accurate than females. At time 2, males indicated that events occurred somewhat earlier than they had indicated 3 years previously; females remained consistent in their recalling when an event occurred.

At both recall times, I asked participants to date the experiences they wrote about on each of the 4 writing days. At time 1, participants dated experiences as occurring (on average) 3 years and 10 months earlier ( $SD=2.94$  years). (Older participants did not write about older events than younger participants ( $r=.26, p>.10$ )). Relative to dating memories during the first writing phase, participants as a group overestimated how long ago their experiences occurred when dating those same events 3 years later. During the time 2 recall, participants suggested events occurred an average of 7 months

earlier ( $SD=20$  months) than the date they had indicated during the first recall.<sup>35</sup> This 7 month overestimate of when past upsetting experiences occurred was not significant ( $t=-1.67, p>.10$ ).

However, males tended to overestimate the date of past events at time 2 ( $M=8.38$  years,  $SD=.25$ , mean adjusted for time 1 date) significantly more than females ( $M=7.27$  years,  $SD=.33$ , mean adjusted for time 1 date;  $F(1)=7.27, p=0.14$ , controlling for time 1 date). Females' and males' time 1 and time 2 indications of when events occurred were both strongly positively correlated ( $r=.98, p=.000$ , for females;  $r=.89, p=.003$  for males); these correlations did not differ from each other (fisher  $z_{0.25}=1.41, p>.05$ ). Gender in addition to the time 1 date of when an event occurred (change  $R^2=.03, p=.003, r=.943, p=.000$ , change  $R^2=.89$  respectively) were the only predictors of participants consistently recalling when past events occurred.

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<sup>35</sup> I accounted for the delay between recall phases when examining participants dating their experiences.

Appendix K

Table K.1

Commonality Analysis: Predicting Repetition of the SAME General Information in Memories

Predictor and Time Frame	R <sup>2</sup>	ΔR <sup>2</sup>	Cor. or Par. Cor.	p	Com.
Depression: time 2 time 1	.02 .55		.16 .73	.ns .000	<b>.00</b>
Self-esteem: time 2 time 1	.08 .32	.24	-.29 -.51	.ns .022	<b>.08</b>
Positive mood prior to writing: time 2 time 1	.01 .23	.22	.04 -.47	.ns .030	-.04
Negative mood prior to writing: time 2 time 1	.05 .22	.17	-.07 .47	.ns .032	-.02

Note. Cor.=Correlation; Par.Cor.=Partial Correlation; Com.=Commonality. Relevant findings are bolded.

Table K.2.

Commonality Analysis: Predicting Repetition of the SAME Affect and Facts in Memories

SAME Specific Information	Predictor and Time Frame	R <sup>2</sup>	ΔR <sup>2</sup>	Cor. or Par. Cor.	p	Com.
GENERAL AFFECTIVE TONE:	Depression: time 2 time 1	.02 .40		-.15 .61	.ns .004	-.01
	Self-esteem: time 2 time 1	.04 .30	.26	-.02 -.54	.ns .013	-.02
	Degree of event resolution: time 2 time 1	.33 .00	.00	.58 .04	.005 .ns	<b>.05</b>
SPECIFIC AFFECT: Negative:	Depression: time 2 time 1	.00 .18	.18	.02 .43	.ns .061	.00
	Degree of event resolution: time 2 time 1	.04 .33	.33	.54 .10	.009 .ns	-.03
	Memory vividness and accuracy: time 2 time 1	.01 .25	.24	.07 -.50	.ns .022	-.02
FACTS:	Depression: time 2 time 1	.09 .40	.31	.23 .59	.ns .006	.00
	Positive mood prior to writing: time 2 time 1	.03 .18	.15	-.17 -.40	.ns .073	.03

Note. Cor.=Correlation; Par.Cor.=Partial Correlation; Com.=Commonality. Relevant findings are bolded.

Table K.3.

**Commonality Analysis: Predicting the ADDITION of General Information in Memories**

Predictor and Time Frame	R <sup>2</sup>	ΔR <sup>2</sup>	Cor. or Par. Cor.	p	Com.
Depression: time 2 time 1	.03 .50	.47	-.18 -.70	.ns .001	.00
Self-esteem: time 2 time 1	.11 .33	.22	.34 .49	ns .028	<b>.10</b>
Positive mood prior to writing: time 2 time 1	.01 .17	.16	-.03 .42	ns .060	-.02
Negative mood prior to writing: time 2 time 1	.01 .25	.24	.10 -.46	ns .035	-.01

Note. Cor.=Correlation; Par.Cor.=Partial Correlation; Com.=Commonality. Relevant findings are bolded.

Table K.4.

**Commonality Analysis: Predicting the ADDITION of Affect and Facts in Memories**

NEW Information Over Time	Predictor and Time Frame	R <sup>2</sup>	ΔR <sup>2</sup>	Cor. or Par. Cor.	p	Com.
AFFECTIVE TONE:	Depression: time 2 time 1	.02 .28	.26	.13 -.52	ns .019	.00
	Self-esteem: time 2 time 1	.07 .34	.27	-.26 .54	ns .014	<b>-.16</b>
	Positive Degree of event resolution: time 2 time 1	.23 .00	.00	-.47 -.07	.028 ns	.04
	Memory vividness and accuracy: time 2 time 1	.22 .33	.11	.43 .46	.087 .037	<b>.08</b>
Neutral	Positive states of mind (time 2)	.23	.23	-.48	.024	n/a
FACTS:	Self-esteem: time 2 time 1	.31 .33	.02	.56 .13	.009 ns	<b>.11</b>
	Negative mood prior to writing: time 2 time 1	.01 .27	.26	-.07 -.52	ns .015	-.01

Note. Cor.=Correlation; Par.Cor.=Partial Correlation; Com.=Commonality. Relevant findings are bolded.

Table K.5.

Commonality Analysis: Predicting the OMISSION of General Information in Memories

Predictor and Time Frame	R <sup>2</sup>	ΔR <sup>2</sup>	Cor. or Par. Cor.	p	Com.
Depression: time 2	.09		-.29	.ns	.00
time 1	.29	.20	-.46	.041	

Note. Cor.=Correlation; Par.Cor.=Partial Correlation; Com.=Commonality. Relevant findings are bolded.

Table K.6.

Commonality Analysis: Predicting the OMISSION of Affect and Facts in Memories

OMITTED Information Over Time	Predictor and Time Frame	R <sup>2</sup>	ΔR <sup>2</sup>	Cor. or Par. Cor.	p	Com.
AFFECTIVE TONE:	Degree of event resolution: time 2	.18		.41	.058	-.03
	time 1	.21	.03	-.09	ns	
Positive	Recency of the memory (at time 1)	.38	.38	-.62	.002	n/a
	Objective Severity rating	.27	.27	-.52	.013	n/a
Negative	Degree of event resolution: time 2	.49		.70	.000	<b>.05</b>
	time 1	.00	.00	-.01	ns	

Note. Cor.=Correlation; Par.Cor.=Partial Correlation; Com.=Commonality. Relevant findings are bolded.



5. Overall, to what degree have you expressed to others your deepest thoughts (i.e., your ideas, beliefs, opinions) about the event(s) you wrote today?

I have not expressed any of my thoughts    1    2    3    4    5    6    7    I have expressed my deepest thoughts

6. Overall, to what degree have you expressed to others your deepest feelings about the event(s) you wrote today?

I have not expressed any of my feelings    1    2    3    4    5    6    7    I have expressed my deepest feelings

7. How much have you wanted to tell another person about what you wrote about today?

not at all    1    2    3    4    5    6    7    a great deal

8. How much have you actively held back from telling others about what you wrote today?

not at all    1    2    3    4    5    6    7    a great deal

9. Overall, how much did you reveal your emotions in what you wrote today?

not at all    1    2    3    4    5    6    7    a great deal

10. In today's writing, to what degree were you able to express your true thoughts about the event(s) that you wrote about?

I held back many of my true thoughts    1    2    3    4    5    6    7    I expressed many of my true thoughts

11. To what degree were you able to express your true feelings about the event(s) that you wrote about?

I held back many of my true feelings    1    2    3    4    5    6    7    I expressed many of my true feelings

12. Overall, how much have you previously written about your deepest thoughts about what you wrote about today?

I have never written about my deepest thoughts    1    2    3    4    5    6    7    I have written a great deal about my deepest thoughts

13. Overall, how much have you previously written about your deepest feelings about what you wrote about today?

I have never 1 2 3 4 5 6 7 I have written a great  
written about my deal about my  
deepest feelings deepest feelings

14. Overall, how much have you previously thought about your deepest ideas, beliefs and opinions about what you wrote about today?

I have not 1 2 3 4 5 6 7 I have given my  
thought about any deepest ideas,  
of my ideas, beliefs beliefs and/or  
and/or opinions opinions a great  
deal of thought

15. Overall, how much have you previously thought about your deepest feelings about what you wrote about today?

I have not 1 2 3 4 5 6 7 I have given my  
thought about any deepest feelings a  
of my feelings great deal of thought

16. How much have you wanted to think about what you wrote about today?

not at all 1 2 3 4 5 6 7 a great deal

17. How much have you actively held back from thinking about what you wrote today?

not at all 1 2 3 4 5 6 7 a great deal

18. When we write or tell people about something that has happened to us, it is not unusual to change the story, or alter the details of what actually happened to some degree. This is quite common, and there are a number of reasons for doing this. Sometimes we need to shorten the story because of time constraints. Sometimes we alter or change details to make the story more interesting, or to emphasize a point we want to make. At other times, we may change or omit those details of a story that we think are less important or perhaps embarrassing. Finally, we often alter our story in order to influence how others might view us.

In writing about your experiences today, to what degree did you alter or rearrange your story for one reason or another?

I stuck precisely 1 2 3 4 5 6 7 I altered or  
to what actually rearranged many  
occurred details

19. While writing today, to what extent did you experience the same thoughts that you experienced when the event(s) occurred?

not at all      1      2      3      4      5      6      7      a great deal

20. While writing today, to what extent did you experience the same feelings that you felt when the event(s) occurred?

not at all      1      2      3      4      5      6      7      a great deal

21. How upsetting or disturbing was the event(s) you wrote about today when it first happened?

not at all      1      2      3      4      5      6      7      a great deal

22. How upsetting or disturbing was it for you to write about your experiences today?

not at all      1      2      3      4      5      6      7      a great deal

23. How often do you find yourself wondering "why" the event(s) you wrote about today occurred?

never            1      2      3      4      5      6      7      always

24. How often do you find yourself searching for some reason, meaning, or way to make sense out of the event(s) you wrote about today.

never            1      2      3      4      5      6      7      always

25. How often do memories, thoughts, and mental pictures of the event(s) come into your mind?

never            1      2      3      4      5      6      7      always

26. How often have you been unable to get thoughts or memories about the event(s) out of your mind even when you wanted to?

never            1      2      3      4      5      6      7      always

27. How often do you become absorbed or 'caught up' in thoughts and memories of the event(s)?

never            1      2      3      4      5      6      7      always

28. To what degree have you made sense out of the event(s) you wrote about today? That is, to what extent do you feel you understand what happened?

not at all    1    2    3    4    5    6    7    a great deal

29. To what degree do you feel that you can now "put these experiences behind you", and not think about them any more?

not at all    1    2    3    4    5    6    7    a great deal

30. To what degree have the event(s) you wrote about today played a significant role in your life (i.e., to what degree have they influenced you or your life)?

not at all    1    2    3    4    5    6    7    a great deal

31. To what degree do the event(s) you wrote about today play a significant role in your life right now (i.e., to what degree do they influence you or your life right now)?

not at all    1    2    3    4    5    6    7    a great deal

32. To what degree would you like other people (who you don't know) to read your anonymous essay?

not at all    1    2    3    4    5    6    7    a great deal

33. To what degree would you like to have your essay thrown away without anyone ever reading it?

a great deal    1    2    3    4    5    6    7    not at all

34. When recalling events that occurred in the past, it can sometimes be quite difficult to remember exactly the way things happened. While we may remember some aspects of events quite clearly in our mind, other aspects may be quite vague or sketchy. Is your memory for the event(s) you wrote about today sketchy or highly detailed? (i.e., Can you remember only bits and pieces, or can you recall the entire sequence of events?)

sketchy    1    2    3    4    5    6    7    highly detailed

35. Do you have any doubts about the accuracy of your memory for the event(s) you wrote about today?

a great deal of doubt    1    2    3    4    5    6    7    no doubt whatsoever

36. To what degree would others (i.e., others who were also involved in the experiences you described), agree with your description of how things happened.

others would not agree at all    1    2    3    4    5    6    7    others would agree completely

37. How clear or vivid is your mental image of the event(s) you wrote about today?

not at all clear    1    2    3    4    5    6    7    extremely clear

38. How clearly or vividly can you recall the emotions you experienced during the course of the event(s)?

not at all clearly    1    2    3    4    5    6    7    extremely clearly

39. Overall, to what degree do you view this event as personally psychologically stressful?

not at all stressful    1    2    3    4    5    6    7    catastrophically or severely stressful

40. Events in our lives may be viewed as largely positive, negative, or both positive and negative to some degree.

a) To what degree do you currently view the event(s) you wrote about today as positive?

not at all positive    1    2    3    4    5    6    7    extremely positive

b) To what degree do you currently view the event(s) you wrote about today as negative?

not at all negative    1    2    3    4    5    6    7    extremely negative

41. To what degree do the event(s) you wrote about today positively affect your self image (i.e. to what degree do they increase your self-esteem)?

not at all    1    2    3    4    5    6    7    a great deal

42. To what degree do the event(s) you wrote about today negatively affect your self image (i.e. to what degree do they decrease your self-esteem)?

not at all    1    2    3    4    5    6    7    a great deal

43. How similar is the essay you wrote today to the essay you wrote 3 years ago?

very similar    1       2       3       4       5       6       7       not at all similar

44. We provided you with a list of themes that you covered in your essay on this day last time (three years ago). Were you able to write about all of these themes today?

Yes

No

**If NO:** Please tell us why:

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