

Flashbulb Memories and Posttraumatic Stress Reactions Across the Life Span: Age-Related Effects of the German Occupation of Denmark During World War II

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A representative sample of older Danes were interviewed about experiences from the German occupation of Denmark in World War II. The number of participants with flashbulb memories for the German invasion (1940) and capitulation (1945) increased with participants' age at the time of the events up to age 8. Among participants under 8 years at the time of their most traumatic event, age at the time correlated positively with the current level of posttraumatic stress reactions and the vividness of stressful memories and their centrality to life story and identity. These findings were replicated in Study 2 for self-nominated stressful events sampled from the entire life span using a representative sample of Danes born after 1945. The results are discussed in relation to posttraumatic stress disorder and childhood amnesia.

Keywords: posttraumatic stress disorder, flashbulb memories, childhood amnesia, autobiographical memory

Those who were children during World War II are now aging. Many of them still have vivid memories of bombardments, explosions, and gunfire against civilians. Some remember hiding, being incarcerated, being separated from their family, losing siblings or parents (Berntsen, 2005; Werner, 2000). During World War II, more than 40 million civilians were killed and more than 20 million children were orphaned (Werner, 2000). Even though World War II was the first war in history with more civilian than military losses (Werner, 2000), surprisingly few studies of posttraumatic stress reactions have been conducted on World War II survivors sampled from the general population (Bramsen & van der Ploeg, 1999). Most studies have concentrated on combat veterans, prisoners of war, and concentration camp survivors (see Falk, Hersen, & Hasselt, 1994, for a review). However, even among people who did not fight actively in the war, or who were not incarcerated, posttraumatic stress disorder (PTSD) symptoms related to World War II may still persist (Bramsen & van der Ploeg, 1999).

Because most World War II survivors who are alive today were children or adolescents at the time of the war, they offer an opportunity to examine how the development of lifelong posttraumatic stress reactions may interact with the age of the child at the

time of the trauma. Even though one might expect the development and lifelong maintenance of such symptoms to depend at least partly on the cognitive and social maturity of the child at the time of the event, the empirical work on the development of PTSD in childhood has been highly limited (e.g., Salmon & Bryant, 2002). One aim of the present work is to help filling this gap in the literature. We use the term *posttraumatic stress reactions* when addressing our present work to emphasize that we do not examine PTSD as defined clinically. We do, however, examine symptoms of this disorder as this disorder is described clinically (American Psychiatric Association, 1994). Here, we examine posttraumatic stress reactions, vividness of traumatic memories associated with World War II, and flashbulb memories for two key events as a function of age at the time of the events in representative samples of older Danes who were between 0 and 26 years when the Germans invaded Denmark in April 1940 and between 0 and 31 years when they surrendered and ended their occupation of Denmark in May 1945. To allow us to examine whether a similar developmental pattern exists in different generations and across different traumatic experiences, a second study involves a large representative sample of younger Danes, all born after the war, who report posttraumatic stress reactions in relation to stressful experiences sampled from their entire lifetime.

Studies of PTSD for Events During World War II

To be diagnosed with PTSD, a person should have endured a traumatic event that satisfies the present diagnostic criteria for a trauma (American Psychiatric Association, 1994). First, the person should have experienced, witnessed, or been confronted with an event that involved actual or threatened death or serious injury or a threat to the physical integrity of him- or herself or others (the A1 criterion). Second, the person should have responded to the trauma with intense fear, helplessness, or horror (the A2 criterion). In

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addition, the person should demonstrate three types of effects from the traumatic event: (a) reexperiencing the trauma—in terms of unwanted thoughts, memories, recurrent dreams, or emotional reactions associated with reminders of the event; (b) avoidance of reminders of the event; and (c) increased arousal.

Most studies of PTSD for events during World War II have involved combat veterans and prisoners of war, and thereby participants who were adults by the time of their traumatic experiences. Such studies have demonstrated a high prevalence of PTSD even four or five decades after the war (see reviews by Falk et al., 1994; McCranie & Hyer, 2000; Weintraub & Ruskin, 1999). In addition, there has been substantial research on posttraumatic stress reactions in individuals who survived the Holocaust or concentration camp incarceration. In this population, prevalence of PTSD has been found to be substantially higher than among controls of the same age (e.g., Amir & Lev-Wiesel, 2003; Joffe, Brodaty, Luscombe, & Ehrlich, 2003; Landau & Litwin, 2000), with number and severity of symptoms reflecting the level of atrocities suffered by the persons—for example, whether the person was hiding from the Germans or detained in a concentration camp (Robinson, Rapaport-Bar-Sever, & Rapaport, 1994) or, among those detained, whether they had been tattooed (Kuch & Cox, 1992). In a study involving a large sample of Dutch World War II survivors, drawn from the general population, Bramsen and van der Ploeg (1999) found an overall prevalence of PTSD of 4.6% 50 years after the war, the percentage was largest among individuals who had been persecuted in Europe or Asia and smallest among civilians exposed to bombardments or who joined the resistance. The number of war events to which the person had been exposed was positively related to level of PTSD symptoms. In a study of 145 Danish World War II survivors drawn from the general population, Berntsen and Thomsen (2005) found that 29% agreed or strongly agreed with the statement that the time of the war had left a “scar on their soul”; 30% agreed or strongly agreed that there were memories from the time that they actively avoided thinking about; 31% sometimes, often, or very often had intrusive memories from the time of the occupation that they would rather not think about; and 11% sometimes, often, or very often had sleep dreams about the occupation. In short, PTSD symptoms related to World War II have been found in different populations several decades after the traumatic events. Prevalence and severity of symptoms have varied systematically with the severity and number of the traumatic experiences even after four or five decades.

PTSD as a Function of Age During the Traumatic Event

PTSD was originally formulated as a disorder applying to adults. Only in 1987, with the revision of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)*; American Psychiatric Association, 1987), was it possible for children to be diagnosed with PTSD (e.g., Davis & Siegel, 2000). Little is known about the development of PTSD in response to traumas in childhood. However, several scholars have proposed that vulnerability to this disorder depends on a variety of emotional and cognitive factors that develop through the preschool years, such as memory, language, coping abilities, prior knowledge, and emotion regulation (e.g., Salmon & Bryant, 2002). Among such factors, one might assume the ability to remember personal events to be of special importance, because one of the three symptom categories

for PTSD is to reexperience the traumatic event in memory (American Psychiatric Association, 1994). Also, several theories of PTSD propose that a key factor for this disorder is an inability to process the traumatic event on the basis of cognitive schemata established prior to the trauma (Horowitz, 1975, 1986; see Brewin, 2003, for a review). For the child to recognize and react to this disparity, he or she needs to be able to encode and evaluate the traumatic event in comparison with knowledge and expectations established prior to the event (Salmon & Bryant, 2002). Following this line of reasoning, because autobiographical memory abilities increase throughout the preschool years (e.g., Pillemer & White, 1989), one should expect schoolchildren to be more at a risk for developing PTSD than preschool children, and especially among preschoolers, one should expect a positive correlation between age at the time of the event and subsequent PTSD symptoms. On the other hand, cognitive and emotional factors that may counteract the development of PTSD symptoms also become increasingly sophisticated throughout childhood, such as the capability to talk about and thus share the traumatic experiences with others and the ability to control emotions and/or inhibit unwanted thoughts and memories (e.g., see Salmon & Bryant, 2002; Scheeringa & Zeanah, 2001; Vogel & Vernberg, 1993, for further discussion). In short, given that most cognitive, social, and emotional abilities develop progressively through the preschool years and given the current lack of knowledge as to the relative importance of these factors for the vulnerability to PTSD, it seems difficult to arrive at any clear predictions as to the relation between age and PTSD. As summarized by Scheeringa and Zeanah (2001): “. . . we may hypothesize that younger age may increase or decrease vulnerability to traumatic experiences” (p. 808).

Empirical Studies of Age in Relation to PTSD

Few studies have examined the level of posttraumatic stress reactions as a function of age at the time of the traumatic event among individuals who encountered a traumatic event in childhood, and most such studies have not included preschool children. One exception is Green, Korol, Grace, and Vary (1991) who examined PTSD symptoms among 179 children (aged 2–15 years) 2 years after the Buffalo Creek dam collapse in West Virginia in 1972. They found fewer PTSD symptoms among the 4- to 7-year-old children than among the older children. Reviewing results from many studies on predominantly school-age children’s response to disasters, Vogel and Vernberg (1993) found no age-related differences among school-age children, and with respect to preschool children, their review included only Green et al.’s (1991) findings. Studies on survivors of road traffic accidents have found no relation between age and PTSD among children who were 5 years and older at the time of the accident (Stallard, Salter, & Velleman, 2004). Stuber et al. (1997) examined PTSD among 186 children who had survived cancer. The children were between 8 and 20 years at the time of the study and between 1 and 16 years at the time of the diagnosis. Neither age at time of the study nor age at the time of the diagnosis was significantly related to PTSD symptoms. Thus, in the four studies, age at the time of the trauma had few effects on PTSD symptoms, unless preschool children were considered.

Especially relevant for the present work, three studies of child survivors of the Holocaust found a positive correlation between

age at the time of the war and symptoms of mental disorders measured four to six decades later in life. Sigal and Weinfeld (2001) found that Holocaust survivors who had been between 2 and 13 years old at the time the war ended scored lower on a number of measures of psychological distress than survivors who had been 14 to 24 years old by the end of the war. Cohen, Dekel, Solomon, and Lavie (2003) examined PTSD symptoms among 134 Holocaust survivors. They found a positive correlation between age at the beginning of the war and current level of PTSD symptoms. (Unfortunately, the age range of participants at the beginning of the war is not clear from the article.) Yehuda, Schmeidler, Siever, Binder-Brynes, and Elkin (1997) examined PTSD symptoms among 100 Holocaust survivors aged 50–79 at the time of the study. Overall, Yehuda et al. found a positive correlation between age and level of PTSD symptoms. (Unfortunately, it is unclear at which age the participants had encountered their Holocaust experiences and how old they were during the war.)

The Role of the Trauma in Relation to Life Story and Identity

The issue of age in relation to PTSD becomes more complicated when long-term effects are considered. First, in studies measuring the impact of an event several decades after it took place, age at the time of the event is confounded with age at the time of the study—a problem we address in the *Results* and in the *Discussion* sections. Second, the long-term outcome of a traumatic event may be influenced by several posttrauma factors, such as subsequent life events, reevaluations, the role of the events in the person's life story and in relation to his or her identity, and so forth. For example, research on combat veterans from different wars suggests that the postwar societal approval of the war in which the veterans fought is a protection against the development and/or maintenance of PTSD symptoms (e.g., Hautamaki & Coleman, 2001; McCranie & Hyer, 2000). Thus, the meaning ascribed to the traumatic experience and its role in relation to the life story and identity of the person seems to interact with the short-term appraisal and immediate encoding of the trauma (Brewin, 2003).

There is a long tradition for viewing posttraumatic stress reactions, such as intrusive memories, as reflecting an inability to process and to integrate the trauma with knowledge of the self and the world (e.g., Horowitz, 1986, pp. 85–110). Recently, however, Berntsen, Willert, and Rubin (2003) proposed that a key problem in PTSD seems to be that the traumatic memory becomes highly central to the identity and life story of the person and thereby may “overshadow” or “color” other, more positive, experiences in the person's life. According to this alternative view, the trauma memory is highly accessible and is thus often used as a cognitive reference point for predicting future outcomes and for attributing meaning to other (nontraumatic) events. Recently, Berntsen and Rubin (2006) have introduced the Centrality of Event Scale (CES) as a measure of the extent to which a traumatic event has become a central component of a person's identity, a turning point in his or her life story, and a reference point for the attribution of meaning to other experiences as well as for the generation of expectations. The CES measure has been found to be positively related to symptoms of PTSD and depression in different populations (see Berntsen & Rubin, 2006, for a review). The features measured by the CES are likely to increase with the age of the child. For

example, the ability to organize one's personal life course into a life story with turning points and overarching abstract themes is assumed to develop only in adolescence (Habermas & Bluck, 2000) along with the emergence of an adult identity (Erikson, 1950). Accordingly, a trauma that happens later in childhood may be more likely to become central to the person's life story and identity than a trauma that happens earlier in childhood, assuming other things are equal.

Flashbulb Memories

Flashbulb memories are vivid and detailed memories of the moment when one first learned the news of an important, and typically shocking, public event, such as the assassination of President Kennedy in 1963 or the 9/11 terrorist attack in 2001 (Brown & Kulik, 1977). Not all important public events generate flashbulb memories. Among other things, it depends on the relevance of the public event for the population under study (e.g., Conway, 1995, for a review) and on the age of the participants when the event took place. The latter issue has been studied systematically by Winograd and Killinger (1983) who asked 138 students whether they remembered their personal circumstances for learning the news of the assassination of President Kennedy and for six other significant public events. The students were between 1 and 7 years old when the Kennedy assassination took place. Winograd and Killinger showed that proportion of students with memory for this event, and amount of information reported, increased linearly with age at the time of the event. Almost all (91%) students who were 7 years old at the time Kennedy was assassinated reported that they remembered their personal circumstances for receiving this news. Using a similar design, we examine the memory of older Danes for how they learned the news about the German invasion of Denmark on the 9th of April 1940 and the German capitulation on the 4th of May 1945. These two events seem especially appropriate for this type of analysis, because Berntsen and Thomsen (2005) found that among Danes who were at least 9 years old at the time of the invasion, virtually everybody reported a memory for these two events. Here we extend Winograd and Killinger's study in four ways. First, by using samples of older Danes who were between 0 and 26 years old at the time of the invasion and between 0 and 31 years old at the liberation, we are able to analyze memory as a function of age, using a larger age span than the 1–7 years span used by Winograd and Killinger for the assassination of President Kennedy. Thus, we are able to examine whether the ability to form flashbulb memories develops beyond age 7. Second, we use considerably longer retention intervals, that is, 64 and 59 years, respectively, against a 17-year delay in Winograd and Killinger's study. Third, we use a representative sample of older Danes. Fourth, we examine memory for an emotionally positive and negative event that are matched with respect to theme and historical importance.

As noted by Winograd and Killinger (1983), studying flashbulb memory as a function of age at the time of the event is relevant for the understanding of childhood amnesia. In addition, we add here that studies of this issue may also be relevant to the understanding of the development of lifelong PTSD symptoms as a function of age at the time of the traumatic event, because an ability to form vivid and detailed memories of discrete events can be considered as a precondition for meeting the PTSD diagnostic criteria of

repeatedly reexperiencing the traumatic episode(s) in memory (American Psychiatric Association, 1994).

An Outline of the Present Studies

The purpose of the following two studies was to examine autobiographical memory and posttraumatic stress reactions as a function of participants' age at the time of the events. Study 1 examines these questions in a sample of older Danes and in relation to experiences during World War II. Study 2 examines similar questions in a sample of younger Danes (all born after 1945) in relation to experiences from their entire lifetime. In both cases we hypothesize a positive relation between posttraumatic stress reactions and participants' age at the time of the events for early years of life. In Study 1, we expect a similar relation between age and memories for the two public events. On the basis of the literature of childhood amnesia (e.g., Nelson, 1993; Pillemer & White, 1989; Rubin, 2000; Usher & Neisser, 1993), we expect this relation to be most clear for participants who were less than 8 years old at the time of the events. On the basis of the literature of PTSD in general (e.g., Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003) and PTSD in relation to World War II in particular (e.g., Bramsen & van der Ploeg, 1999; Falk et al., 1994), we expect the present level of posttraumatic stress reactions to vary as a function of the severity of the traumatic events encountered in the past as measured by the A1 and A2 trauma criteria for the PTSD diagnosis (American Psychiatric Association, 1994). These criteria have been changed twice since the introduction of the PTSD diagnosis in 1980 (Young, 1995) and are still being debated (McNally, 2003). The two studies were conducted in 2004 as part of the same general survey by TNS Gallup, Denmark. Respondents were selected from all geographic areas of Denmark except Greenland and the Faroe Islands. All respondents were able to speak and understand Danish. In each household, 1 or 2 respondents were randomly selected by a combined criterion based on number of household members above age 16 and their birthdays. The response rate for the entire survey was 60%. Participants in Study 1 were 59 years and older, thus they were born before 1946. They answered questions related to experiences during the German occupation of Denmark, 1940–1945. Participants in Study 2 were between 18 and 58 years. They answered similar questions related to (self-selected) traumatic experiences sampled from their entire life span.

Study 1

Method

Participants. A representative sample of 423 Danes between 59 and 90 years participated. Participants who were 64 years and older answered all questions. Participants between 59 and 63 years did not answer questions in relation to the German invasion of Denmark the 9th of April 1940, which occurred prior to their birth. Table 1 shows the number of male and female respondents sorted by age in 5-year intervals.

Procedure. Data were collected in June and July 2004 by telephone interviews. The questions of relevance for the present study were preceded only by demographic questions in the survey. The respondents were informed that the purpose of the present study was to obtain information about their memories from the time of the German occupation of Denmark. Questions are presented in Table 2. Questions 1–4 addressed flashbulb

Table 1
Participants in Study 1

Age range (years)	<i>n</i>	Women
59–63	131	71
64–68	110	61
69–73	68	40
74–78	52	31
79–99	62	41

memories for the invasion and liberation. (Questions 1 and 2 were not asked to respondents between 59 and 63 years.) Questions 5–17 were preceded by the following introduction:

“We would like to ask you a series of questions concerning certain reactions that people sometimes have after an emotionally negative event. Your task is to decide whether you have such reaction in relation to one or more memories from the time of the occupation.”

Question 6 addressed whether respondents felt that one or more experiences had left a lifelong traumatic impact on them, by using the colloquial (Danish) expression “left a scar on my soul.” Questions 5, 7, 8, and 9 addressed manifestations of the three symptoms/categories of PTSD (avoidance, reexperience, and arousal symptoms, respectively), consistent with how these symptoms are described in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*; American Psychiatric Association, 1994). Questions 15 and 16 addressed the A1 and A2 criteria for a traumatic event, as described in *DSM-IV*. Questions 11, 12, and 13 derive from the CES (Berntsen & Rubin, 2006). The three questions were chosen because they had shown the highest correlations with the remaining questions of the CES in a previous study (Berntsen & Rubin, 2006). Questions 4–14 and Question 17 also included a don't know option. Don't know responses were coded as missing data. The number of valid responses and the number of missing data, respectively, for Questions 1–17 were as follows: (a) 292, 0; (b) 209, 3; (c) 423, 0; (d) 287, 2; (e) 379, 44; (f) 395, 28; (g) 406, 17; (h) 410, 13; (i) 411, 12; (j) 382, 41; (k) 395, 28; (l) 396, 27; (m) 389, 34; (n) 270, 153; (o) 423, 0; (p) 423, 0; (q) 291, 132.

Results

We first present findings on flashbulb memories for the two public events as a function of age at the time of the event. We next examine posttraumatic stress reactions, vividness of the traumatic memory, and CES score as a function of age at the time of participants' most traumatic event and as a function of trauma severity (as measured by the A1 and A2 criteria in the *DSM-IV*; American Psychiatric Association, 1994). We finally present correlations among measures of PTSD symptoms, vividness of traumatic memories, CES, and the A1 and A2 criteria.

Flashbulb memories by age at the time of the event. The top panel of Figure 1 shows the proportions of respondents who reported that they had a memory for receiving the news of the invasion in April 1940 and the news of the liberation in May 1945. For both events, an almost linear increase is seen up to age 8, after which point the curve levels and stays at ceiling. In agreement with the literature on childhood amnesia (e.g., Rubin, 2000), we chose age 7 as a cutoff level. For respondents who were 7 years and younger at the time of the events, biserial correlations between having a memory and age were $r(155) = .54, p < .0001$ for the invasion and $r(196) = .64, p < .0001$ for the liberation. When the

Table 2
Questions Answered in Study 1 and Modified for Study 2

1. Do you remember where you were and what happened around you on the 9th of April 1940, when you realized that the Germans had occupied Denmark? (Yes/No)
2. If yes, how vivid is your memory? (1 [*not at all vivid*]; 7 [*as vivid as if it happened now*])
3. Do you remember where you were and what happened around you on the 4th of May 1945, when you realized that the Germans had surrendered? (Yes/No)
4. If yes, how vivid is your memory? (1 [*not at all vivid*]; 7 [*as vivid as if it happened now*])
5. There are memories about one or more emotionally negative events from the time of the occupation that I try to avoid thinking about (1 [*strongly disagree*], 2 [*disagree*], 3 [*neutral*], 4 [*agree*], or 5 [*strongly agree*]).
6. One may say that one or more emotionally negative events from the time of the occupation has left a scar on my soul (1 [*strongly disagree*], 2 [*disagree*], 3 [*neutral*], 4 [*agree*], or 5 [*strongly agree*]).
7. Memories about one or more emotionally negative events from the time of the occupation come to my mind spontaneously, though I would rather not think about them (1 [*never*], 2 [*seldom*], 3 [*sometimes*], 4 [*often*], or 5 [*very often*]).
8. At night I may dream about one or more emotionally negative events from the time of the occupation (1 [*never*], 2 [*seldom*], 3 [*sometimes*], 4 [*often*], 5 [*very often*]).
9. Memories and thoughts about one or more emotionally negative events from the time of the occupation may keep me awake at night or make it hard for me to concentrate (1 [*never*], 2 [*seldom*], 3 [*sometimes*], 4 [*often*], or 5 [*very often*]).
10. How vivid are your memories about one or more negative events from the time of the war? (1 [*not at all vivid*]; 7 [*as vivid as if it happened now*]).
11. I feel that one or more emotionally negative events from the time of the occupation have become part of my identity (1 [*strongly disagree*], 2 [*disagree*], 3 [*neutral*], 4 [*agree*], or 5 [*strongly agree*]).
12. One or more emotionally negative events from the time of the occupation have become a central part of my life story (1 [*strongly disagree*], 2 [*disagree*], 3 [*neutral*], 4 [*agree*], or 5 [*strongly agree*]).
13. One or more emotionally negative events from the time of the occupation have become a reference point for the way I understand myself and the world (1 [*strongly disagree*], 2 [*disagree*], 3 [*neutral*], 4 [*agree*], or 5 [*strongly agree*]).
14. What was the most dominant emotion in the emotionally negative event(s) that you considered when answering the previous questions? Was it (select one): fear, sadness, anger, shock, other?
15. During one or more of the emotionally negative events from the time of the occupation, did you experience, witness, or were you confronted with actual or threatened death or serious injury or a threat to the physical integrity of self or others? (Yes/No)
16. During one or more of the emotionally negative events from the time of the occupation, did you feel intense fear, helplessness, or horror? (Yes/No)
17. How old were you during your most emotionally negative event from the time of the occupation? (give age in years)

Note. Participants in Study 1 answered all questions with the exception that Questions 1 and 2 were asked only to participants older than 63 years old. Participants in Study 2 answered Questions 5–17 for an emotionally negative event from their life.

same analyses included only respondents who were older than 7 years at the time of the event and whose current age was less than 85 years (to control for effects due to aging in very old age), no significant correlations were found, $r(116) = -.02$, $p > .7$ and $r(206) = .01$, $p > .9$, respectively. Thus, an age-related increase in the ability to form flashbulb memories is clearly observed up to age 7, but not after this age. This agrees with the childhood amnesia literature as well as with previous studies of the development of flashbulb memories as a function of age at the time of the events (Berntsen & Thomsen, 2005; Winograd & Killinger, 1983).

The bottom panel of Figure 1 shows the mean ratings of vividness for memories of the invasion and liberation (among those who reported a memory). Both curves show a monotonic increase in vividness as a function of age at the time of the event. This increase is steepest, and thus most easily observed, up to the age of 8 years at the time of the event, but it probably extends somewhat beyond that age according to the plots in the bottom panel of Figure 1. Correlational analyses including only respondents who were 7 years old and younger at the time of the events showed positive associations between vividness and age, $r(78) = .30$, $p < .01$, for the invasion and, $r(74) = .39$, $p < .0001$, for the liberation. When the same analyses included only respondents who were older than 7 years at the time of the event and whose current age was less than 85 years (to control for effects due to aging in very old age), weaker, but still statistically significant, positive corre-

lations were found between age and vividness, $r(111) = .21$, $p < .05$, for the invasion and, $r(193) = .17$, $p < .05$, for the liberation.

Posttraumatic stress reactions and vividness of trauma memories as a function of age at the time of the events. Among those who answered, 80 (21%) respondents agreed or strongly agreed that they actively avoided thinking about stressful experiences from the time of the war; 76 (19%) sometimes, often, or very often had intrusive memories about stressful experiences from the time of the war; 14 (3%) sometimes, often, or very often had sleep dreams about unpleasant experiences from this time; and 8 (2%) sometimes or often were kept awake or had difficulties concentrating because of stressful experiences from the time of the war. These four questions were positively correlated (average interitem correlation = .36; Cronbach's $\alpha = .57$) and averaged to form a composite score for posttraumatic stress reactions. The top panel of Figure 2 shows current level of posttraumatic stress reactions as a function of age at the time of the most traumatic event (Question 17 in Table 2). The level of symptoms increases with age up to around age 8 after which the curve seems to level. An analysis that included only respondents who were younger than 8 years at the time of their most traumatic event showed a weak, but significant, positive association between age (at the time of the trauma) and current level of posttraumatic stress reactions, $r(110) = .25$, $p < .01$. When age and posttraumatic stress reactions were correlated in an analysis that only included respondents who were older than

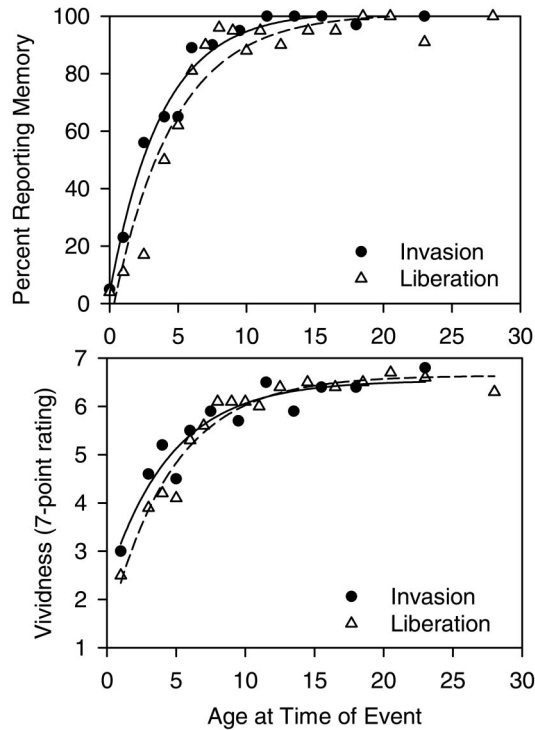


Figure 1. Percentage of participants reporting a memory (top panel) and mean ratings of vividness (bottom panel) for the day of the invasion and liberation by the age of the participant at the time of the event. The lines are from an exponential fit to the data. Each data point represents a minimum of 20 cases.

7 years at the time of the event and whose current age was less than 85 years (to control for effects due to aging in very old age), no significant relation was found, $r(148) = -.05, p > .6$.

Among those who answered, 67 (17%) respondents agreed or strongly agreed that the time of the war had left a scar on their soul. Respondents' own estimates of the degree to which the trauma had left a scar on their soul showed a similar pattern as the data based on the composite score of posttraumatic stress reactions. Again, an effect of age at the time of the most traumatic event was observed up to age 8. This was confirmed by a positive correlation between age and ratings of the scar question for respondents who were 7 years and younger at the time of their most traumatic event, $r(117) = .33, p < .0001$. Once more, when the same two variables were correlated in an analysis that only included respondents who were older than 7 years at the time of the event and whose current age was less than 85 years, the two variables were not associated, $r(149) = .00, p > .9$.

The middle panel of Figure 2 shows ratings of vividness of the trauma memories as a function of age during the most traumatic event. Again, an increase is found over the preschool years, after which no systematic pattern is seen. For participants who were 7 years old and younger during their most traumatic event, a positive correlation was found between age and vividness, $r(115) = .42, p < .0001$. No significant correlation was found in an analysis that only included respondents above age 7 at the time of the trauma

and whose current age was less than 85 years, $r(145) = .06, p > .4$.

Centrality to life story and identity as a function of age at the time of the most traumatic event. The three questions addressing the centrality of the stressful experiences to participants' life story and identity (Questions 11–13 in Table 2) showed a high average interitem correlation (.64) and high internal consistency (Cronbach's $\alpha = .84$). The bottom panel of Figure 2 shows the composite score for the three questions addressing how central traumatic events from the time of the occupation were to the current life story and identity of the respondents. This plot follows the same pattern as the patterns observed in the previous figures. An increase is seen up to age 7, after which point no clear increase or

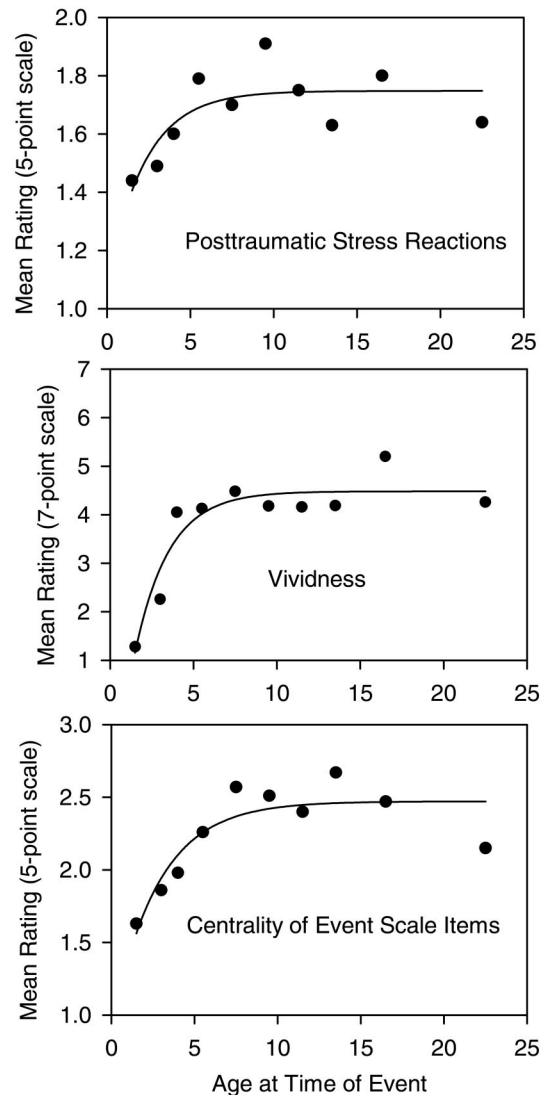


Figure 2. Mean score for posttraumatic stress reactions (top panel), mean ratings of vividness for negative events (middle panel), and mean score for Centrality of Event Scale (bottom panel) by the age of the participant at the time of his or her most traumatic event from the time of the German occupation. The lines are from an exponential fit to the data. Each data point represents a minimum of 20 cases.

drop can be observed. This was confirmed statistically by a positive correlation between age and CES score for respondents 7 years and younger at the time of their most traumatic event, $r(111) = .29, p < .01$. When age and CES score were correlated in an analysis that only included respondents who were older than 7 years at the time of their most traumatic event and whose current age was less than 85 years, a weak and nonsignificant negative correlation was observed, $r(143) = -.04, p > .6$.

Trauma severity, emotions, and current reactions. Approximately one fourth (24.1%) of the respondents confirmed the question addressing the diagnostic A1 criteria for trauma in the *DSM-IV*—that is, the person had experienced, witnessed, or been confronted with actual or threatened death or serious injury or threat to the physical integrity of him- or herself or others (American Psychiatric Association, 1994). Table 3 shows means and standard deviations for measures of posttraumatic stress reactions, memory, CES, and age at the time of the most traumatic event for those who responded “yes” versus “no” to this question. (To avoiding inflating differences caused by participants too young to recall the A1 event, Table 3 [as well as Tables 4, 5, and 6] includes only participants who were older than 7 years at their most traumatic event.) Respondents who answered “yes” to the A1 question had higher means on all included measures, except age at the time at the event. Among those who answered “yes,” a substantially higher proportion also confirmed the A2 trauma criterion—that is, that they had felt extreme fear, helplessness, and horror (see Table 3). A comparison of the mean scores of those who answered “yes” versus “no” to the statement addressing the A2 criterion showed a similar pattern as the one presented in Table 3 (all $ps < .01$).

When asked for their most dominant emotions during the event(s), fear was reported by 42.2%, sadness by 15.9%, shock by 10.7%, anger by 6.3%, and other by 24.8%. When participants’ scores on posttraumatic stress reactions, “scar on my soul,” trauma vividness, and CES, were broken down by these five emotion categories, mean scores for shock were numerically higher than mean scores for any of the other four emotion categories on all variables. A series of one-way analyses of variance (ANOVAs) showed significant effect of emotion for all variables (all $ps < .001$), except for “scar on my soul.” Bonferroni post hoc tests

showed that these effects were mainly due to shock having higher mean scores than one or more of the other emotion categories ($ps < .05-.0001$).

In summary, systematic relations were found between measures of posttraumatic stress reactions, CES, and memory, on the one hand, and measures of severity of the traumatic event (in terms of both the A1 and A2 trauma criteria) on the other. This is contrary to findings in student populations reported by Berntsen and Rubin (2006), but agrees with studies involving other populations (Brewin et al., 2000; Ozer et al., 2003). According to the retrospective measures of emotion, shock appeared to be most strongly associated with posttraumatic reactions.

Correlations between posttraumatic stress reactions, vividness, and CES. Table 4 shows the correlations among measures of posttraumatic stress reactions, “scar on soul,” vividness of trauma memories, and the A1 and A2 trauma criteria. All measures are positively correlated. The .51 correlation between the CES score and the score of posttraumatic stress reactions is higher than the correlations found in younger populations (Berntsen & Rubin, 2006), which may reflect that the mechanisms measured by the CES (e.g., the tendency to make the trauma a turning point in the life story or a key component of identity) are central mechanisms for maintaining posttraumatic stress reactions over a life time, or, conversely, that having posttraumatic stress reactions in relation to one or more specific events may over a lifetime make the person consider these events as being central to his or her life story and identity.

None of the variables included in Table 4 correlated with gender (all $ps < .07$). Socioeconomic status (a composite variable calculated from measures of income, occupation, and years of education) correlated only significantly with scar on soul, $r(360) = .11, p < .05$. A multiple regression analysis with posttraumatic stress reactions as the dependent variable and age, gender, socioeconomic status, A1 and A2 trauma criteria, and CES score as predictor variables showed a significant effect only of the CES score ($\beta = .48, SE = .05, t(319) = 9.40, p < .0001$, and the A2 trauma criterion ($\beta = .17, SE = .05, t(319) = 3.15, p < .01; R^2$ for the entire analysis = .39).

Table 3
Mean Scores on Posttraumatic Stress Reactions, A2 Trauma Criterion, Vividness of Trauma Memory, and CES for Participants in Study 1 Who Answered “No” Versus “Yes” to Trauma Criterion A1

Measure	No to A1		Yes to A1		<i>t</i>	<i>df</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Posttraumatic stress	1.64	0.53	1.90	0.70	2.64**	159
Criterion A2	0.27	0.45	0.74	0.44	6.64****	167
“Scar on my soul”	2.13	1.23	2.88	1.46	3.51***	161
Vividness	4.08	2.11	5.27	2.06	3.47***	157
CES score	2.09	0.99	2.86	1.22	4.28****	152

Note. Participants younger than 8 years at their most traumatic event were excluded. CES = Centrality of Event Scale; A1 criterion = the person should have experienced, witnessed, or been confronted with an event that involved actual or threatened death or serious injury or a threat to the physical integrity of him- or herself or others, measured by question 15 in Table 2; A2 criterion = the person should have responded to the trauma with intense fear, helplessness, or horror, measured by question 16 in Table 2.

** $p < .01$. *** $p < .001$. **** $p < .0001$.

Table 4
Correlations Between Posttraumatic Stress Reactions, Vividness, CES, and A1 and A2 Trauma Criteria in Study 1

Measure	1	2	3	4	5	6
1. Posttraumatic stress	—					
2. "Scar soul"	.46****	—				
3. Vividness	.33****	.16	—			
4. CES score	.51****	.41****	.51****	—		
5. Criterion A1	.18*	.22**	.24**	.33****	—	
6. Criterion A2	.33****	.19*	.22*	.29**	.43****	—
7. A1 and A2	.25**	.17*	.30****	.34****	.79****	.68****

Note. $N = 137$. Participants younger than 8 years at their most traumatic event were excluded from the analyses. CES = Centrality of Event Scale; A1 criterion = the person should have experienced, witnessed, or been confronted with an event that involved actual or threatened death or serious injury or a threat to the physical integrity of him- or herself or others, measured by question 15 in Table 2; A2 criterion = the person should have responded to the trauma with intense fear, helplessness, or horror, measured by question 16 in Table 2. * $p < .05$. ** $p < .01$. **** $p < .0001$.

Summary and Discussion for Study 1

The frequency of participants reporting a memory for receiving the news of the invasion and liberation increased as a function of participants' age up to around age 8, after which point no statistically reliable relationship was found. The same pattern was found for the ratings of posttraumatic stress reactions, the assessment of whether events from the time of the war had left a scar on participants' soul, vividness of the traumatic memories, and the average score for the CES questions. Vividness of memories for the invasion and liberation similarly increased as a function of age up to age 8, and in addition showed a weak (but significant) positive correlation with age after this cutoff point.

Participants with traumas that fulfilled the A1 trauma criterion had higher scores on measures of posttraumatic stress reactions, "scar on soul," vividness of the traumatic memories, and CES than participants who did not confirm this question. A similar pattern was found for the A2 trauma criterion. More of those who confirmed A1 also confirmed the question on the A2 trauma criterion. Because both criteria are measures of trauma severity, according to the *DSM-IV* (American Psychiatric Association, 1994), the present results show that posttraumatic stress reactions vary systematically with severity of the traumatic event even 50–60 years after the events took place (e.g., Bramsen & van der Ploeg, 1999; Robinson et al., 1994). Similar systematic effects of trauma severity were found on measures of memory vividness and on how central the events were perceived to be to the person's life story and identity.

Measures of posttraumatic stress reactions, "scar on soul" question, CES, and A1 and A2 trauma criteria correlated positively with one another. Lower socioeconomic status correlated weakly, but significantly, with level of posttraumatic stress reactions. A multiple regression analysis showed that only the CES score and A2 trauma criterion significantly predicted level of posttraumatic stress reactions when controlling for age, gender, and socioeconomic status. The A1 trauma criterion did not enter as a significant predictor. This finding and the importance of a CES score for predicting posttraumatic stress reactions replicate our previous work with undergraduates (e.g., Berntsen & Rubin, 2006).

Study 2

Participants in the Study 1 were older Danes who had lived through World War II. It is important to examine whether similar findings can be obtained within a postwar population, involving different age groups, and different types of traumatic events with more varied retention intervals. Study 1 did not address the relation between age and posttraumatic stress reactions for individuals who had encountered a traumatic event after young adulthood. Reporting results from a meta-analysis of predictors of PTSD, Brewin et al. (2000) found a weak correlation between younger age and PTSD across 29 studies, all of which included participants who were more than 18 years old and whose symptoms were measured in relation to relatively recent traumas. Other findings disagree with younger adults being more at risk for developing PTSD than older adults. For example, in a study of posttraumatic stress responses to terrorist bombing in France, Verger et al. (2004) found that participants between 35 and 54 years were more vulnerable to traumas as compared with younger and older age groups. Study 2 was conducted to address these questions.

Method

Participants. A representative sample of 1,021 Danes between 18 and 58 years participated (mean age = 40.1 year, 566 were women).

Procedure. The procedure was the same as the one described in Study 1. The respondents were informed that the purpose of the present study was to obtain information about their memories for negative events in their lives. The questions were the same as the ones presented in Table 2, except that participants answered these questions for memories of one or more emotionally negative events sampled from their entire lifetime (instead of one or more emotionally negative events experienced during the German occupation, as in Study 1) and that participants were not asked Questions 1–4. Don't know options were available for Questions 5–14. Don't know responses were coded as missing data. The number of missing data for Questions 5–17 was (in consecutive order) as follows: 16, 10, 6, 8, 3, 15, 20, 11, 16, 65, 0, 0, and 0.

Results

Posttraumatic stress reactions and vividness of trauma memories as a function of age in the most traumatic event. Among those who answered, 416 (41%) students agreed or strongly agreed

that they actively avoided thinking of one or more stressful experiences from their life; 497 (49%) sometimes, often, or very often had intrusive memories referring to experiences that they would rather not think about; 224 (22%) sometimes, often, or very often had sleep dreams about stressful experiences; and 215 (21%) sometimes, often, or very often were kept awake at night or had difficulties concentrating during the daytime because of one or more stressful experiences from their life. Answers to these questions were intercorrelated (average interitem correlation = .37, Cronbach's $\alpha = .66$) and averaged to form a composite score for posttraumatic stress reactions. As in Study 1, a positive correlation between age at the time of the most traumatic event and posttraumatic stress reactions was found only among those whose most traumatic event took place before age 8, $r(130) = .32, p < .0001$. A partial correlation controlling for time since the traumatic event showed similar results, $r(129) = .34, p < .0001$. Only a weak positive relation was found when the same analysis was based on participants who were above 7 years old at the time of their most traumatic event, $r(863) = .07, p < .05$. When controlling for time since the traumatic event in a partial correlation, no statistically reliable relation was found between age at the event and posttraumatic stress reactions, $r(862) = .03, p > .3$, among participants older than 7 years at the time of the event.

Ratings of "scar on my soul" increased by age at the time of the most traumatic event, but again only up to age 8. This was confirmed statistically by a positive correlation between the two variables when participants older than 7 years at the time of the event were removed from the analysis, $r(132) = .33, p < .0001$. A partial correlation controlling for time since the most traumatic event yielded a similar result, $r(131) = .31, p < .0001$. However, when participants who were younger than 8 years at the time of the most traumatic event were removed, the two variables were no longer associated, $r(874) = .02, p > .6$.

The pattern for memory vividness as a function of age at the time of the most traumatic event was similar. A positive correlation was found between vividness and age for participants who were less than 8 years old at the time of their most traumatic event, $r(128) = .23, p < .01$. A partial correlation controlling for time since the most traumatic event also confirmed the relation,

$r(127) = .26, p < .005$. However, a weaker positive correlation was also found among participants who had been more than 7 years old at the time of their most traumatic event, $r(874) = .14, p < .0001$. Similarly, a weak positive correlation was found when controlling for the time elapsed since the event in a partial correlation, $r(873) = .12, p < .0001$.

Centrality to life story and identity by age at the time of the most traumatic event. The three questions addressing the centrality of the stressful experiences in relation to participants' life story and identity showed an average interitem correlation of .58 and good internal consistency (Cronbach's $\alpha = .80$). They were therefore averaged to form a composite CES score. Up to age 8, a significant positive relation was seen between age at the time of the most traumatic event and CES score, $r(129) = .37, p < .0001$, and when controlling for time since the trauma by a partial correlation, $r(128) = .34, p < .0001$. However, when the same analysis was based on participants who were 8 years and older during their most traumatic event, no reliable relation was seen, $r(853) = -.03, p > .4$; a weak (but statistically significant) negative relation was seen in a partial correlation controlling for time since the event, $r(852) = -.10, p < .01$.

Trauma severity, emotions, and current reactions. A total of 598 participants (59%) affirmed that one or more negative events from their life had the characteristics listed under the A1 trauma criterion (Question 15 in Table 2, accommodated to the younger population). This agrees with the prevalence of traumatic events found in a representative sample of an American population (Kessler et al., 1995). As shown in Table 5, participants who answered "yes" to this question had higher scores on posttraumatic reactions, vividness of the emotional memories, and the CES questions. In addition, a larger proportion of them also confirmed the A2 trauma question (cf. Question 16 in Table 2, accommodated to the younger population). Analyses analogous to the ones presented in Table 5, but comparing scores between participants with yes versus no responses to the A2 trauma criteria, yielded similar results (all $ps < .0001$). A total of 405 participants (40%) affirmed that one or more negative events from their life had the characteristics listed under both the A1 and A2 trauma criteria.

Table 5
Mean Scores on Posttraumatic Stress Reactions, A2 Trauma Criterion, Vividness of Trauma Memory, and CES for Participants in Study 2 Who Answered "No" Versus "Yes" to Trauma Criterion A1

Measure	No to A1		Yes to A1		<i>t</i>	<i>df</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Posttraumatic stress	2.31	0.68	2.47	0.75	3.08**	863
Criterion A2	0.41	0.49	0.68	0.47	8.22****	880
"Scar on my soul"	3.40	1.25	3.72	1.23	3.70***	875
Vividness	3.74	1.82	4.36	1.82	4.83****	874
CES score	2.85	1.07	3.05	1.07	2.63**	853

Note. Participants younger than 8 years at their most traumatic event were excluded from the analyses. CES = Centrality of Event Scale; A1 criterion = the person should have experienced, witnessed, or been confronted with an event that involved actual or threatened death or serious injury or a threat to the physical integrity of him- or herself or others, measured by question 15 in Table 2; A2 criterion = the person should have responded to the trauma with intense fear, helplessness, or horror, measured by question 16 in Table 2.
** $p < .01$. *** $p < .001$. **** $p < .0001$.

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The frequencies for the emotions reported in response to the question addressing the most dominant emotions during the event (Question 14 in Table 2) were as follows: sadness 42.1%, shock 12.4%, fear 11.9%, anger 7.6%, and other 25.9%. When scores on posttraumatic stress reactions, "scar on my soul," vividness, and CES were broken down by the five emotions in a series of one-way ANOVAs, a significant effect of emotion was found for all four variables ($ps < .01-.0001$). Bonferroni post hoc tests showed that this effect was mostly due to higher scores associated with fear and/or shock compared with the other three emotion categories ($ps < .05-.001$). The means for fear were numerically higher for all variables, except for vividness for which shock had the highest mean score.

Correlations between posttraumatic stress reactions and CES. Table 6 shows positive correlations between posttraumatic stress reactions, the degree to which participants thought they had a "scar on their soul," vividness of their traumatic memories, the composite score for the CES, and whether the event satisfied the A1 and A2 trauma criteria. Weak negative correlations were found between time since the most traumatic event and all of the other variables. Also in the present study, a strong positive correlation was found between the CES composite score and the composite score for posttraumatic stress reactions.

Female gender correlated (weakly) with all of the variables in Table 5 (r s range: $.19-.09$, all $ps < .05$, $n = 957$). Lower socioeconomic status correlated with posttraumatic stress reactions, $r(932) = .16$, $p < .0001$, CES score, $r(932) = .10$, $p < .01$, vividness, $r(932) = .08$, $p < .01$, and A2 trauma criterion, $r(932) = .08$, $p < .05$. A multiple regression analysis was conducted with posttraumatic stress reactions as the dependent variable and the following predictor variables (with beta coefficients, standard errors, and p level in parentheses; $n = 946$, R^2 for the entire analysis = $.30$): CES score ($\beta = .41$, $SE = .03$, $p < .0001$), A2 trauma criterion ($\beta = .17$, $SE = .03$, $p < .0001$), age at most traumatic event ($\beta = .17$, $SE = .04$, $p < .0001$), years since most traumatic event ($\beta = .09$, $SE = .04$, $p < .05$), lower socioeconomic status ($.14$, $p < .0001$), female gender ($\beta = .05$, $SE = .03$, $p > .09$), and A1 trauma ($\beta = .02$, $SE = .03$, $p > .4$). As in Study 1, the CES score entered as a highly significant predictor, the A2

trauma measure also showed a significant effect, whereas the A1 criterion did not. Unlike findings in Study 1, in the present study (which had more statistical power) socioeconomic status showed a weak but statistically significant effect.

General Discussion

A clear pattern was observed with respect to the relation between the development of long-term posttraumatic reactions and age at the time of the traumatic event in both studies: For participants who were 7 years or younger at the time of their most traumatic event, positive correlations were found between their age at the time of their most traumatic event and current levels of posttraumatic reactions, vividness of the stressful memories, and CES score. For participants who were above age 7 at the time of their most traumatic event, no such relations were found. For the World War II population in Study 1, a similar pattern was observed for the presence and vividness of participants' personal memories of the day of the German invasion and the day of their capitulation (though vividness also correlated weakly with age after age 7). The findings related to memories for the two historical events agree with studies of childhood amnesia generally (e.g., Nelson, 1993; Pillemer & White, 1989; Rubin, 2000; Usher & Neisser, 1993) and more specifically with previous studies on age differences in the development of flashbulb memories (Berntsen & Thomsen, 2005; Teckan & Peynircioğlu, 2002; Winograd & Killinger, 1983). The fact that the relation between long-term posttraumatic stress reactions and age at the time of the event mirrors the age-related ability of retaining autobiographical memories from childhood to adulthood has at least two possible interpretations. One possibility is that posttraumatic stress reactions (in terms of reexperiencing, avoidance, and hyperarousal; American Psychiatric Association, 1994) depend on the presence of autobiographical memory abilities. This interpretation seems to agree with theorists who assume that PTSD reflects a disorganization of autobiographical memory and identity caused by the traumatic event (e.g., Brewin, 2003; Nijenhuis & van der Hart, 1999; van der Kolk & Fisler, 1995; see Berntsen, Willert, & Rubin, 2003, for a review). It also agrees with a different view, according to which the traumatic memory plays

Table 6
Correlations Between Posttraumatic Stress Reactions, Vividness, CES, and A1 and A2 Trauma Criteria and Years Since the Most Traumatic Event in Study 2

Measure	1	2	3	4	5	6	7
1. Posttraumatic stress	—						
2. "Scar soul"	.51****	—					
3. Vividness	.38****	.35****	—				
4. CES score	.44****	.51****	.44****	—			
5. Criterion A1	.10**	.12****	.16****	.09*	—		
6. Criterion A2	.29****	.31****	.27****	.26****	.25****	—	
7. A1 and A2	.24****	.26****	.24****	.20****	.67***	.73****	—
8. Years ago	-.07*	-.01	-.07*	-.10**	-.04	-.04	-.05

Note. $N = 836$. Participants younger than 8 years at their most traumatic event were excluded from the analyses. CES = Centrality of Event Scale; A1 criterion = the person should have experienced, witnessed, or been confronted with an event that involved actual or threatened death or serious injury or a threat to the physical integrity of him- or herself or others, measured by question 15 in Table 2; A2 criterion = the person should have responded to the trauma with intense fear, helplessness, or horror, measured by question 16 in Table 2.

* $p < .05$. ** $p < .01$. **** $p < .0001$.

a central role for the organization of the person's life story and identity by constituting a turning point in the person's life story and a reference point for making inferences and for attributing meaning to other events (Berntsen & Rubin, 2006; Berntsen et al., 2003). Logically, a prerequisite in both cases appears to be the presence of some autobiographical memory abilities prior to the event. Alternatively, the development of posttraumatic stress reactions and autobiographical memory could both depend on similar underlying cognitive and emotional skills that develop throughout the preschool years, such as language, semantic memory, and emotion. The fact that PTSD is maintained and sometimes intensified in dementia could be seen to indicate a less central role for autobiographical memory abilities in PTSD. However, in most such cases it seems that the traumatic memory is preserved, although other autobiographical information is lost (van Achterberg, Rohrbaugh, & Southwick, 2001; Verma et al., 2001). Irrespective of which interpretation is favored, the present findings indicate that children older than 7 are more at a risk for developing long-term posttraumatic reactions, and among those younger than 8, older children are more at risk than younger children. These findings largely agree with the few studies that have examined age-related effects of traumas encountered in early childhood. In their review of children's responses to traumas, Vogel and Vernberg (2003) found no age-related differences among school-age children. Green et al. (1991) found that fewer preschool children than schoolchildren developed PTSD. Studies on people who survived the Holocaust as children have shown positive correlations between age and trauma-related distress later in life (e.g., Sigal & Weinfeld, 2001).

It should be emphasized that with respect to posttraumatic stress reactions, we measured only four symptoms here. These were selected in accordance with the description of PTSD in the *DSM-IV* so that reexperience, avoidance, and arousal symptom categories were represented (American Psychiatric Association, 1994). There may be other reactions to traumas—not measured here—for which younger children are more vulnerable than older children, such as fear of being separated from their parents, dissociation, depression, or anxiety. As suggested by some clinicians (e.g., Durst, 2003), qualitatively different trauma reactions may be associated with different ages in childhood. Such possible qualitative differences are overlooked or simplified when applying criteria derived from the PTSD diagnosis uniformly to all age groups. In the present survey studies, no information was obtained about the contents of the specific traumatic experiences that our participants had encountered, thus we are unable to address this question. Furthermore, trauma exposure increases the risk for mental disorders other than PTSD (e.g., depression; Kessler et al., 1995). Our work does not address whether trauma exposure in early childhood relative to exposure later in life increases the risk for such disorders. In Study 2, female gender and lower socioeconomic status correlated weakly with levels of posttraumatic stress reactions, as has been found in previous work (Brewin et al., 2000). However, with respect to gender, the effect disappeared when controlling for the influence of other factors in multiple regression analyses.

The present findings showed a positive relation between the degree to which a stressful event is seen as central to a person's life story and identity (the CES score) and posttraumatic stress reactions in relation to this event. The results replicate Berntsen and

Rubin's (2006) findings with undergraduates in a general population of Danes between 18 and 58 years and among Danes older than 58 years in relation to stressful events encountered during World War II. The present findings also agree with Berntsen and Thomsen's (2005) observation that intrusive memories from the time of the German occupation of Denmark were positively related to the extent to which this time period was seen as central to the person's life story and identity. These findings suggest that it may be detrimental to the person's well-being if cognitive schemata are accommodated too well to fit a traumatic event. This can be seen to contradict the more common view that a key characteristic of posttraumatic stress reaction is a poor integration of the trauma into the life story and identity of the person (e.g., Nijenhuis & van der Hart, 1999; van der Kolk & Fisler, 1995), and that symptoms of PTSD are due to the lack of an accommodation of cognitive schemata to match the reality of the trauma (Horowitz, 1986).

In both of the present studies, multiple regression analyses showed that the CES score was more strongly associated with posttraumatic stress reactions than were the A1 and A2 trauma criteria (American Psychiatric Association, 1994), of which only A2 entered as a significant predictor in the regression analyses. Taken together, the findings suggest that the role of the traumatic memory in the overall cognitive organization of personal memories related to life story and identity is important for the development and maintenance of posttraumatic stress reactions and that this may be more decisive for the long-term impact than whether the traumatic event fulfills the formal diagnostic criteria for a trauma according to the *DSM-IV* (American Psychiatric Association, 1994). One practical implication is that the centrality of an emotionally negative event in a person's life story and self-understanding (e.g., how often this event is spontaneously talked about and/or used as a reference point in inferences about the self and the world) may be a better indicator of this person's present distress and mental suffering than the actual content of the traumatic event in the past (e.g., whether the person was injured or in life danger).

Participants in Study 1 and Study 2 differed with respect to which emotions were regarded as most dominant during the traumatic/stressful events. In Study 1, fear was nominated most frequently (by 42%); in Study 2, sadness was nominated most frequently (also by 42%), whereas fear was mentioned only by 12%. For the two studies taken together, shock and fear were associated with the highest scores for posttraumatic stress reactions, vividness, and centrality of event, which seems to agree with the emphasis on fear in the *DSM-IV* (American Psychiatric Association, 1994).

Possible methodological weaknesses of the present studies are their cross-sectional designs and reliance on self-reports. Findings related to the A1 and A2 trauma criteria and the question on emotion derive from retrospective assessments and should be considered with that reservation in mind. The same is the case for age at the time of the most traumatic event, especially in Study 2 in which participants sampled from their entire lifetime. Participants in Study 1 sampled from a specific 5-year period in their life, so the choice of their most traumatic event and age estimates was less open to retrospective bias. The fact that findings in Study 2 replicate those in Study 1 generally supports the validity of the results.

Surprisingly little work has been done on autobiographical memories and posttraumatic stress reactions related to World War II in the general population. Clinicians and social workers working with older people should be aware that PTSD in relation to World War II may be underdiagnosed in civilian populations. As pointed out by Zeiss and Dickman (1989), posttraumatic stress reactions may vary in strength over the lifetime and may increase in response to current life stressors, such as losses associated with aging. Most studies of PTSD in response to World War II traumas have hitherto been limited to specific populations with distinct and generally well-recognized traumatic experiences, such as Holocaust survivors or combat veterans. However, World War II affected many people's lives and generated lifelong vivid memories and posttraumatic stress reactions that may also persist in the broader civilian population even after five to six decades (Berntsen & Thomsen, 2005; Bramsen & van der Ploeg, 1999). For the same reason, World War II offers an opportunity for studying the impact of stressful childhood events in old age as a function of multiple factors. Here we have focused primarily on age during the events. Future studies might examine other factors, such as nationality, membership in social groups, and social as well as emotional support.

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