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Intrusions related to indirectly experienced events in clinical offspring of World War Two survivors

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ABSTRACT

Negative events may not only linger on in the form of intrusive memories in the minds of those *directly* exposed but also in those who are only *indirectly* confronted with these events. The aim of the present study was to investigate if intrusions referring to indirectly experienced traumatic events do indeed occur, and to compare their frequency and characteristics to intrusions about directly experienced negative events. Participants (N = 98) were adult postwar offspring of World War Two survivors currently in treatment in one of two clinics specialized in the treatment of war victims. We examined the frequency and characteristics of intrusions about indirectly experienced (i.e., parent war-related) events and two types of directly (self-) experienced events: Self-experienced traumatic events and negative events related to participants' upbringing. Intrusions referring to indirectly experienced traumatic events did indeed occur. The frequency as well as other characteristics of these intrusions did not differ from those of both types of intrusions about directly experienced events. The similarities between intrusions related to different types of events emphasize the (re)constructive nature of memory. Our findings indicate that traumatic events not only affect those directly involved but may also continue to plague the next generation.

1. Introduction

Ubiquitous in human life is the experience of negative events like the death of a loved one, physical and sexual abuse, war and violence, and natural disaster. Almost 90 % of adults have experienced at least one very negative or traumatic event in their life (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Kilpatrick et al., 2013). For some, these events linger on in their mind, long after the event took place, in the form of recurrent, involuntary intrusive memories of the event. Such distressing involuntary memories which often have a 'here and now' quality, can have a large impact on the mental health of those involved and are a feature of several mental disorders including post-traumatic stress disorder (PTSD) and depression (e.g., Williams & Moulds, 2007). An important question is whether these distressing memories only affect those *directly* involved, or whether intrusions are also experienced by family members, friends, and/or colleagues of those involved by way of *indirect* exposure to the traumatic event. In the DSM-5, the A-criterion for PTSD has been extended to include, in addition to directly experiencing a traumatic event or witnessing it in person, learning that the potentially traumatic event occurred to a close family member or friend as potentially traumatic. In addition, the criterion also incorporates repeated or extreme exposure to aversive details of the event after it took place (e.g., first responders collecting human remains; police officers repeatedly exposed to details of child abuse) (American Psychiatric Association (APA) (2013)).

Clinical observations have suggested that those who indirectly experienced or witnessed a stressful event can develop intrusions. Intrusions have, for example, been reported by those whose loved ones have been murdered (Rynearson & McCreery, 1993) and by people whose relatives were hospitalized for burn injuries (Cella, Perry, Kulchycky, & Goodwin, 1988). However, despite these clinical observations, systematic empirical study of intrusions in people who did not directly experience or witness a traumatic event is scarce. More systematic empirical research is needed to identify the possible occurrence and characteristics of intrusions related to indirectly experienced events and compare these to the occurrence and characteristics of

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directly experienced events. Are indirect intrusions similar in emotional intensity, valence and sensory or cognitive contents? Such information is needed to grasp the breadth of the impact of negative events in society, and is pivotal to the work of health care professionals around the world.

Most models about the development and persistence of intrusive memories have been developed in the context of PTSD and focus on directly experienced traumatic events (Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Foa & Rothbaum, 1998). A common feature of these models is that they postulate a *special memory mechanism* emphasizing the factors that operate at the time of encoding of the traumatic event and affect the memory of the traumatic event. For example, the influential cognitive model of Ehlers and Clark (2000) implies that the trauma memories are poorly elaborated and inadequately integrated into context (i.e., time and place) and that intrusive memories are triggered not by conceptual but by perceptual cues temporally associated with the traumatic event (i.e., which bear a physical resemblance to cues present shortly before or during the traumatic event) (Brewin & Holmes, 2003; Dalgleish, 2004). These models emphasize the importance of special memory mechanisms operating at the moment of directly (i.e., personally) experiencing traumatic events, and can thus not account for the possible occurrence of intrusive memories related to events that people did not experience themselves. Moreover, they cannot readily explain intrusions referring to events in the future, including involuntary future cognitions (for a review see Berntsen, 2019) and flashforwards in clinical disorders (e.g., Hales, Deeprose, Goodwin, & Holmes, 2011; Holmes, Crane, Fennell, & Williams, 2007; Ivins, Di Simplicio, Close, Goodwin, & Holmes, 2014). Also, these models do not readily explain the finding that intrusions referring to personally experienced events are not always exact representations of the event but sometimes include imagined details (worst-case scenarios, thoughts or images about non-experienced details of the event, memory amplification or other hypothetical reconstructions (Bryant & Harvey, 1998; Ehlers et al., 2002; Grunert, Devine, Matloub, Sanger, & Yousif, 1988; Merckelbach, Muris, Horselenberg, & Rassin, 1998; Oulton, Strange, Nixon, & Takarangi, 2018; Reynolds & Brewin, 1998).

A model that could help explain the possible occurrence of intrusions about indirectly experienced negative events and other reconstructed intrusions is the so-called *mnemonic model* (Rubin, Berntsen, & Bohni, 2008). Rather than focusing on aberrant encoding processes operating at the time of experiencing the negative event, this model emphasises the (re)constructive nature of memory retrieval. This process is influenced by many factors, hence the memory is subject to change over time rather than reflecting an indelible account of the negative event. This *mnemonic model* thus implicates that post-event memory processes are decisive for the development of intrusions. It is the interaction between memory (re)construction and the many factors influencing this process (e.g., individual differences like neuroticism and a person's current attitudes and goals) that determines whether intrusions will develop. Although not constructed specifically to explain indirect intrusions, the emphasis on memory construction in this model opens the door to the possibility of the development of intrusions based on events that people did not experience themselves. In addition, the mnemonic model predicts that the characteristics (e.g., frequency, controllability) of such intrusions do not differ from intrusions based on personally experienced events.

Most of the empirical research so far has focused on people having directly experienced or witnessed a traumatic event. Participants not meeting this criterion (i.e., experiencing traumatic events indirectly) have usually not been included in intrusion studies. This group of participants, however, would be crucial for testing our assumptions of intrusions associated with indirect experiences based on the mnemonic model (Rubin, Bernsten et al., 2008). A highly relevant population in this regard is the adult offspring of World War Two survivors. Several studies have indicated that children of Holocaust survivors, born after World War Two, display mental health problems, such as depression, anxiety, maladaptive behaviour, attachment problems, and symptoms of personality disorder (Danieli, Norris, & Engdahl, 2017), and some studies have emphasized a similarity of symptoms in now adult offspring to those experienced by their parents (Sagi-Schwartz et al., 2003; Van der Velden, Eland, & Kleber, 1994; Van IJzendoorn, Bakermans-Kranenburg, & Sagi-Schwartz, 2003). In a study of 56 adult offspring of Holocaust survivors, seven percent reported that the Holocaust stories of events that occurred to their parents caused them great distress (Wiseman et al., 2002). More specifically, they reported being too young to handle both the graphic information about murder, torture and rape as well as the emotional responses of the parents while they were reliving these experiences. Subsequently, they either imagined their parents re-experiencing these events or "applied" the events to themselves. Furthermore, about one-fourth of the offspring mentioned their Holocaust-related upbringing as very distressing. Examples included emotional and/or physical neglect of the child by a parent, the responsibility of caring for a parent at a young age, the minimizing of the offspring's own life experiences in contrast to the Holocaust, and being taught by a parent to fear the environment (Yehuda, Schmeidler, Wainberg, Binder-Byrnes, & Durdevani, 1998).

To our knowledge, no research to date *systematically* compared the occurrence, content, and characteristics of intrusions in offspring related to the stressful events experienced by their parents, compared to personally and directly experienced stressful events and/or negative events related to their upbringing.

2. The present study

The aim of the present study was to systematically investigate the possible occurrence and characteristics of intrusions about events that were not directly experienced or witnessed. We conducted a questionnaire assessment in a clinical sample of adult offspring of World War Two survivors, who were born after the war was ended. The parents of these children were survivors of the German or Japanese concentration and internment camps during World War Two, and their offspring were in treatment in one of two centers specialized for war related problems. We investigated the occurrence, frequency and characteristics of intrusions in offspring related to World War Two events experienced by their parents. The frequency and characteristics of intrusions of indirectly experienced events were compared with a) intrusions resulting from personally experienced traumatic events (i.e., as reported on a screening instrument for potentially traumatic events in a respondent's lifetime), and b) intrusions reflecting perceived war-related upbringing. The latter intrusion type was added given that previous studies have indicated that offspring have often mentioned their upbringing as distressing and as strongly influenced by their parent's war experiences (e.g., Scharf & Mayseless, 2011; Wiseman et al., 2002; Yehuda et al., 1998) while existing screeners for distressing and traumatic life events do not incorporate an explicit category for this type of events. Intrusions reflecting perceived war-related upbringing can be differentiated from the indirect intrusion category because the latter refer to intrusions related to *directly* experienced events in childhood (i.e., whereas the other category refers to intrusions related to events experienced by parents in World War Two).

3. Methods

3.1. Participants

The study sample consisted of a convenience sample of now-adult first generation World War Two survivor offspring (N = 101) in treatment at one of two Dutch treatment centres specialized in the treatment of war related mental health problems. The patients were either self-referrals or referred by their general practitioner because of an assumed link between their symptoms and the World War Twoexperiences of their parents. The participants were recruited

between 2011 and 2016. The sample size was determined by feasibility reasons (i.e., data collection was terminated after 5 years). To be included in the study, participants had to meet the following criteria: 1) At least one of the biological parents or caretakers was survivor of the German or Japanese occupation in World War Two; 2) the offspring were born after the liberation (either May 5th 1945 in the Netherlands or August 15th 1945 in the Former Dutch East Indies)[1] . Both male and female offspring were included. The exclusion criteria were 1) current (comorbid) diagnosis of schizophrenia and other psychotic disorders, and 2) current alcohol or drug dependence as recorded in their personal file at the treatment centre. One patient was born in 1944 and two additional patients were excluded because of current alcohol or drug dependence, rendering a sample of $N = 98$. In this sample, the mean age was 55.64 years ($SD = 6.92$) and 57 % was female. The median education level was 6 (range 2–7) on a scale from 1 (low, primary school) to 7 (high, university) (Verhage, 1964).

The study was approved by the Medical Ethical Committee of the University Medical Centre Groningen. Written informed consent included consent to use participant questionnaire data as well as consent to obtain the participant's main and comorbid psychiatric diagnoses according to DSM-IV classification classified by trained clinical professionals from their personal file at the treatment centre.

The mental disorders categorized according to DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association (APA), 2000) were available from 94 of the 98 patient files (96 %). More specifically two participants provided informed consent for the study but refused to give consent to obtain their diagnostic information and from two personal files, the information on primary diagnosis was missing. In 68 % ($N = 64$) patients were diagnosed with an Axis I disorder as a primary diagnosis, whereas in 31 % ($N = 29$) an Axis II disorder (i.e., personality disorder) was mentioned as the primary diagnosis. For one patient, both an Axis I and Axis II disorder were mentioned as primary diagnosis. The most frequently mentioned primary Axis I disorders were mood disorders (55 %) and anxiety disorders (24 %). Seventeen patients (18 %) were diagnosed with PTSD, of which 10 (11 %) the main diagnosis was PTSD and 7 (7%) PTSD was a comorbid diagnosis. The most frequently mentioned Axis II disorder was personality disorder not otherwise specified (50 %). Most patients received one or more comorbid diagnosis (49 % Axis I and 61 % Axis II diagnosis). Anxiety disorders and mood disorders were mentioned in almost equal numbers as a comorbid Axis I diagnosis, both about 20 %.) The mean total score on the PSS-SR (PTSD Symptom Scale Self-Report; (Foa, Riggs, Dancu, & Rothbaum, 1993) was 21.22 (SD = 11.24), on the subscale re-experiencing (5.70 ($SD = 4.12$), on the subscale avoidance 8.30 ($SD = 4.82$), and on the subscale hyperarousal 7.23 ($SD = 3.42$).

3.2. Measures

The *Life Events Checklist* (LEC) (Gray, Litz, Hsu, & Lombardo, 2004; Hovens, Luinge, & Van Minnen, 2005) is a 17-item self-report measure designed to screen for potentially traumatic events in a respondent's lifetime. The LEC assesses exposure to 16 events known to potentially result in PTSD and includes one additional item to index other extraordinarily stressful events not covered by the first 16 items. For each possible traumatic event, respondents rated their experiences on a 4-point nominal scale (1 = happened to me, 2 = witnessed it, 3 = experienced by a relative, 4 = does not apply). The LEC has demonstrated convergent validity with other measures designed to assess exposure to traumatic events (Gray et al., 2004).

The *Offspring Intrusive Memory Questionnaire* was developed for the purpose of this study, to compare the memory characteristics of different kinds of intrusions, and is based on the Autobiographical Memory Questionnaire by Rubin, Boals, and Berntsen (Rubin, Boals, & Berntsen, 2008). A broad definition of intrusive memories was included referring to images and/or thoughts that suddenly and involuntarily pop up in consciousness when awake without the intention to retrieve a memory. The questionnaire consists of three parts each containing comparable items but referring to different types of intrusions. The first part assesses intrusions related to personally experienced traumatic events as indicated in the LEC. The second part assesses indirect intrusions from war-events experienced by parents during the German or Japanese occupation in the Second World War. Finally, the third part assesses intrusions related to war-related upbringing. Each part started by asking to describe the main intrusion related to the traumatic event (i.e., the intrusion occurring most frequently). If participants experienced many intrusions with similar frequency, the most distressing of these was identified as the main intrusion. After describing the intrusion, they were asked to indicate certain characteristics for thisintrusion: (a) The frequency (scale from 1 almost never to 7 several times a day), (b) the intensity (scale from 1 not intense not intense at all to 7 very intense) and (c) valence (scale from 1 very negative to 7 very positive) of the feelings, (d) repetitiveness (scale from 1 not at all to 7 as if experiencing again), (e) vividness (scale from 1 not at all to 7 very), (f) perceptual detail (scale from 1 not at all to 7 completely), (g) level of fragmentation (scale from 1 fragments to 7 as a whole), (h) the influence on mood (scale always the same, worse or better mood), (i) physical sensation, (scale from 1 not at all to 7 very strong), (j) controllability (scale from 1 not at all to 7 very), (k) reliving (scale from 1 not at all to 7 completely), (l) from which perspective (first- vs. third person) the intrusive memory was experienced (scale from 1 observer to 7 field), (m) content of the intrusions (i.e., always the same, reflects the start, warning signal, turning point, wish other action, worst moment or worst case scenario (all scales from 1 not at all to 7 completely true), and (l) whether the intrusion was triggered by anything. The final part of the questionnaire consisted of offspring demographic data (e.g., age, education,) and further event and family characteristics (e.g., parental age, war experiences).

The *PTSD Symptom Scale Self-Report* (PSS-SR; (Foa et al., 1993) was included to assess posttraumatic stress symptoms. The scale consists of 17 items consistent with the 17 DSM-IV criteria for PTSD (Engelhard, Arntz, & Van den Hout, 2007). The items are scored on a 4 point-scale (range from 0 = not at all to 3 = five or more times a week/almost always, anchors differing slightly between questions). The total score (range: 0–51) is calculated as the sum of the severity ratings for the 17 items. PTSD cluster severity scores were calculated as the sum of the severity ratings for the items in each of the subscale re-experiencing, avoidance and arousal. The PSS-SR has good psychometric properties (Engelhard et al., 2007). Cronbach's alpha in the current sample was 0.91 for the total scale, 0.87 for the re-experiencing scale, 0.75 for the avoidance scale, and 0.72 hyperarousal scale.

3.3. Procedure

The participants completed questionnaires in the following fixed order: (1) Life Events Checklist (LEC); (2) Offspring Intrusive Memory Questionnaire; (3) PTSD Symptom Scale Self-Report (PSS-SR). The participants completed the questionnaires at home. This study was part of a larger investigation in this patient group. Only measurement details relevant to the current study are described in this section.

3.4. Statistical methods

Intrusions related to indirect experiences (i.e., parent war-related experiences) were compared to 1) intrusions related to personally experienced or directly witnessed events (i.e., as indicated on the LEC), and 2) intrusions referring to war-related upbringing. Because the types

[1] The offspring did not experience World War Two themselves, although in the Former Dutch East Indies a liberation war (1945-1949) took place after the Japanese capitulation.

Table 1
Characteristics of Intrusive Memories per Event Type (Dichotomous Variables).

Measure	Type I Parent trauma	Type II Personal trauma	Type III Upbringing	Comparison	*Odds Ratio*	95 % *CI*	*p*
Occurrence of intrusion	58 %	66 %	71 %	I vs. II	0.72	0.39 – 1.35	$p = .30$
	($n = 83$)	($n = 87$)	($n = 93$)	I vs. III	0.56	0.30 – 1.05	$p = .07$
Always the same (vs different) intrusions?	17 %	29 %	29 %	I vs. II	0.50	0.19 – 1.29	$p = .15$
	($n = 47$)	($n = 59$)	($n = 65$)	I vs. III	0.48	0.19 – 1.24	$p = .13$
Specific trigger?	90 %	96 %	93 %	I vs. II	0.41	0.07 – 2.41	$p = .32$
	($n = 41$)	($n = 47$)	($n = 60$)	I vs. III	0.66	0.15 – 2.84	$p = .58$
Worse mood	83 %	80 %	77 %	I vs. II	1.25	0.46 – 3.37	$p = .67$
(compared to better mood or unchanged)	($n = 47$)	($n = 59$)	($n = 66$)	I vs. III	1.43	0.55 – 3.75	$p = .46$
Intrusion reflects:	($n = 48$)	($n = 59$)	($n = 65$)				
Start of traumatic event	17 %	20 %	15 %	I vs. II	0.76	0.28 – 2.08	$p = .59$
				I vs. III	1.07	0.38 – 3.01	$p = .90$
Warning signal	17 %	37 %	26 %	I vs. II	0.34	0.13 – 0.85	$p = .02$
				I vs. III	0.57	0.22 – 1.45	$p = .24$
Turning point good*	2%	5%	0%				
Wish other action	10 %	14 %	11 %	I vs. II	0.73	0.22 – 2.43	$p = .61$
				I vs. III	0.95	0.28 – 3.24	$p = .94$
Worst moment	48 %	27 %	34 %	I vs. II	2.47	1.10 – 5.57	$p = .03$
				I vs. III	1.80	0.83 – 3.88	$p = .13$
Worst case scenario:	($n = 47$)	($n = 59$)	($n = 66$)				
Less severe than event	26 %	22 %	15 %	I vs. II	1.21	0.49 – 3.00	$p = .67$
(i.e., compared to more severe or the same)				I vs. III	1.92	0.75 – 4.95	$p = .18$
More severe than event	32 %	31 %	30 %	I vs. II	1.08	0.47 – 2.48	$p = .86$
(i.e., compared to less severe or the same)				I vs. III	1.09	0.48 – 2.47	$p = .83$

Note. * test results not calculated given the low frequencies reported. The reported *n* in cells refers to the number of valid cases on which the percentages are based.

of intrusions are nested within participants (i.e., each participant may report one, two or three types of intrusions), we used multilevel models to analyze the occurrence of memory intrusions and the various intrusion characteristics measured by the Offspring Intrusive Memory Questionnaire. To compare the intrusion types with respect to outcomes measured on an interval measurement level, we used a linear mixed model analysis. For dichotomous outcomes we performed a generalized linear mixed model (a logistic regression with random effects). Throughout the analyses, we used Variance Components as the covariance type for random effects and the standard Restricted Maximum Likelihood (REML) as the model fit estimation method. We utilized an overall significance level of 5%. We report both initial test results as well as results after controlling for the false discovery rate using the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995). All available data were included. As a consequence, sample sizes across analyses are not completely consistent as some patients did not complete all items in some questionnaires, details are reported in the specific analyses.

4. Results

All patients ($N = 98$) indicated that their father and/or mother experienced traumatic events in the Second World War, and 58 % reported that they had experienced one or more intrusions related to these events (see Table 1). Ninety-three percent of the patients indicated that they had experienced or directly witnessed one or more personal traumatic events. The most often reported events were physical assault, unwanted sexual experiences other than sexual assault, sudden unexpected death of loved one, and motor vehicle accidents. Of these patients, 66 % indicated that they had experienced one or more intrusive memories related to these events. Ninety-seven percent of the patients indicated that the war and the war-experiences of their parents played a role in their upbringing. Of these patients, 71 % reported that they had experienced one or more intrusive memories related to these events. Thirty-seven percent of the patients indicated they had experienced all three types of intrusions.

The results of the linear mixed model analyses indicated no differences in the reported frequency of intrusions when comparing indirect intrusions (i.e., based on war experiences of parents) with personally experienced traumatic events nor when comparing them to intrusions related to upbringing events. The means and standard deviations on the reported various other intrusion characteristics for the three types are summarized in Table 1 (dichotomous variables) and Table 2 (continuous variables)[2] . Considering indirect intrusions (i.e., related to parent war trauma), the majority of participants experienced multiple intrusions (i.e., in contrast to the same intrusion over and over again, 17 %). The mean frequency of the reported intrusions was between multiple times per month and once a week. Almost everyone (90 %) experienced triggers that elicited the intrusions. The mean intensity of the reported feelings during intrusions was rated by the participants as intense and most participants (83 %) reported a worsened mood following the intrusion. Participants indicated that they experienced indirect intrusions often in the form of visual images and thoughts (i.e., as compared to intrusions in the form of sounds and smells)[3] . Participants also rated the intrusions as quite vivid. Physical reactions during the intrusions (e.g., sweating, cramps, cardiac palpation) were rated as quite strong. Regarding the vantage point of the intrusion, the participants indicated that they experienced the intrusions more from a field (i.e., first person) perspective than from an observer (i.e., third person) perspective. They also indicated that the feeling of reliving of the experience during the intrusion was quite high. On fragmentation and controllability of the intrusion, participants did not show clear scores towards the fragmentation or coherence end. No significant differences were found when comparing the characteristics mentioned above for intrusions related to the parent war experiences compared to intrusions related to personal trauma nor when comparing them to intrusions

[2] Three additional items were not analyzed. One item pertained to the number of different intrusions. This item was not analyzed as the scores were difficult to categorize as they were very heterogeneous (e.g., answered in word or numbers). The same accounts for an item asking to describe the type of cue eliciting the intrusion. The third item asked about the moment of day of the intrusion. This item was not analyzed because the vast majority of participants indicated there was not a fixed moment when the intrusion occurred.

[3] Due to a technical error, the scale administered in Type III was incorrect so these results are not reported.

Table 2
Characteristics of Intrusive Memories per Event Type (Continuous variables).

Measure	Type I Parent trauma *M (SD)*	Type II Personal trauma *M (SD)*	Type III Upbringing *M (SD)*	Comparison	Mean Difference	95 % *CI*	*p*
Frequency of intrusion	3.40 (1.75)	3.71 (1.82)	3.40 (1.78)	I vs. II	−0.48	−1.04 - 0.09	$p = .10$
(1 almost never - 7 several times a day)	($n = 48$)	($n = 56$)	($n = 62$)	I vs. III	−0.14	−0.69 - 0.40	$p = .60$
Intensity of feelings during the intrusion	5.91 (1.18)	5.86 (1.28)	5.70 (1.34)	I vs. II	0.04	−0.40 - 0.48	$p = .84$
(1 not intense at all – 7 very intense)	($n = 47$)	($n = 59$)	($n = 66$)	I vs. III	0.22	−0.21 - 0.65	$p = .31$
Valence of feelings during the intrusion	2.38 (1.50)	1.78 (0.91)	2.20 (1.49)	I vs. II	0.60	0.10 – 1.09	$p = .02$
(1 very negative - 7 very positive)	($n = 48$)	($n = 59$)	($n = 66$)	I vs. III	0.18	−0.31 - 0.66	$p = .47$
Visual images	6.24 (1.21)	6.00 (1.53)	–	I vs. II	0.14	−0.26 - 0.54	$p = .49$
(1 not at all – 7 completely)	($n = 46$)	($n = 59$)					
Thoughts	5.98 (1.65)	5.71 (1.71)	–	I vs. II	0.28	−0.31 - 0.87	$p = .35$
(1 not at all – 7 completely)	($n = 46$)	($n = 58$)					
Sounds	3.86 (2.43)	3.86 (2.47)	–	I vs. II	0.06	−0.71 - 0.82	$p = .88$
(1 not at all – 7 completely)	($n = 42$)	($n = 57$)					
Smells	2.44 (2.05)	2.15 (1.88)	–	I vs. II	0.29	−0.17 - 0.76	$p = .22$
(1 not at all – 7 completely)	($n = 43$)	($n = 55$)					
How vivid – clear is the memory	5.60 (1.71)	5.95 (1.57)	5.85 (1.64)	I vs. II	−.40	−0.88 - 0.09	$p = .11$
(1 not at all – 7 very)	($n = 48$)	($n = 59$)	($n = 66$)	I vs. III	−.29	−0.76 - 0.17	$p = .21$
Physical sensation during the intrusion	5.60 (1.35)	5.69 (1.37)	5.74 (1.29)	I vs. II	−.11	−0.54 - 0.32	$p = .62$
(1 not at all – 7 very strong)	($n = 48$)	($n = 59$)	($n = 65$)	I vs. III	−.15	−0.57 - 0.27	$p = .48$
Controllability of the intrusion	3.38 (1.95)	2.98 (1.79)	3.33 (2.00)	I vs. II	.45	−0.10 – 1.00	$p = .11$
(1 not at all – 7 very)	($n = 47$)	($n = 59$)	($n = 66$)	I vs. III	.12	−0.41 - 0.64	$p = .67$
Field vs. observer perspective	5.27 (2.14)	5.15 (2.30)	5.12 (2.22)	I vs. II	.07	−0.75 - 0.90	$p = .86$
(1 observer – 7 field)	($n = 48$)	($n = 59$)	($n = 66$)	I vs. III	.11	−0.69 - 0.91	$p = .79$
Reliving	5.10 (1.53)	5.39 (1.57)	5.24 (1.58)	I vs. II	−.38	−0.90 - 0.13	$p = .14$
(1 not at all – 7 completely)	($n = 48$)	($n = 59$)	($n = 66$)	I vs. III	−.25	−0.75 - 0.24	$p = .31$
Fragmentation	4.04 (2.05)	4.37 (2.10)	4.62 (2.17)	I vs. II	−.33	−1.00 - 0.35	$p = .34$
(1 fragments −7 as a whole)	($n = 48$)	($n = 59$)	($n = 66$)	I vs. III	−.62	−1.27 - 0.03	$p = .06$
Event really happened	5.35 (2.03)	6.46 (1.21)	6.14 (1.59)	I vs. II	−1.11	−1.63 - -0.59	$p < .001$
(1 completely made up – 7 completely true)	($n = 48$)	($n = 59$)	($n = 65$)	I vs. III	−.85	−1.36 - -0.35	$p = .001$

Note. The reported *n* in cells refers to the number of valid cases on which the percentages are based.

related to upbringing.

Significant differences between indirect intrusions compared to the other two types of intrusions were found for a few other reported characteristics. One of these was the valence of the emotions felt during the intrusions. Participants indicated that intrusions related to the parent's war experiences were experienced as less negative compared to events related to personal events (mean difference 0.60 on a scale from 1 to 7). In addition, in response to the question whether the event in the intrusion really happened (i.e., whether nothing was imagined or added that did not happen), participants considered the events in their intrusions related to their parent's war experiences as relatively more 'made-up' while they considered the events in their intrusions related to personal events and those related to their upbringing to have happened more in reality (mean difference 1.11 on a scale from 1 to 7). Finally, a higher percentage of participants indicated that the intrusions related to their parents' war experiences reflected the worst moment of the event (odds ratio 2.47) while the intrusions related to their personally experienced traumatic events more often reflected the warning signal (i.e., referring to the moment when they realised the severity of the situation, in other words, the traumatic turning-point; odds ratio 0.34).

After correction for the false discovery rate using the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995; 44 comparisons in total), only two comparisons remained significant. That is, participants indicated that the events related to the indirect intrusions were experienced more as made up (i.e., less as if it really happened) compared to personally experienced traumatic events and compared to events related to upbringing.

5. Discussion

The aim of the present study was to systematically investigate the occurrence and characteristics of intrusions in offspring related to events that happened to their parents several decades ago and thus were not directly experienced or witnessed. Importantly and in line with the mnemonic model, we found that intrusions related to indirectly experienced events, that is, war atrocities experienced by the offspring parents in World War Two, were indeed reported. We thus found evidence for the occurrence of intrusions referring to indirectly experienced traumatic events. The frequency of these intrusions did not differ from the frequency of intrusions about directly-experienced traumatic events or war-related upbringing.

The intrusions related to indirectly experienced events were comparable to both types of intrusions of directly experienced (traumatic) events. They were all experienced as vivid, intense, and uncontrollable, mainly in the form of images and thoughts, and they were accompanied by relatively strong physical sensations. It should be mentioned that after applying the Benjamini-Hochberg procedure for controlling familywise error, none of the differences in characteristics between the intrusion related to indirectly experienced events and the two other types of intrusions remained significant but one: the question whether the event in the intrusion really happened. Participants indicated that they felt that intrusions referring to indirectly experienced events relatively were more fabricated compared to intrusions referring to personally experienced traumatic events and events related to upbringing; those latter ones were experienced relatively more as completely true and real.

The similarity between direct and indirect intrusions with regard to their frequency and other characteristics provide support for the mnemonic model with its emphasis on the (re)constructive nature of memory, its accentuation of comparable memory processes for non-traumatic (but emotional) and traumatic memories, and its emphasis on the possibility of indirect memories being constructed and reconstructed at a later point in time. Because memory (re)construction may well be influenced by current psychopathology, current goals, and individual characteristics such as neuroticism (Rubin, Boals et al., 2008), it would be interesting for future research to examine if these variables may also be related to the occurrence and characteristics of indirect intrusions. We would like to emphasize, however, that

although the current finding (i.e., also indirectly experienced events may give rise to intrusions) cannot be readily explained by 'special mechanisms' models, this by no means discredits the relevance of these models for understanding the development of intrusions related to directly experienced traumatic events.

Another interesting finding was that intrusions related to upbringing were also quite frequent and influential in this sample of survivor offspring. We chose to assess intrusions related to upbringing as a separate category following the results of previous studies (e.g., Yehuda et al., 1998), reporting that around one-fourth of the offspring mentioned Holocaust-related upbringing as their most distressing life event. The results of our current study indicate that upbringing not only plays an important role in voluntary retrieval but also in the involuntary memory of these patients. The experience of frequent intrusive memories of upbringing related topics is not only rated as eliciting negative and intense feelings during the intrusion, but also to have a detrimental impact on functioning in daily life.

Given the exploratory nature of the current study, we included many variables and corrected for multiple testing. Before applying the Benjamini-Hochberg correction, some notable differences between the types of intrusions were found that may be worth of further scrutiny in future research. First, the current findings point to the possibility that intrusions related to parents' war experiences were perceived more often as reflecting the worst moment of the event, while the intrusions related to personally experienced traumatic events consisted of a warning signal (i.e., referring to the moment when they realised the severity of the situation, in other words, the traumatic turning-point). These warning signal intrusions represented stimuli that were present shortly before the moment with the largest emotional impact and they indicated impending danger (Ehlers et al., 2002). Further research may extend this finding and investigate, for example, the possibly differential impact of worst moment vs. signal intrusions on people's mood and other features of mental disorders. Another interesting avenue for further research of intrusions in offspring might be whether the intrusions mainly relate to offspring witnessing their parent(s) relive WWII experiences or whether they were told or found out in different ways the details of these experiences.

Limitations of the current study include the explorative nature of the study resulting in many comparisons and the retrospective nature. This calls for replications using other methods (e.g., experience sampling methods in a specified monitoring period) and hypothesis-driven replication in independent samples. The current study also provides an indication which variables to consider in future studies such as the type of content of the intrusions (i.e., whether it reflects the worst moment or a warning signal). Also, asking people directly about intrusive memories may overestimate the prevalence of such memories, but this then was the case for all types of intrusions in the current study because all three kinds of intrusions were directly asked about in the same way. Furthermore, the results of the current patient sample may not be generalizable to the population of (children of) the wider field of man-made or natural traumatic incidences or even (adult) children of war/Holocaust survivors in general because it consisted of a patient sample in treatment at a center specialized for war related problems. This selection of participants may have resulted in increased reports of intrusions related to parent experiences. Moreover, it should be acknowledged that the type of treatment that was offered to the patients was not monitored in this study. It can thus not be ruled out that some patients may have received trauma-focused therapy, which might have influenced (i.e., diminished) the occurrence, frequency and quality of reported direct intrusions (i.e., related to personally experienced events). It would be interesting to see whether similar intrusions can also be found in World War Two offspring not in treatment and in other groups of individuals who indirectly experienced different types of negative events. However, the aim of the current study was to investigate whether indirect intrusions, that is, intrusions experienced by the family, friends, and/or colleagues of those involved by way of indirect exposure to the traumatic event, occur at all. Our results clearly show that this is the case in offspring of World War Two survivors. It would be interesting to see whether similar intrusions can also be found in World War Two offspring not in treatment and in other groups of individuals who indirectly experienced different types of negative events.

The occurrence of indirect intrusions raises the question if and in what way these intrusions need psychological treatment. Available evidence-based interventions for intrusions referring to direct traumatic experiences (e.g., EMDR, prolonged exposure, or imagery rescripting) might also be effective for the treatment of intrusions referring to indirect traumatic experiences. On the other hand, these methods might have (more) negative side effects when applied to intrusions referring to indirect experiences. This includes the risk of the creation of false memories (e.g., Houben, Otgaar, Roelofs, Smeets, & Merckelbach, 2020). Patients may, for example, start to experience the events as having happened to themselves instead of to their parent as a result of adding vivid self-referential memory details in reconstructing the scene of the memory. Therapists should be very careful in the treatment of indirect intrusions. It will be important to provide psychoeducation on the (re)constructive nature of memory, therapists should avoid labelling intrusive images as memories, and avoid asking patients to reconstruct in detail and/or in a self-referential nature.

Taken together, the current findings demonstrate that traumatic events may not only afflict those directly involved but may also have repercussions on their offspring. Not only do these events have a direct impact on the upbringing and attachment relation perceived in the next generation, they also give rise to intrusions in trauma survivor's offspring, with comparable characteristics to intrusions related to personally experienced event. Traumatic events thus have an indirect impact on the mental health of the next generation and possibly many generations to come.

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