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To mention or not to mention? The inclusion of self-reported most traumatic and most positive memories in the life story

Inge Lise Lundsgaard Kongshøj, Annette Bohn, and Dorthe Berntsen

Center on Autobiographical Memory Research (CON AMORE), Department of Psychology and Behavioral Sciences, Aarhus University, Aarhus, Denmark

Author note

Correspondence regarding this article should be addressed to Inge Lise Lundsgaard Kongshøj, Department of Psychology and Behavioral Sciences, Aarhus University, Bartholins Allé 11, 8000 Aarhus C, Denmark. Email: liselk@psy.au.dk
Abstract

Many theories on Posttraumatic Stress Disorder (PTSD) make assumptions on the relationship between PTSD and centrality of traumas to the life story and identity. Although the Centrality of Event Scale (CES; Berntsen & Rubin, 2006) is a popular measure of centrality of personally experienced events to the life story, no studies have examined whether self-rated “central” events are mentioned, when individuals recount their lives. It is also unknown if mentioning specific event types in the life story is related to psychological health or life story coherence. We asked 386 adults to write their life stories, nominate their most traumatic and positive events, rate these events on the CES, and complete measures of PTSD and depression. Two-thirds of the sample mentioned at least one event, with the positive event being mentioned twice as often as the trauma. Mentioned events were more central than non-mentioned events. Participants who mentioned their trauma scored higher on symptoms of PTSD and depression than participants who only mentioned their positive event, but did not write less coherent life stories. Further, death- and illness-related traumas were mentioned more often than accidents and disasters. Findings are discussed in relation to theories on trauma memory in PTSD.

Keywords: Life stories, centrality of event scale (CES), posttraumatic stress (PTSD), life story coherence, trauma types
To mention or not to mention? The inclusion of self-reported most traumatic and most positive memories in the life story

Most people would probably agree that some events in life are more memorable than others, and that some memories are more important than others in defining who we are. When constructing our life stories, we piece together key memories to a coherent narrative that explains who we are, how we became who we are, and who we expect to become in the future (McAdams, 1988, 1996). Yet, even among memories important enough to become part of the life story, differences may exist in how essential a role they play. As Pillemer (2000) put it: “Narrative representations of a person’s life are built around highly salient and memorable episodic nodes” (p. 96). Some memories are simply more central than others. But what happens if some of these central memories are of traumatic events?

Many researchers have considered how integration of specific events, especially traumas, into the life story and identity may influence the narrative (e.g. Berntsen & Rubin, 2006, 2007; Berntsen, Willert, & Rubin, 2003; Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Horowitz, 1975). To operationalize this integration, the Centrality of Event Scale (CES; Berntsen & Rubin, 2006) was developed. Although originally developed to measure centrality to the life story and identity of traumas or stressful events, research using the CES has contributed with knowledge about how individuals perceive a range of events including not only traumatic or negative (Bernard, Whittles, Kertz, & Burke, 2015; Boals & Ruggero, 2016), but also positive (e.g. Berntsen, Rubin, & Siegler, 2011; Boals, 2010; Zaragoza Scherman, Salgado, Shao, & Berntsen, 2015), moral/immoral (Stanley, Bedrov, Cabeza, & De Brigard, 2019), and shameful events (e.g. Pinto-Gouveia, Castilho, Matos, & Xavier, 2013). Using items such as “I feel that this event has become part of my identity”, “I feel that
this event has become a central part of my life story”, and “This event was a turning point in my life”, the CES measures to what extent an event “forms a personal reference point for the attribution of meaning to other events, a salient turning point in the life story and a central component of a person’s identity and self-understanding” (Berntsen & Rubin, 2006, p. 223). Thus, events that are rated as central by individuals are assumed to be prominent events in their life stories. Yet, empirical evidence as to whether this is indeed the case is lacking. Few studies have examined life stories in relation to trauma (e.g. Clifford, Hitchcock, & Dalgleish, 2020), but no studies have investigated if personal life events, rated as central on the CES, are spontaneously mentioned when individuals recount their life stories.

The purpose of the present study is threefold: First, we want to test the assumption that higher scores on the CES indicate that the memory is mentioned in the life story, although a perfect correlation would never be expected due to different methods of measurement as well as contextual factors producing variance in the selection of events. We examine this question for self-nominated most positive and most traumatic events. Bringing this assumption to empirical testing is important in validating the scientific evidence gained from research using the CES. Second, we want to investigate how mentioning or not mentioning traumas in the life story relates to symptoms of PTSD, depression, and life story coherence. Investigating this will test theoretical assumptions of different theories on the role of trauma memories in PTSD. Third, we also investigate whether mentioning of traumas is related to type of trauma experienced.

**Centrality for Positive and Negative Events**

Consistent with the well-documented positivity biases in autobiographical memory, showing that individuals across age groups and cultures remember more positive than negative events,
and affect fades faster for negative than positive events (e.g. Berntsen, 1996; Berntsen & Rubin, 2002, 2008; Bohn & Berntsen, 2007; Marsh, Edginton, Conway, & Loveday, 2019; Ritchie et al., 2015; Walker, Skowronski, & Thompson, 2003; Walker, Vogl, & Thompson, 1997), a number of studies have shown that positive events are considered more central to the life story and identity than negative events (Berntsen et al., 2011; Rubin, Berntsen, Deffler, & Brodar, 2019; Zaragoza Scherman et al., 2015; but see Boals, 2010).

Regarding the centrality of negative events, the picture is less clear. In some understandings of PTSD, the disorder is expected to be associated with lower levels of integration of the trauma into the life story and identity, due to faulty processing and/or avoidance (Ehlers & Clark, 2000; Horowitz, 1975; Shapiro, 1989, 2018). However, from an autobiographical memory perspective, it has been argued that the emotionality and distinctiveness of traumas heighten accessibility in memory and thus make it more likely that these events become central in the life story (Berntsen & Rubin, 2006; Berntsen et al., 2003). Consistent with this idea, in a systematic review, Gehrt, Berntsen, Hoyle, and Rubin (2018) found robust positive correlations between CES for traumatic and/or negative events and PTSD-symptoms, across multiple studies with different populations. Further, centrality of negative events is a strong predictor for PTSD even when controlling for other factors such as trauma exposure (Bernard et al., 2015; Schuettler & Boals, 2011), just as event centrality has been found to predict later PTSD in longitudinal investigations (Blix, Birkeland, Solberg, Hansen, & Heir, 2016). Thus, evidence for higher levels of PTSD being associated with more trauma centrality is well established. Yet, it remains to be examined if people in their actual life stories mention traumas that they rate highly on the CES, and if mentioned traumas are more strongly associated with PTSD-symptoms than unmentioned traumas.
Life Stories and Coherence

In Horowitz’s (1975, 1986) highly influential work on stress response syndromes, a core feature was lack of integration of the trauma into pre-existing schematic knowledge, such as a person’s life story. A similar view was expressed in later theories (e.g. Brewin et al., 1996; Ehlers & Clark, 2000). For instance, according to Brewin et al. (1996), PTSD reflects a lack of integration of the trauma memory into the “person's other memories and sense of self in the world” (p. 679) and remission thus depends on completing this integration (Horowitz, 1975, 1986). In other words, not integrating the trauma is seen as a disruptive force in the coherence of the life story. Further, because of maladaptive processing, trauma memories themselves are hypothesized to be incoherent (Shapiro, 2018). These views of incoherent trauma memories disrupting the life story have been highly influential and have also made their ways into diagnostic conceptualizations of PTSD, in terms of difficulties with remembering central details of the event (American Psychiatric Association [APA], 1994; 2013).

However, empirical evidence from autobiographical memory research does not support the hypothesis that trauma memories are rated as less coherent than other memory types, nor the hypothesis that trauma memories are less integrated into the life story (e.g. Berntsen & Rubin, 2014; Rubin, Berntsen, & Bohni, 2008; Rubin, Berntsen, Ogle, Deffler, & Beckham, 2016; Rubin, Deffler, et al., 2016). In an extensive study of 28 measures of coherence, Rubin, Deffler, et al. (2016) found no evidence that narrative incoherence is related to PTSD. From a viewpoint informed broadly by autobiographical memory research, traumas are assumed to be central to the life story, and may form reference points for other, less distinct events (Berntsen & Rubin, 2006; Berntsen et al., 2003). Because the trauma memory is distinct, personally significant, and highly emotional, it may take a central position
in the life story from which other events are structured, and the life story would thus not be expected to be incoherent. However, it remains to be examined how mentioning traumas in the life story relates to narrative coherence.

**Trauma Types in the Life Story**

Comparing events included in life stories to those that are not entails considering not only the valence, but also the content of the memory. Different trauma types are not necessarily equal, and variability may exist as to what extent individuals will consider an event as traumatic, how central to their life story they perceive it to be, and how risk of developing PTSD is associated with different trauma types. For instance, interpersonal trauma types, where someone had the intention to harm others (De Bellis & Van Dillen, 2005), may be associated with a greater risk of developing PTSD than non-interpersonal trauma types without such intentions (e.g. natural disasters or traffic accidents; De Bellis & Van Dillen, 2005). Previous research has found interpersonal trauma types to be more frequently associated with PTSD in both children and youths (Alisic et al., 2014) and adults (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). The question remains if these differences are paralleled by differences in event centrality, and whether different types of traumatic events differ concerning their tendency to be included into the life story. To the best of our knowledge, no studies have examined whether some traumatic events are more likely to be featured in life stories than others.

Regarding centrality ratings, studies are scarce, and the results are mixed. Fitzgerald, Berntsen, and Broadbridge (2016) and Keshet, Foa, and Gilboa-Schechtman (2019) found no differences in centrality between different trauma-event types. However, Fitzgerald et al. (2016) used an event coding system that did not distinguish between, for
instance, interpersonal and non-interpersonal events or life-threatening or non-life-threatening events. In contrast, Ogle, Rubin, Berntsen, and Siegler (2013) found life-threatening events to be more central to the life story than non-life-threatening events, though interpersonal and non-interpersonal events did not differ. Blix, Birkeland, and Thoresen (2020) found bereaved from a ferry fire to consider the disaster to be significantly more central to their life story than survivors. While 86% of the bereaved lost close family members, this was the case for only 7% of the survivors. Finally, Reiland and Clark (2017) found interpersonal traumas to be more central than non-interpersonal traumas in a student sample. Thus, although studies are scarce and the results mixed, existing evidence is mostly pointing towards trauma types varying with regards to how central they are perceived to be.

The Present Study

The purpose of the present study was to test the assumption that events rated highly on the CES also are featured in the life story of the same person, and if patterns of mentioning or not mentioning traumatic events in the life story are related to psychopathological measures, coherence, and experienced trauma types. We asked adult participants to first provide their life stories and afterwards their self-nominated most traumatic and most positive events to test whether these important personal events were spontaneously mentioned by the participants in their life stories. Next, participants rated the events on the CES to investigate if patterns of mentioning or not mentioning events were related to self-perceived event centrality.

The psychopathological measures included in this study were PTSD, as the CES was developed to address the assumed underlying memory mechanisms of this disorder (Berntsen & Rubin, 2006), and depression due to the close resemblance and comorbidity of these two disorders (APA, 2013). Coherence was investigated because of the ongoing
controversy of which role coherence plays in PTSD (e.g. Berntsen et al., 2003; Brewin et al., 1996; Rubin, Deffler, et al., 2016). Type of trauma was examined due to the different relations between different trauma types and PTSD (e.g. Kessler et al., 1995).

Based on the reviewed literature, we generated the following hypotheses:

1. **Spontaneous mentioning of events and the CES.** In line with the theoretical assumptions underlying the CES, we anticipate that some participants spontaneously mention their most positive event and/or their most traumatic event in their life stories. We expect participants who spontaneously mention their positive event (alone or together with their trauma) score higher on the CES for the positive event than those who do not mention this event. Likewise, participants who spontaneously mention their traumatic event (alone or together with their most positive event) are expected to score higher on the CES for the trauma than those who do not mention their traumas.

2. **Positivity bias.** In line with previous research (Berntsen et al., 2011) we expect participants to be more inclined to mention their most positive event in their life story than their most traumatic event. Furthermore, based on previous research on positivity bias (Berntsen et al., 2011), we expect participants to regard their positive event as more central to their life story than their trauma, but also that this interacts with whether the trauma is included (or not included) in the life story.

3. **Mentioning of trauma and PTSD.** We expect participants who spontaneously mention their traumatic event (alone or together with their positive event) to score higher on PTSD symptoms. Further, compared with those who do not mention their trauma, more individuals who include the trauma in their life story are expected to score above
a clinical cut-off score of 33 on the PTSD Checklist for DSM-5 (PCL-5; Weathers, Litz, et al., 2013). However, we do not expect them to write less coherent life stories.

4. **Mentioning of trauma and type of traumatic exposure.** Participants who spontaneously mention their traumatic event (alone or together with the positive event) are expected to report exposure to more severe traumatic events than participants who do not include their trauma in the life story.

### Method

#### Participants

Participants were recruited online via the Amazon Mechanical Turk platform, where native English-speaking workers could participate. A total of 420 participants completed the questionnaire, including passing attention checks that were distributed throughout the survey. Of these, 34 responses were excluded due to the following criteria: (a) the participant did not provide a worst event; (b) the participant was inconsistent in the gender used at the beginning of the survey and the personal pronoun used in their life story; (c) the participant did not provide a life story; (d) the participant did not provide future events, and finally (e) the participant was clearly not following instructions (e.g. writing personal statements, or copy-pasting narratives from web-pages). Thus, the sample consisted of 386 respondents (58.3% females, 41.5% males, 0.3% other). The mean participant age was 36.10 years ($SD = 10.63$, range 19-72).

#### Procedure

A local ethics committee evaluated the study to ensure it was conducted in line with current professional guidelines for research ethics (American Psychological Association, 2020).
General written information about the purpose and content of the study was given at the beginning of the survey, and to proceed with the questionnaire, participants had to give informed written consent. The specific purpose of investigating life stories, event centrality, and PTSD was not disclosed until the survey was completed. This was to prevent priming participants to include their traumatic event in their written life narrative. After providing demographic information, participants were asked to write their life story. They also recorded three to seven imagined future events, which were dated and rated for valence. To prevent order effects, the life story and future events tasks were counterbalanced. We checked for potential order effects by comparing the counterbalanced groups on all outcome variables and did not find any differences in core measures (ps ranging from .102 to .961). As the future events task is not relevant to the present study, it will not be described further.

Following the life story task, participants completed the Life Events Checklist for DSM-5 (LEC-5; Weathers, Blake, et al., 2013) which is a measure of lifetime traumatic exposure. After reporting lifetime traumatic exposure, participants, as part of the LEC-5, also identified the event they considered the worst. With this worst event in mind, participants filled in the Centrality of Event Scale (CES; Berntsen & Rubin, 2006) and the PTSD Checklist for DSM-5 (PCL-5; Weathers, Litz, et al., 2013). They then completed the Geriatric Depression Scale (GDS; Sheikh & Yesavage, 1986). All psychometric measures were presented after the life story task to prevent the measures from influencing how participants would describe their life. Having completed all other sections of the survey, participants in the end were asked to identify and describe their most positive life event and then rate it on the CES. Once the survey was completed participants were debriefed and the specific purposes of the study was revealed. For an overview of the survey flow, please see Figure 1.
Measures

In the following, the included measures are described in the same order as they were presented to the participants (also see Figure 1).

Life story task. Based on prompts from Bohn and Berntsen (2008) and Ottsen and Berntsen (2015), participants were asked to write their life story with the following instruction:

“This is your first task is to think about what has happened since you were born and up to now. Imagine that you are telling your life story to a new friend, whom you have just met, and who, therefore, does not know anything about your past. It is a (fictitious) friend, whom you trust, and with whom you can be completely honest. You can for example write about the most important things in your life, or the biggest changes that have happened in your life. It is required that you have personally experienced these events.”

Participants were encouraged to spend 15-20 minutes on the task. There was no requirement on the length of the life story, but participants could not proceed with the survey before three minutes had passed.

Life Events Checklist for DSM-5. To screen for potential traumatic exposure, the LEC-5 was used (Weathers, Blake, et al., 2013). This measure consists of 17 event categories of which 16 are specific event types known to be related to PTSD. The final category, Other, leaves room for the respondents to identify traumatic events not covered by the fixed items. For each event type, participants indicate the degree of exposure they have experienced on the following 6-point nominal scale: Happened to me, witnessed it, learned about it, part of my job, not sure, or does not apply. Once the trauma screening was completed, participants were asked to identify and briefly describe the event that currently caused the most distress using.
the following prompt: “If you have experienced more than one of the events in the questionnaire, think about the event you consider the worst event, which for this questionnaire means the event that currently bothers you the most. If you have experienced only one of the events in the questionnaire, use that one as the worst event. […] Briefly describe the worst event (for example, what happened, who was involved, etc.)”. Previous versions of the LEC have displayed adequate reliability and validity, such as temporal stability, good agreement with other established trauma exposure measures, and expected correlations with measures of PTSD samples (Gray, Litz, Hsu, & Lombardo, 2004).

**Centrality of Event Scale.** To measure how central to the life story participants perceived an event to be, the seven-item CES (Berntsen & Rubin, 2006) was employed. It is an instrument measuring event centrality on a 5-point Likert scale ranging from 1 (*totally disagree*) to 5 (*totally agree*), and the CES-score refers to the mean of these items. The CES was originally developed to measure integration of traumatic events into a person’s life story and identity (Berntsen & Rubin, 2006), but has also been used to measure centrality of positive events (e.g. Berntsen et al., 2011; Boals, 2010). In this study, the CES was used to measure centrality of both the most positive event (CESpositive) and the most traumatic event (CESnegative). The internal consistency as measured by Cronbach’s Alpha was high (.95 for CESpositive and .94 for CESnegative).

**PTSD Checklist for DSM-5.** The PCL-5 (Weathers, Litz, et al., 2013) assesses PTSD-symptom severity on the 20 symptoms from the DSM-5 diagnostic criteria. Each item is measured on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). As the instrument employs a sum score, the range of symptom severity is 0-80, and the authors suggest to use 33 as a cut off-point, with higher scores indicating clinical disorders (Weathers, Litz, et al., 2013).
The PCL-5 has shown good reliability and validity across different samples (Blevins, Weathers, Davis, Witte, & Domino, 2015; Bovin et al., 2016), and the internal consistency as measured by Cronbach’s Alpha was high (.97).

**Geriatric Depression Scale Short Form.** The GDS Short Form (hereafter referred to as the GDS; Sheikh & Yesavage, 1986) screens for depression with 15 yes/no questions. The questionnaire was originally developed for use in older adults, but has also been validated and used in samples with younger adults (Bohn, 2010; Ferraro & Chelminski, 1996; Rule, Harvey, & Dobbs, 1989). The internal consistency as measured by Cronbach’s Alpha was high (.90).

**Most positive event task.** Using the following instruction, participants were asked to identify and briefly describe their most positive event: “For this final part of the survey, please think back upon the most positive event in your life. Please describe the event in a sentence or two.” Participants were furthermore asked to indicate their age when the most positive event happened.

**Scoring**

All scoring procedures were practiced on a pilot dataset not included in the database. The first author was responsible for instructing the coders, who were student research assistants or PhD students with experience in scoring autobiographical memories. Practice continued until coders felt comfortable doing the scorings individually.

**Coherence.** Based on the general procedure from Bohn and Berntsen (2008), life stories were coded for global coherence using a 4-point scale. However, as Bohn and Berntsen’s (2008) measure was designed for children’s life narratives, in the present study the scale was adjusted to be used for adults’ narratives. Therefore, the scores were 0 = Life story
consists of a single episode; 1 = Several episodes, loosely ordered chronologically without clear connection between episodes and/or with major lifetime periods left unaccounted for; 2 = Clear chronological order, episodes are clearly tied together, and the entire life course is accounted for; and 3 = Evaluative life story, evaluating specific events or life time periods (e.g. “a safe childhood”) or the entire narrative (e.g. “my life has not been an easy one”).

Coherence was scored progressively, meaning higher scores would only be obtained if lower scores were satisfied. Two coders individually scored 50% of the narratives. A two-way random ICC of .70 revealed good interrater reliability. Disagreements were resolved by discussion. One coder scored the remaining life stories.

Trauma type. Self-nominated traumas were coded for 1) type of event (e.g. assault, traffic accident, natural disaster) and 2) whether the event was an interpersonal or non-interpersonal trauma type. Two raters each scored 15% of the sample. For event type, the first author classified events based on the 17 categories defined by the LEC-5. Further categories were added from the Other-category if they were mentioned by at least 3% of all participants. This produced four additional traumatic event types: Parent’s natural death, Grandparent’s natural death, Other’s natural death, and Serious non-life-threatening illness or injury. The final coding scheme thus consisted of 21 categories. Raters agreed in 86.2% of the cases corresponding to a Cohen’s κ of .85, which is interpreted as excellent interrater agreement (Fleiss, 1981). For the scoring of interpersonal vs. non-interpersonal trauma types, the definition from De Bellis and Van Dillen (2005) was employed. Interpersonal trauma involves an intention to harm others, and examples of this trauma type include warfare, terrorism, and assaults. Non-interpersonal trauma types are events without intentions of inflicting harm on others, such as accidents, natural disasters, and severe illness or accidental deaths. Raters agreed in 98.3% of the cases corresponding to a Cohen’s κ of .95 and
representing excellent interrater reliability. Disagreements were resolved by discussion for both kinds of scorings. The first author scored the remaining 85%.

After scoring the individual event types, the first author clustered the event types into four major theme categories, as comparing groups on 21 different event types was unfeasible. The major theme categories were: Accidents and Disasters (consisting of natural disasters, fire or explosion, transportation accident, serious non-traffic accident, and exposure to toxic substance); Violence (consisting of physical assault, assault with weapon, sexual assault, other unwanted or uncomfortable sexual experience, combat or exposure to a war-zone, and captivity); Death and Illness (consisting of life-threatening illness or injury, severe human suffering, sudden violent death, sudden accidental death, serious injury, harm or death you caused to someone else, parent’s natural death, grandparent’s natural death, other’s natural death, and serious non-life-threatening illness or injury); and finally an Other-category containing other trauma types. An independent rater also clustered the 21 events into the four categories. Raters agreed in 95% of the events, corresponding to Cohen’s $\kappa$ of .93, representing excellent interrater reliability.

*Mentioning of the trauma and most positive events in the life story.* The life stories were scored on whether the self-reported most traumatic and most positive events were mentioned in the life story. Two coders individually scored 50% of the life stories. For both trauma and most positive event present in the life story, agreement was excellent with raters agreeing in 94.8% of the cases corresponding to a Cohen’s $\kappa$ of .87 (negative events) and in 93.3% of the cases corresponding to a Cohen’s $\kappa$ of .85 (positive events). Disagreements were resolved by discussion. One coder scored the remaining life stories.
Results

All life narratives and event descriptions were read by the first author and were included if they conveyed a meaningful description of, at least parts of the participant’s life. In cases of doubt, the second author was consulted. The mean word count of the life stories was 254.42 words ($SD = 194.03$, $Mdn = 199.50$). Participants mostly wrote about common life experiences such as attending school, marrying, or moving locations. Thus, even if participants did not mention their target events, they often mentioned other important life events such as their graduation day, current job, own children etc.

To investigate the study hypotheses, participants were grouped based on whether they spontaneously mentioned their most positive event and/or their trauma in their life stories. This created four life story groups based on different response patterns: a) Participants who only mentioned their trauma (henceforth the *trauma only group*); b) participants who only mentioned their positive event (henceforth the *positive only group*); c) participants who mentioned both (henceforth the *trauma and positive events group*); or d) participants who mentioned neither (henceforth the *no target events group*). For some analyses, however, it was theoretically relevant only to compare participants that mentioned their trauma to those that did not. For those analyses, because of this theoretical relevance and to avoid small cell sizes and thus maximize power, the *trauma only group* was combined with the *trauma and positive event group*, thereby creating a superordinate *overall trauma group*.

As shown in Table 1, the groups did not differ on current age, years of education, ages when the trauma and positive events happened, and retention intervals from the traumatic and positive events to time of answering the survey, meaning the groups were comparable.
The results section is structured based on comparisons between the defined groups on the four hypotheses.

**Hypothesis 1: Spontaneous mentioning of events and the CES.**

We expected some participants to spontaneously mention their most positive and/or most traumatic events in their life stories, and many participants did. Specifically, 41.7% (N=161) of participants only mentioned their positive event (i.e., the *positive only group*), thereby making this response pattern the most typical. In contrast, the smallest group, and thus the least likely response pattern, was the *trauma only group* with 8.3% (N=32) of participants. One third of the participants (33.4%, N=129) did not mention any of their events (i.e., the *no target events group*), whereas 16.6% (N=64) mentioned both (i.e. the *trauma and positive events group*). A goodness of fit analysis revealed that this response pattern was not coincidental, $\chi^2(3)=108.11, p<.001$. Combining the *trauma only* and *trauma and positive events groups* to the *overall trauma group* showed that in total 24.9% of participants mentioned their trauma.

The first hypothesis concerned the relationship between the CES and mentioning or not mentioning the trauma and the positive events. The groups differed with regard to CES\textsubscript{trauma}, $F(3, 125.09)=39.76, p<.001$. In line with the hypothesis and as depicted in Figure 2A, post-hoc Games-Howell tests revealed that the groups that included their trauma in their life stories, that is, the *trauma only group* ($M=3.79, SD=0.86$) and the *trauma and positive events group* ($M=4.19, SD=0.75$), considered their trauma to be significantly more central to their life stories than the groups that did not mention their traumas, that is, the *positive only group* ($M=2.81, SD=1.22$) and the *no target events group* ($M=3.11, SD=1.10$). The two groups that mentioned their traumas did not significantly differ from each other, just
like the two groups that did not mention their traumas. A similar pattern emerged for

$$CE_{S_{positive}}, \ F(3, 109.01)=14.74, p<.001.$$ As shown in Figure 2B, post-hoc Games-Howell tests revealed that the two groups that mentioned their most positive event in their life stories also rated this event higher on the CES (positive only: $$M=4.41, SD=0.75$$; trauma and positive events: $$M=4.55, SD=0.76$$) than the two groups that did not mention their most positive event (trauma only: $$M=3.58, SD=1.23$$; no target events: $$M=3.82, SD=1.13$$). The two groups that mentioned the positive event were not significantly different from each other, just like the groups not mentioning their positive event.

**Hypothesis 2: Positivity bias**

The positive only group with 41.7% of the participants was almost twice as big as the overall trauma group of 24.9% of the participants, $$\chi^2(1)=16.44, p<.001$$, supporting the first part of the hypothesis. Given that the overall trauma group also included participants that mentioned both their trauma and their positive event, this larger inclination to mention the positive rather than the traumatic event was further substantiated. Overall, 58.5% (N=225) mentioned their positive event, either alone or together with the trauma, which a binominal test revealed was above chance level, $$p=.001$$.

The second part of the hypothesis predicted that participants would rate their positive event as more central than their trauma, and that this would interact with group. Thus, a 2 (Event Type) by 4 (Life Story Groups) mixed ANOVA was conducted. This revealed medium-large main effects of both the Event Type, $$F(1, 382)=57.68, p<.001, \eta^2_p=.13$$ as well as of life story groups, $$F(3, 382)=20.78, p<.001, \eta^2_p=.14$$. Furthermore, a large interaction effect was revealed, $$F(3, 382)=26.15, p<.001, \eta^2_p=.17$$. The interaction effect is depicted in
Figure 3, which shows that the no target events, the positive only, and the positive and trauma events groups all regarded their positive event to be significantly more central to their life story than their trauma, supporting the hypothesis. The trauma only group did not follow this pattern. Instead, and interestingly, this group considered their trauma to be just as central as their positive event.

Hypothesis 3: Mentioning of trauma and PTSD.

The third hypothesis predicted that participants who mentioned their trauma in their life story will have higher levels of PTSD symptoms. As this part of the hypothesis only concerned comparing those who mentioned their trauma to those who did not, the following analyses were performed using the overall trauma group. A one-way ANOVA revealed that the three groups (no target events, positive only, and overall trauma groups) did not differ on current age, years of education, age when the trauma happened, retention interval from the trauma to time of answering the present survey, and age at the most positive event (ps ranging from .052 to .571). As gender previously has been found to be related to differences in types of trauma exposure (e.g. Breslau, Chilcoat, Kessler, & Davis, 1999; Kessler et al., 1995) and trauma reactions such as PTSD (e.g. Brewin, Andrews, & Valentine, 2000), we further performed a chi-square analysis to test for potential differences in binary gender distribution (male/female) between the groups. There was no association between gender and the mention of positive or traumatic events ($\chi^2(2) = 4.15, p = .126$, Cramer’s $V = .10$).

The three groups differed significantly on PTSD-symptoms, $F(2, 226.92) = 9.13, p < .001$. Post-hoc Games-Howell tests revealed that the positive only group displayed significantly lower levels of PTSD than the other groups, as shown in Table 2. There was no
difference between the no target events group and the overall trauma group. The hypothesis was thus partly supported. Though not stated in the hypotheses, the same analysis was conducted on depression symptoms, and a similar pattern emerged, $F(2, 220.06)=7.23$, $p=.001$. As shown in Table 2, post-hoc Games-Howell tests showed that the positive only group scored significantly lower on depression symptoms than the overall trauma group and the no target events group. The no target events and overall trauma groups did not differ from each other.

To test the second part of the hypothesis regarding the percentages of group members scoring 33 or higher on PCL-5 (Weathers, Litz, et al., 2013), a chi-square analysis was performed. As predicted, the groups differed, $\chi^2(2)=14.03$, $p=.001$, Cramer’s $V=.19$. Specifically, as shown in Table 3, in the positive only group 14.9% of participants scored above the cut-off score, whereas this percentage was clearly higher in the no target events and overall trauma groups with 31.8% and 31.3%. The overall trauma and no target events groups did not differ from each other. Hence, this part of the hypothesis was also partly supported.

Finally, Hypothesis 3 predicted that including the trauma in the life story would not be related to less coherent life stories. A one-way ANOVA showed that the groups differed on how coherent their life stories were, $F(2, 223.78)=12.49$, $p<.001$. As Table 2 shows, post-hoc Games-Howell tests revealed that the no target events group wrote significantly less coherent narratives than the positive only group and the overall trauma group, who in turn did not differ from each other. Examining the percentages of coherence scores in the three groups using Chi-square analysis, revealed significant differences between all groups, $\chi^2(6)=44.65$, $p<.001$, Cramer’s $V=.24$ (see Table 4). The no target events group
wrote more loosely ordered life stories, whereas more life stories in the positive only group were clearly chronological. Interestingly, the overall trauma group had the largest percentage of evaluative life stories. Thus, as predicted, including the trauma into the life story was not related to less coherent life stories.

Hypothesis 4: Mentioning of trauma and type of traumatic exposure.

The fourth hypothesis predicted that participants who spontaneously mentioned their most traumatic event would report exposure to more severe traumas. Since the trauma event coding scheme consisted of 21 different event types, comparing the groups on all event types was unfeasible, and we used the four major theme categories instead. Further, because this hypothesis was only concerned with comparing those who mentioned their traumas to those who did not, we employed the overall trauma group for these analyses.

The distribution of reported trauma categories by the three superordinate life event groups is shown in Table 5. There was a significant association between life story groups and the reported trauma categories, $\chi^2(6)=42.46, p<.001$, Cramer’s $V=.24$. In line with the prediction, the overall trauma group reported significantly fewer Accident and Disaster type traumas and more Death and Illness than the no target events and positive only groups, who did not differ from each other. Further, the overall trauma group reported more Other-traumas than the positive only group, but did not differ from the no target events group. Neither did the positive only and the no target events groups differ from each other. Finally, the percentage of participants in the overall trauma group who reported Violent traumas was 26.0% and thus numerically higher than the proportion reported in the no target events (17.8%) and positive only (18.6%) groups, but this difference failed to reach statistical significance.
To investigate if the group differences were a matter of the trauma group reporting more interpersonal traumas, a chi-square test was performed. Though the overall trauma group did report more interpersonal traumas (38.5%) than both the no target events (25.6%) and the positive only (29.2%) groups, this difference was not statistically significant, $\chi^2(2)=4.54, p=.103$, Cramer’s $V=.11$.

**Discussion**

The CES (Berntsen & Rubin, 2006) is frequently used to assess how central to their life story and identity people perceive an event to be. To date no studies have examined the association between such self-reported centrality assessments of events and the inclination to actually include the same events when telling their life story. Also, it is unknown how such inclusion might be related to psychopathology and coherence of the narrative. The present study was undertaken to address this gap in the literature. We did this by testing four specific hypotheses.

First, we expected some participants to mention their most positive and/or their most traumatic event in their life stories and predicted that participants who mentioned events would score higher on the CES for these events than participants who did not mention them. We found that most participants spontaneously mentioned their most positive event in their life stories, and a substantial minority mentioned their most traumatic event. Consistent with our prediction, participants who mentioned target events considered these events to be more central to their life story than participants who did not.

Second, we expected participants to be more inclined to rate the positive event more central than their trauma, although we also expected this to interact with whether the trauma was mentioned in the life story. Consistent with this assumption, participants generally
considered their most positive event to be more central. However, this was not the case for participants who only mentioned their trauma when telling their life story.

Third, we expected participants who mentioned their trauma to have higher levels of PTSD symptoms. In line with this prediction, the group of participants who only mentioned their positive event scored lower than the other groups on the measure of PTSD, and fewer of the participants in this group scored above a clinical cut off-score on the scale. Yet, participants who mentioned their traumas did not differ from participants who did not mention any of the target events. As expected, participants who mentioned their trauma did not write less coherent life stories than participants who did not.

Fourth, we predicted that participants who mentioned their trauma would also report more severe traumatic exposure. In agreement with this assumption, participants who mentioned their trauma reported more Death and Illness-related traumas and fewer Accidents and Disasters type traumas than the other participants, but they did not report more interpersonal traumas.

Thus, overall, the findings show that participants spontaneously mentioned both their most positive and traumatic events. It also showed that those who mentioned a target event also rated this event as more central than those who did not mention the event. The demonstration of the expected positivity bias, in terms of a greater tendency to include the positive event in the life story, supports the credibility of the data, but also extends the positivity bias literature to include events specifically mentioned in life stories. Further, participants who mentioned only their trauma did not show such a positivity bias, just as the positivity bias was less pronounced for those who mentioned both their trauma and their most positive event. As participants who mentioned their trauma, showed higher levels of
symptoms for PTSD and depression, this finding nuances the positivity bias by taking psychological adjustment into account. Taken together, the findings not only support the assumption underlying the CES that events rated as central are indeed salient events in the life story (Berntsen & Rubin, 2006), but also replicate and extend previous findings by using a novel approach: An investigation of *literal* inclusion of self-reported central events into actual, written life stories, rather than rating scale answers. By employing this very concrete method, the present study demonstrated a direct connection between events mentioned in actual life stories and ratings on the CES. The consistently higher ratings on the CES of mentioned events over non-mentioned events indicate that when participants in other studies rate their specific memories to be very central to their life stories, it is likely that the same participants would spontaneously mention these events in their actual life stories.

Participants that mentioned their trauma showed higher levels of PTSD-symptoms than participants who only mentioned their most positive event suggesting that integration of the trauma into the life story is associated with higher levels of PTSD (e.g. Berntsen & Rubin, 2006, 2007). This is counter to what would be expected by earlier theories of the role of the traumatic memory in PTSD, where lack of integration of the trauma into the life story is considered key to understanding the symptoms, such as intrusive memories (e.g., (e.g. Horowitz, 1975, 1986; Shapiro, 1989, 2018). Further, the results demonstrate that integration can be understood quite literally – that is, as actually mentioning the trauma when recounting one’s life story.

The group of participants who mentioned their trauma did not score higher on PTSD nor did they more frequently score above the cut-off for PTSD than participants who did not mention any of the target events. This finding should be viewed in the light of the
most typical type of response was to only mention the most positive event. Thus, it is fair to assume that this group constitutes the norm, and that other response patterns can be considered deviations from this baseline. This suggests that only mentioning one’s most positive event in the life story reflects lower levels of psychological distress and appears to be associated with psychological health, thus supporting the position that having traumas central to life stories is problematic (e.g. Berntsen & Rubin, 2006, 2007). However, further research is needed to clarify the relationship between PTSD-symptoms and mentioning a most traumatic event as opposed to mentioning none of the target events in one’s life story. We found that participants who mentioned their trauma wrote on average equally coherent life stories as participants who did not mention their trauma. In fact, in the trauma group, the percentage of participants writing highly coherent life stories was much larger than in the groups not mentioning their traumas, suggesting that mentioning a self-defined most traumatic event in a person’s own life story is not negatively related to coherence.

Finally, results showed that different trauma types were not equally likely to be featured in the life stories. Individuals who mentioned their worst traumas in their life story were more likely to report traumas of death and illness than those who did not mention their trauma. The latter often reported accidents and disasters as their worst trauma in the LEC-5 (Weathers, Blake, et al., 2013). Accident and disaster trauma types are generally not highly associated with PTSD (Kessler et al., 1995), whereas death and illness-related traumas in general have been found to be more related to PTSD (Darves-Bornoz et al., 2008; Ogle et al., 2013). This difference in reported trauma types between those who mentioned versus did not mention their trauma in their life story is particularly interesting given the higher centrality rating of mentioned events. In other words, individuals may more often consider death and illness-related events to be central to their life story than accidents and disasters. One possible
explanation for this finding is that death and illness-related events simply occur more often than accidents and disasters (Darves-Bornoz et al., 2008; Ogle et al., 2013) and thus more people would mention this type of event. An additional, more speculative explanation may relate to cultural life scripts (Berntsen & Rubin, 2004). Despite cultural life scripts being predominantly positive, death and illness are mentioned as expected life events across a wide range of cultures (e.g. Berntsen & Rubin, 2004; Bohn, 2010; Hatiboğlu & Habermas, 2016; Janssen, Uemiya, & Naka, 2014; Ottsen & Berntsen, 2014; Rubin, Berntsen, & Hutson, 2009; Zaragoza Scherman, Salgado, Shao, & Berntsen, 2017), whereas accidents are rarely mentioned in life scripts, and disasters not at all (Coleman, 2014; Erdoğan, Baran, Avlar, Taş, & Tekcan, 2008; Janssen & Haque, 2018; Janssen & Rubin, 2011; Štěpánková, Kadlčíková, & Zaragoza Scherman, 2020). Hence, not only are deaths and illnesses serious and potentially traumatic events, they are also relatively common, to some extent expected, and considered important in a cultural context. This perspective may also help explain why interpersonal trauma types, despite being highly related to PTSD, (Alisic et al., 2014; Kessler et al., 1995) were not mentioned more often in life stories than non-interpersonal trauma types.

Limitations and future directions

This study has some limitations. First, the study relied on participants sharing personal information, but did not control for potential differences in self-disclosure. Previous research has reported gender differences in self-disclosure (e.g. Dindia & Allen, 1992), and thus, results may have been impacted by such differences. Although there were no gender differences in our groups, future research should consider controlling for this factor. Second, the present study introduced a new way of investigating centrality of specific event types and how mentioning or not mentioning these related to psychopathology, narrative coherence, and
event content. However, it still remains to be examined how the different factors interact over time. Replicating the present findings in a longitudinal design and with a focus on more complex interactions (elucidated through mediation or moderation analyses) may help disentangle more clearly the underlying mechanisms that drive centralization of events and reactions to such centralization. Third, participants provided their most traumatic and most positive events in the same session as their life stories. Participants may have thought back to their life stories to find events, regardless of whether these events indeed were participants’ most positive or traumatic experiences. However, we do not believe this is a major limitation for two reasons: First, many participants nominated events they had not included in their life stories, especially traumatic events. Second, the life story is an organizing construct within autobiographical memory (Bluck & Habermas, 2000; Habermas & Bluck, 2000), and so it is expected that individuals think back to their life story in search of specific memories. Future studies may consider collecting life stories and important life events in different sessions. In the same vein, the effect of collecting oral vs. written life stories needs to be explored.

Finally, future research may consider more in-depths analyses of the types of events integrated into life stories, and how these events relate to psychopathology and well-being. In the present study, a sizeable share of participants mentioned neither their most positive nor most traumatic events in their life stories. Yet, they reported as many symptoms of PTSD and depression as those who mentioned their traumas. The question thus remains what this group included in their life stories, and why they were more distressed than participants who only mentioned their most positive event.
Conclusion

The focus of this study on actual, written life stories offers a new way to study post-trauma reactions. Researchers from both clinical (e.g. Brewin et al., 1996; Ehlers & Clark, 2000; Horowitz, 1975) and cognitive (e.g. Berntsen & Rubin, 2006, 2007; Berntsen et al., 2003) research fields have made assumptions of how experiencing trauma may influence life stories and identity, and these assumptions are critical for the understanding of posttraumatic reactions. However, to the best of our knowledge, this study is the first to actually investigate how the mentioning of trauma in life stories may be related to depression, PTSD and narrative coherence. By employing this very concrete strategy, we demonstrated that mentioning traumas in the life story is related to higher PTSD-levels. At the same time, this integration was not negatively associated with narrative coherence. Though more research is needed to understand the relationship between the integration of trauma into actual life stories and post-trauma reactions, we believe this study constitutes an important first step.

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Disclosure statement

The authors have no conflicting interests to disclose.

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### Table 1.

*Means (M) and standard deviations (SD) of study variables and one-way independent ANOVAs of the four life story groups*

<table>
<thead>
<tr>
<th>Measures</th>
<th>No target events group</th>
<th>Trauma only group</th>
<th>Positive only group</th>
<th>Trauma and positive events group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Years of education&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15.74</td>
<td>2.57</td>
<td>14.87</td>
<td>1.65</td>
</tr>
<tr>
<td>Age at trauma (years)</td>
<td>23.06</td>
<td>10.53</td>
<td>23.31</td>
<td>14.74</td>
</tr>
<tr>
<td>Retention interval, trauma</td>
<td>12.45</td>
<td>10.86</td>
<td>14.63</td>
<td>13.54</td>
</tr>
<tr>
<td>Age at most positive event</td>
<td>25.19</td>
<td>9.61</td>
<td>27.84</td>
<td>11.04</td>
</tr>
<tr>
<td>Retention interval, positive event</td>
<td>10.32</td>
<td>9.61</td>
<td>10.09</td>
<td>10.19</td>
</tr>
</tbody>
</table>

*Note.* Means that do not share the same subscript across rows are statistically different from each other at *p* < .05.

<sup>a</sup> One participant from the trauma group and one from the positive group did not report their educational level.

<sup>b</sup> Welch corrected F-value.
Table 2.

Means (M) and standard deviations (SD) of PTSD, Depression, and Coherence, and one-way independent ANOVAs of the three life story groups

<table>
<thead>
<tr>
<th>Measures</th>
<th>No target events group</th>
<th>Positive only group</th>
<th>Trauma group</th>
<th>F</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS</td>
<td>5.33, SD: 4.64</td>
<td>3.69, SD: 3.80</td>
<td>5.31, SD: 4.56</td>
<td>7.23</td>
<td>.001</td>
<td>.040</td>
</tr>
<tr>
<td>Coherence</td>
<td>1.39, SD: 0.79</td>
<td>1.75, SD: 0.82</td>
<td>1.94, SD: 0.95</td>
<td>12.49</td>
<td>&lt;.001</td>
<td>.070</td>
</tr>
</tbody>
</table>

Note. Means that do not share the same subscript across rows are statistically different from each other at p < .05 (by Games-Howell tests). PCL-5 = PTSD Checklist for DSM-5; GDS = Geriatric Depression Scale short form.

Table 3.

Number of group members scoring 33 or higher on the PCL-5 by three superordinate life story groups

<table>
<thead>
<tr>
<th>PCL-5</th>
<th>No target events group</th>
<th>Positive only group</th>
<th>Trauma group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Less than 33</td>
<td>88, 68.2</td>
<td>137, 85.1</td>
<td>66, 68.8</td>
<td>291</td>
</tr>
<tr>
<td>33 or above</td>
<td>41, 31.8</td>
<td>24, 14.9</td>
<td>30, 31.3</td>
<td>95</td>
</tr>
<tr>
<td>Total</td>
<td>129, 100.0</td>
<td>161, 100.0</td>
<td>96, 100.0</td>
<td>368</td>
</tr>
</tbody>
</table>

Note. Counts that do not share the same subscript across rows are statistically different from each other at p < .05; PCL-5 = PTSD Checklist for DSM-5; Due to rounding of decimals, total scores may not add up to 100.0.
Table 4.

Distribution of life story coherence scores by the three superordinate life story groups

<table>
<thead>
<tr>
<th>Life story coherence score</th>
<th>No target events group</th>
<th>Positive only group</th>
<th>Trauma group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>0: Life story = single episode</td>
<td>$4_a$</td>
<td>3.1</td>
<td>$0_a$</td>
<td>0.0</td>
</tr>
<tr>
<td>1: Several episodes, loosely ordered</td>
<td>$92_a$</td>
<td>71.3</td>
<td>$80_b$</td>
<td>49.7</td>
</tr>
<tr>
<td>2: Clear, chronological order</td>
<td>$12_a$</td>
<td>9.3</td>
<td>$42_b$</td>
<td>26.1</td>
</tr>
<tr>
<td>3: Evaluative life story</td>
<td>$21_a$</td>
<td>16.3</td>
<td>$39_a$</td>
<td>24.2</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>100.0</td>
<td>161</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Counts that do not share the same subscript across rows are statistically different from each other at $p < .05$.

Table 5.

Number of worst trauma categories by three superordinate life story groups

<table>
<thead>
<tr>
<th>Trauma Category</th>
<th>No target events group</th>
<th>Positive only Group</th>
<th>Trauma group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Accidents / Disasters</td>
<td>$52_a$</td>
<td>40.3</td>
<td>$63_a$</td>
<td>39.1</td>
</tr>
<tr>
<td>Violence</td>
<td>$23_a$</td>
<td>17.8</td>
<td>$30_a$</td>
<td>18.6</td>
</tr>
<tr>
<td>Death / Illness</td>
<td>$43_a$</td>
<td>33.3</td>
<td>$57_a$</td>
<td>35.4</td>
</tr>
<tr>
<td>Other</td>
<td>$11_{a,b}$</td>
<td>8.5</td>
<td>$11_b$</td>
<td>6.8</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>100.0</td>
<td>161</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Counts that do not share the same subscript across rows are statistically different from each other at $p < .05$; Due to rounding of decimals, total scores may not add up to 100.0.
Figure 1.

Overview of the survey flow

- Demographic information
  - Life story task
    - Life Events Checklist, including identification and description of currently most traumatic event
      - Centrality of Event Scale for most traumatic event
        - PTSD Checklist for DSM-5 for most traumatic event
          - Geriatric Depression Scale short form
            - Identification and description of currently most positive event
              - Centrality of Event Scale for most positive event

Note. Participants were also asked to generate imagined future events, but this task is not reported in the present study. The future events task was counterbalanced with the Life story task (i.e. before or after the Life story task).
Figure 2.

*CES for the trauma (upper panel/A) and for the most positive event (lower panel/B)*

![Graph showing CES ratings for trauma and positive events](image)

Note. Error bars represent 95% confidence intervals; CES = Centrality of Event Scale; Please note that the Positive only and Trauma only groups are switching position in the two panels. *p < .05
Figure 3.

*CES for the trauma and the most positive event by the four life story groups*

![Graph showing mean CES ratings for trauma and most positive events across different life story groups.](image)

**Note.** Error bars represent 95% confidence intervals; CES = Centrality of Event Scale.