

Construct Validation of the Dutch Version of the Impact of Event Scale

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The Impact of Event Scale (IES; M. J. Horowitz, N. Wilner, & W. Alvarez, 1979) is a worldwide-used self-report measure to assess the frequency of intrusive and avoidant phenomena after a variety of traumatic experiences. The purpose of this article is to assess the psychometric value of the Dutch version of the IES (D. Brom & R. J. Kleber, 1985) in several samples of individuals who had experienced various traumatic stressors. The reliability and structure of the IES were evaluated in 3 different samples (total $N = 1,588$). The reliability of the Dutch version of the IES was adequate across the various stressors. The construct validity was assessed by using confirmatory factor analyses. Outcomes revealed a robust structure over the various samples, generally supporting the composition of the original IES.

Until traumatic experiences such as rape, combat, disasters, and acts of violence are assimilated and integrated into existing views of the world, they produce an oscillation between intrusive and emotionally upsetting recollections on the one hand and numbing and avoiding strategies on the other hand. This interaction between intrusion and avoidance has been emphasized by many authors in the trauma field (Horowitz, 1976; Van der Kolk, McFarlane, & Weisaeth, 1996).

Intrusions are manifested in a preoccupation with the traumatic experience, repeated thoughts about the experience, related pangs of emotions, nightmares about the experience, and a recurrent need to talk about it (e.g., Horowitz, 1976). These intrusions are associated with distress but are also conceptualized as forms of processing the trauma. According to cognitive models of trauma (e.g., Creamer, 1995; Kleber & Brom, 1992), the exposure to trauma-related memories allows associations between stimulus and response components to weaken and prompts modification of the meanings associated with the incident (e.g., individuals learn that

they are not always vulnerable to a recurrence). At the same time, the numbing and avoidance responses are considered as attempts to block out intrusive images (Creamer, 1995; Herman, 1992). Examples are emotional numbness, a loss of interest, the refusal to talk about the experience, and the avoidance of locations reminding of the experience. These responses may be conceptualized as coping strategies, albeit often maladaptive, in response to discomfort resulting from intrusive memories. The degree of avoidance may be reinforced by familial or societal expectations not to discuss the trauma (Kleber, Figley, & Gersons, 1995).

Cognitive conceptualizations of posttraumatic reactions (e.g., Chemtob, Roitblat, Hamada, Carlson, & Twentyman, 1988; Foa, Steketee, & Rothbaum, 1989; Janoff-Bulman, 1985) propose that activation of the traumatic memories and the incorporation of new information allow for processing to take place. Thus, although activation of the thoughts and the feelings associated with the trauma result in high symptom levels, they lead to reduced symptom levels in the future as the memories are modified. At the same time, intrusion and avoidance are painful and in the long run are often dysfunctional (Shalev & Yehuda, 1998). High levels of intrusion and avoidance are used as essential indicators of posttraumatic stress disorder (PTSD; American Psychiatric Association, 1994).

Horowitz, Wilner, and Alvarez (1979) introduced the Impact of Event Scale (IES), a self-report inventory to assess these characteristic responses to traumatic stressors. This instrument was built on earlier observations of the link between traumatic life events and subsequent psychological symptoms (Breuer & Freud, 1895/1952; Horowitz, 1976; Kardiner, 1941). The IES (comprising 15 items) was developed to assess current subjective distress for any major life event. The first dimension is Intrusion (intrusively experienced ideas, images, feelings, or bad dreams; 7 items), and the second dimension is Avoidance (self-reported avoidance of certain ideas, feelings, or situations; 8 items). The scale provides subscores for these dimensions of response sets as well as a total subjective stress score. In a sample of adults who sought psycho-

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therapy as a result of disturbances due to a serious life event, the psychometric characteristics of the IES were examined by Horowitz et al. (1979). The scale showed satisfactory psychometric properties. The reliability coefficients were .79 for Intrusion and .82 for Avoidance.

Since its introduction, the IES has been used worldwide in relation to various traumatic experiences and in different samples. The inventory was found to be very valuable in many studies on trauma victims and on outcomes of various trauma interventions. It is probably the most popular trauma-specific questionnaire worldwide (cf. Joseph, 2000; Sundin & Horowitz, 2002). The questionnaire has been translated into several languages, for example, Hebrew (e.g., Schwarzwald, Solomon, Weisenberg, & Mikulincer, 1987), Swedish (e.g., Larsson, 2000), Croatian (e.g., Dyregrov, Kuterovac, & Barath, 1996), Arabic (e.g., Dyregrov, Gjestad, & Raundalen, 2002), Bosnian (e.g., Mooren & Kleber, 2001), and German (e.g., Schnyder, Moergeli, Klaghofer, & Buddeberg, 2001). The purpose of this article is to assess the reliability and the factor structure of the Dutch version of the IES in various samples in the Netherlands (Brom & Kleber, 1985; translated as Schokverwerkingslijst).

Issues With Regard to the Subscales of the IES

A central issue concerns the structure and homogeneity of the scale. A number of studies have indicated that the two-factor structure is not as equivocal as originally assumed. First, Zilberg, Weiss, and Horowitz (1982) studied two samples of outpatients who sought help after the death of their parent ($n = 35$) and field subject volunteers ($n = 37$). Principal-components analysis (PCA; with Kaiser criterion) revealed three principal components, but the third component explained only 6% of the variance. Therefore, they decided to drop the third component and performed a forced two-component PCA. They found the original structure designed by Horowitz et al. (1979) in this sample. The subscales of the IES indicated high internal consistency (ranging from .79 to .92) for both samples across repeated measurements in time and at varying average levels of subscale scores.

Brom and Kleber (1985) examined the psychometric properties of the Dutch version of the IES in a sample of 105 individuals attending psychotherapy after various traumatic events. The internal consistency coefficients were for .72 for Intrusion and .66 for Avoidance. Although they found some evidence for three factors (a second smaller factor within the Avoidance factor), the two dimensions, Intrusion and Avoidance, were confirmed by factor analyses and cluster analyses. Two of the items (Items 6 and 8) were not consistent, as their content did not load on the target dimension of the scale. The authors decided to drop those in summarizing the subscale scores. This revised version has been used in many studies in the Netherlands (e.g., Brom, Kleber, & Defares, 1989; Brom, Kleber, & Hofman, 1993).

In Israel, a slightly different factor structure than the original one was found in several studies on the Hebrew translation of the IES. The study of Schwarzwald et al. (1987) focused on men who had been exposed to combat-related trauma. Three samples were studied: (a) participants who had been in combat and had been identified as having combat stress reaction ($n = 382$), (b) a control group composed of people who had participated in the same battles and were matched on relevant sociodemographic characteristics

but had not shown stress symptoms ($n = 334$), and (c) combat-ready participants who were similar to the other two samples but had not actually participated in battle ($n = 88$). PCA (with Kaiser criterion) was used to examine the underlying structure of the IES. A three-factor solution was found, with the third factor accounting for 7% of the total variance. Consistent with the research of Brom and Kleber (1985) and Zilberg et al. (1982), the third factor was dropped, and a forced two-factor solution was performed by PCA. Two Avoidance items (Items 8 and 15) did not yield sufficient loading in either of the obtained factors. Whereas the Avoidance factor reflected behavioral-cognitive avoidance, these two items tapped emotional avoidance or numbing. Coefficients of internal consistency for nine items of the Intrusion factor ($\alpha = .91$) and for the four items of Avoidance ($\alpha = .84$) indicated a high level of reliability.

Joseph, Williams, Yule, and Walker (1992) examined the structure of the English IES in a sample of survivors of disasters at sea. The first sample consisted of 37 adult survivors of the Herald of Free Enterprise disaster (in Belgium), and the second sample consisted of 35 adult survivors of the Jupiter cruise ship disaster (in Greece). Three factors were found in the scree plot of eigenvalues. The results were similar to those found by Schwarzwald et al. (1987): Items 8 and 15 did not load on either the Intrusion or the Avoidance dimension but emerged as a separate factor. In line with the studies above, there appeared to be a distinction between two types of avoidance: active versus passive and emotional versus cognitive. As the third factor explained only 7.6% of the variance, the authors adopted the decision of Zilberg et al. (1982) to drop this factor. Items 2 and 12 were found to have ambiguous loadings.

In examining the factorial structure of the IES, most studies used an exploratory factor analysis (for an overview, see Joseph, 2000). However, confirmatory factor analysis (CFA) is more appropriate to evaluate the hypothesized structure. With CFA, the relationships among the observed variables (responses) and the latent variables (factors) are explored by using theoretical considerations as a point of departure.

Recently, three studies were conducted to assess the factor structure of the IES by using CFA. Shevlin, Hunt, and Robbins (2000) examined the structure of the IES in a sample of World War II (WWII) veterans ($n = 657$) and Korean War veterans ($n = 22$) who had experienced combat 40–50 years earlier. They specified three confirmatory factor analytic models on the basis of theoretical considerations and earlier research. The best-fitting model specified a two-factor model with additional cross-factor loading for Items 2 and 12. The fit indices (root-mean-square error of approximation [RMSEA] = .06, standardized root-mean-square residual = .04) indicated adequate model fit.

Larsson (2000) analyzed the Swedish translation of the IES by using CFA in a sample of individuals who had witnessed a mass murder of seven people ($N = 321$). The first tested model was based on the two components of the original IES, but this model did not provide an acceptable outcome (RMSEA = .13, goodness-of-fit index [GFI] = .84). In addition, a model with one latent variable was tested. This model was too simplistic for the data. The fit indices (RMSEA = .12, GFI = .80) did not indicate adequate model fit. On the basis of modification indices, a model with one general factor and three subordinate specific factors (Intrusion, Avoidance, and Sleep Disturbance) was developed. This model was considered to be psychologically meaningful. The statistical

goodness of fit of the model was acceptable ($RMSEA = .06$, $GFI = .95$).

Amdur and Liberzon (2001) tested the factor structure of the IES in a clinical sample of male combat veterans with chronic PTSD ($N = 195$). The two-factor structure including Intrusion and Avoidance deviated significantly from good fit. On the basis of an exploratory factor analysis, alternative models were identified. A four-factor model with Intrusion, Effortful Avoidance, Sleep Disturbance, and Emotional Numbing fitted significantly better (Item 9, "I tried not to talk about it," was dropped). The statistical goodness of fit was good ($RMSEA = .03$, adjusted goodness-of-fit index [AGFI] = .92).

Another psychometric issue has to do with the nature of the samples used in IES studies. Unfortunately, most studies were conducted on clinical samples, in particular patient samples and comparable samples, such as applicants for war pensions. By definition, these people have mental disturbances related to traumatic experiences, most notably PTSD. However, the association between extreme stresses and PTSD is certainly not a direct and monocausal connection (Kleber et al., 1995; Yehuda & McFarlane, 1995). Only a minority of people confronted with violence, terror, and calamities have been found to have trauma-related disorders, and only a portion of these disorders have been found to be PTSD. In systematic overviews of random samples of victims of major events (Brom, Kleber, & Witztum, 1991) and in epidemiological research (Breslau, 1998), prevalence rates of approximately 10%–25% of PTSD are mentioned. Unfortunately, there have been only a few studies using the IES in random samples of people confronted with disaster, rape, and combat. In spite of the many studies using the IES, it is unclear whether the instrument is suitable for these samples and whether a similar factor structure is revealed.

Another issue related to the construct validity of the IES is its widespread use to assess the aftermath of a diversity of traumatic experiences. The stressors vary from death of a parent (Horowitz et al., 1979) to floods (Green et al., 1994), earthquakes (Lundin & Bodegard, 1993), accidents (Malt, Hoivik, & Blikra, 1993), and WWII (Bramsen, 1995). However, it is remarkable that no study has yet determined possible differences in responses, as assessed by the IES, to these various stressors. It is worthwhile to examine the possible differences in responses of victims after exposure to various kinds of events.

Finally, the IES has been repeatedly used in different countries (e.g., Norway, the Netherlands, Great Britain, Germany, Bosnia-Herzegovina). An adequate examination of the reliability and structure of a non-English version (in this case, Dutch) compared with the original inventory from the United States is warranted.

Goals of This Study

The purpose of this study was to analyze reliability and construct validity of the Dutch version of the IES in different samples confronted with various kinds of traumatic incidents. Confirmatory factor analytic methods were used, which allowed for a priori specification of alternative factor models and statistical tests to evaluate the fit of the specified model. In addition, it is possible to test the equivalence of the IES across various samples. Although this article is primarily focused on the internal structure of the Dutch IES, we also examine the convergent validity in order to

provide insight in the relation of the IES with other mental health indicators. Specifically, we address the following issues with regard to the internal structure:

1. On the basis of theoretical considerations and former research, several factor models (a one-dimensional model, the original two-factor structure, a three-factor model, and additional models on the basis of modification indices) are specified. Their fit is evaluated in a sample of individuals who were confronted with various sorts of traumatic events (i.e., work-related and war-related acts of violence and confrontations with an accident or disaster).
2. Comparing independent samples of trauma-stricken people, we test the equivalence of the IES. Is the best-fitting model equivalent across different samples; that is, can similarity of the IES scale structure concerning different kinds of traumatic incidents be confirmed?

Method

Selection of Samples

For the analyses described in this article, studies were included that used the Dutch version of the IES during the past decade. The data were gathered in all research projects on traumatic stress or traumatic events conducted by the Institute for Psychotrauma, Zaltbommel, the Netherlands, and/or Utrecht University, Utrecht, the Netherlands (published before 2000). For the purpose of this validation study, only cases with completed Dutch versions of the IES were included.

Participants

Participants of the different studies were recruited in three general ways: They were asked to participate in work-related projects (Sample 1), in a comprehensive study on the late consequences of WWII and migration (Sample 2), or in studies on the impact of a disaster (Sample 3). Table 1 provides an overview of demographic data of all respondents.

Sample 1: Work-related trauma. First, samples on work-related trauma focused on high-incident organizations (Subsamples 1a–1f; see Table 1); that is, participants worked in professions that involved a high stress level or risk for experiencing critical events.

Subsample 1a consisted of all employees working at one of the main departments of the civil social services of the city of Amsterdam ($n = 56$; Eland et al., 1990). The study combined interviews and standardized questionnaires (including the IES). It was directed at obtaining insight into the kind and magnitude of experienced violence in relation to individual functioning. During the year before the study, almost half of the participants had experienced violence directly. For instance, a (fake) weapon was pointed at them; a furniture part was thrown toward them; or they were held, yelled at, kicked, or taken hostage. An equal number of employees had been a witness to these acts being directed at others. The response rate was high (88%). Most of the participants were men, and the mean age was 38.0 years ($SD = 9.4$).

A second study was conducted among a randomly selected sample of employees of a large department store (Subsample 1b, $n = 173$; Van der Velden, 1996). The project investigated the impact of unsafe or violent situations on the health of the employees. Assessment methods were questionnaires. More than half of the participants had been subjected to direct violence, whereas others had been a witness to the violent scene (client threatened to hurt another person, e.g., a colleague). Examples of direct confrontations were being yelled at by a client; being held or hit by

Table 1

Demographics of the Respondents (N = 1,588) in the Studied Groups and Experiences of Violence and Threat Among the Respondents in the Different Groups

Sample and subsample	n	Year of study	Men		Women		Age (in years)		Has partner		Without partner		Type of violence or threat
			n	%	n	%	M	SD	n	%	n	%	
1													
a	56	1990	35	62.5	21	37.5	38.0	9.4	43	79.6	11	20.4	Directly or indirectly subjected to violence and/or threat
b	173	1995	111	64.2	62	35.8	35.1	9.7	136	78.6	37	21.4	Directly or indirectly subjected to violence and/or threat
c	148	1990	70	47.3	78	52.7	34.1	11.3	131	88.5	17	11.5	Robberies
d	52	1991	52	100.0	0	0.0	38.5	8.0	45	86.5	6	11.5	Robberies
e	29	1994	25	86.2	4	13.8	36.5	9.7	27	93.1	2	6.9	Continuous stress, potential hazardous incidents
f	123	1995–1998	63	51.6	59	48.4	36.6	9.3	110	90.2	12	9.8	Various stressful events: (bank) robberies, sexual assault, maltreatment, taken hostage, threat, confrontation with dead bodies, and injuries
2													
g ₁	316	1995	164	51.9	152	48.1	58.8	5.0	194	61.4	122	38.6	World War II: German occupation
g ₂	227	1995	111	48.9	116	51.1	58.6	4.4	113	49.8	114	50.2	World War II: Japanese occupation, revolution period (<i>Bersiap</i>), and migration
g ₃	237	1995	132	55.9	104	44.1	60.6	3.9	121	51.1	116	48.9	World War II: Japanese occupation, revolution period (<i>Bersiap</i>), and migration
g ₄	56	1995	31	55.4	25	44.6	58.2	4.2	25	44.6	31	55.4	World War II: Japanese occupation, revolution period (<i>Bersiap</i>), and migration
3													
h	137	1986–1987	83	60.6	54	39.4	36.9	16.1	71	51.8	66	48.2	Traffic accident
i	34	1994	17	50.0	17	50.0	54.8	10.8	31	91.2	3	8.8	Sinking of the cruise ship the Achille Lauro near the coast of Somalia

Note. For the subsamples, a = civil social services, b = department store, c = bank, d = money transport company, e = air traffic control, f = eye movement desensitization and reprocessing study, g₁ = comparison group of people who spent their youth in the Netherlands during World War II; g₂ = survivors from the former Dutch Indies; g₃ = survivors from the former Dutch Indies who applied for material and immaterial help; g₄ = survivors from the former Dutch Indies who received psychotherapy; h = traffic accidents; and i = a shipping disaster.

a client; being threatened with a knife, gun, or sexual violence; or being threatened to be killed. The overall response rate was high: 86% participated in an interview and returned the questionnaire. Men were better represented (64.2%) in this sample than were women (35.8%). The estimated average age was 35.1 years ($SD = 9.7$).

Subsample 1c encompassed all professional employees of a medium-size Dutch bank organization who had experienced a bank robbery ($n = 148$; Van der Velden, Van der Burg, Steinmetz, & Van den Bout, 1992). Assessment methods were (standardized) interviews. For one out of four victimized employees, the robbery took place less than 6 months ago; for others, more time had passed. In most cases, the victims (75.7%) were directly assaulted. They were yelled at, kicked, stabbed with a knife, or shot at. The number of robberies among employees varied between one and five (or more). The average number of years that had passed since the last robbery was 5 years ($SD = 4$). Slightly more female employees (52.7%) than male employees (47.3%) participated; 30% of the men and 23% of the women had experienced a robbery more than once (range = 1–4). The response rate was 71%. Mean age was 34.1 years ($SD = 11.3$).

The fourth subsample, Subsample 1d, consisted of a randomly selected sample of employees of the largest money transport company in the Netherlands ($n = 52$; Van der Velden, Eland, Ten Veen, & Kleber, 1991). Filling out the IES was part of a study to investigate the relationship between confrontation with robberies of money transports and employees' health. Included were participants who stated that they had been forced to hand over money or goods during work, or witnessed such events, one to five or more times. They were all men with an average age of 38.5 years ($SD = 8.0$).

The fifth subsample, Subsample 1e, consisted of employees of Air Traffic Control Netherlands ($n = 29$; Van der Velden & Kleber, 1995). A study combining interviews and questionnaires (including the IES) was conducted to assess the prevalence of and type of psychological reactions to acute stressful events among a small but representative sample of officers and their assistants in this highly stress-provoking field of work (response rate = 83%). All participants in this study reported that they had been confronted with near-disasters as well as hazardous incidents during their work. Examples of such incidents were acute technical problems with pilots, daily peaks in the air traffic, or bad weather. For 43.8% of the controllers, the most recent stressful event had taken place less than 2 years ago. Most of the participants were men ($n = 25$, 86.2%); the average age of all respondents was 36.5 years ($SD = 9.7$).

The final subsample with regard to work, Subsample 1f, consisted of people working for various companies, such as banks, police departments, security agencies, and fire fighting departments ($n = 123$; Van der Velden & Kleber, 2002). They were randomly selected from the therapy files of the Institute for Psychotrauma. These patients all participated in controlled eye movement desensitization and reprocessing (EMDR) therapy. Most of the respondents who participated in the study had experienced one or more stressful events in or during their work (85%). Relatively frequently occurring events were being threatened, confrontation with dead bodies, robberies, maltreatment, being confronted with injuries, taken hostage, or sexual assault. More men (51.6%) than women (48.4%) participated, and the mean age was 36.6 years ($SD = 9.3$). Before and after treatment they completed a set of questionnaires, including the IES. Only the pretreatment data were included here.

Sample 2: War-related trauma. The second sample was derived from a comprehensive research project on health and adjustment of survivors of WWII in the former Dutch Indies, living in the Netherlands at the time of study in 1994–1995 (Subsamples 2g₁–2g₄; see Table 1; Mooren & Kleber, 1996). In this study, four subsamples were analyzed. The first two subsamples were random samples of the community registers of seven cities in the Netherlands; one of these subsamples consisted of people born in the former Dutch Indies who survived the hardships of the Japanese occupation and who came to the Netherlands in the 1940s and 1950s (Subsample 2g₂; $n = 227$), and the other was composed of a matched comparison group

of people born in the Netherlands who spent WWII in the former Dutch Indies (Subsample 2g₁; $n = 316$). All respondents were selected irrespective of whether they received help. Participants in the third subsample were randomly selected via the National Institute for Pensions and Allowances for the provision of material and immaterial help to survivors of WWII in the Netherlands (Subsample 2g₃; $n = 237$). Participants in the fourth subsample were randomly selected patients of a national clinic that specialized in the treatment of mental health disturbances related to WWII (Subsample 2g₄; $n = 56$). These last two subsamples were considered clinical groups as opposed to the two community groups. These child survivors were selected at a mean age of 60 years. The response rates of the four subsamples were 34% (Subsample 2g₁), 47% (Subsample 2g₂), 55% (Subsample 2g₃), and 75% (Subsample 2g₄), respectively.

The participants in this sample had to trace their memories for experiences that had happened to them in either WWII or the subsequent period of decolonization. Examples of experiences that were noted by many participants were having a serious injury, having a serious illness, losing family members, witnessing or experiencing destruction of property, having been in the line of fire, being maltreated or abused, and being a witness to the abuse of a family member.

Sample 3: Disasters. The third sample stemmed from two studies on the consequences of experiencing a traffic accident (Subsample 3h) and a shipping disaster (Subsample 3i). Subsample 3h ($n = 137$; Brom et al., 1993) assessed the impact of experiencing a traffic accident on individual well-being. Victims of traffic accidents in a large city of the Eastern part of the Netherlands were randomly selected from police registers and were assigned to either a counseling or a control condition. Response rates were different for both conditions: 13% ($n = 68$) and 36% ($n = 83$), respectively (mean age = 36.9, $SD = 16.1$). The severity of the accident was established by rating the police reports by independent judges. More than half of all accidents were rated as “rather severe,” and a restricted number were rated as “very severe” (4% of the control group, 15% of the counseling group). Measurements, including the Dutch version of the IES, were carried out 1 month after the accident.

Subsample 3i (Van der Velden & Kleber, 1997) focused on the consequences of a shipping disaster (the sinking of the *Achille Lauro*, a large Italian cruise ship) in 1994. Approximately 1 month after the disaster, all Dutch survivors were asked to fill out a set of questionnaires (including the IES). Among the victims of the explosion and subsequent sinking of the cruise ship, almost a quarter reported having physical injuries caused by the disaster, such as breathing problems, wounds on their legs, and bruises. Several respondents reported severe anxiety and a fear of dying. In particular, great distress had been caused by the appearance of thick smoke, the absence of fire alarms, not being informed clearly, and the absence of supervision. Thirty-four completed questionnaires were available for analysis (response rate = 70%). An equal number of men and women participated, with a mean age of 55 years ($SD = 10.8$; range = 20–71).

Measurements

The participants in all samples answered the Dutch version of the IES (Brom & Kleber, 1985; Horowitz et al., 1979). The Dutch IES was developed after careful translation and back-translation into Dutch. *Intrusion* (7 items) refers to the tendency to be triggered by stimuli associated with the traumatic event(s), whereas *Avoidance* reflects the tendency to avoid situations that are reminders of what happened (8 items). For every statement, the respondent answered on a 4-point scale whether this was present—with 0 (*not at all*), 1 (*rarely*), 3 (*sometimes*), or 5 (*often*)—during the past 7 days. Subscale indices were obtained by summing the item scores.

All items referred to the specific experienced event(s). For the work-related subsamples (Subsamples 1a–1f), respondents had to take the most recent incident in mind. In the war-related project, base of reference was the period of WWII and the subsequent revolution period, including

specific incidents. In the subsamples assessing the consequences of traffic accidents and the shipping disaster (Subsamples 3h and 3i), the particular accident or disaster was referred to.

In addition, in most subsamples, the validated Dutch version of the Symptom Checklist-90 (SCL-90; Derogatis, 1983; Dutch version: Arrindell & Ettema, 2003) was used to obtain an indication of subjective current mental health. Subscales assessed feelings of agoraphobia (7 items), anxiety (10 items), depression (16 items), the presence of sleeping problems (3 items), somatic complaints (12 items), insufficiency of thinking and acting (9 items), and problems in the interpersonal sphere, specified as feelings of hostility (18 items) and distrust (6 items). A total score reflects generalized psychosocial malfunctioning. This questionnaire was used in the following subsamples and sample: banks (Subsample 1c), money transport concern (Subsample 1d), EMDR study (Subsample 1f), and the study on war-related trauma (Sample 2). In the study on victims of traffic accidents (Subsample 3h), a shortened version of the SCL-90 was used. Furthermore, in the study on war-related trauma, symptoms of dissociative thought were assessed by using the Dutch translation of the Dissociation Experience Scale (DES; Bernstein & Putnam, 1986). Participants judged the accuracy of 28 statements by indicating on a line of 10 cm the proportion of time that they experienced the events described in the statements. The total score on the DES was used to assess the distinctive posttraumatic response of dissociation (Van der Kolk et al., 1996).

Analyses

Means and standard deviations were computed per item. Besides, in line with previous publications (Horowitz et al., 1979; Schwarzwald et al., 1987; Zilberg et al., 1982), frequencies of endorsement for each individual item were given. *Endorsement* was defined as an item response larger than zero. Cronbach's alphas were computed to test the internal consistency of the factors. Data were analyzed by using the Statistical Package for Social Sciences (SPSS Version 10.0).

To study the structure of the Dutch version of the IES, we specified and estimated a series of confirmatory factor models by using Amos (Version 4.01; Arbuckle & Wothke, 1999). Using Amos, raw data can be analyzed. The parameters were estimated by using maximum likelihood. To examine how closely competing models fit the data, we calculated several fit indices (Hu & Bentler, 1995, 1999). The first is the traditional chi-square fit index. In addition, two other fit indices are reported that counteract problems associated with the chi-square statistic, such as the influence of sample size. Those indices are the comparative fit index (CFI) and the RMSEA. The CFI should be greater than .95. RMSEA values less than .05 indicate good fit, and values as high as .08 represent reasonable fit (MacCallum, Brown, & Sugawara, 1996).

The first model specifies a single-factor model, one latent variable containing all 15 manifest variables (Hendrix, Jurich, & Schumm, 1994). The measurement error terms would be uncorrelated. Model 2 specifies two correlated factors with the Intrusion items (Items 1, 4, 5, 6, 10, 11, and 14) loading on the first factor (Intrusion) and the Avoidance items (Items 2, 3, 7, 8, 9, 12, 13, and 15) loading on the second factor (Avoidance). The Intrusion items would have zero loading on the Avoidance factor, and the Avoidance items would have zero loading on the Intrusion factor. The measurement error terms would be uncorrelated. A schematic representation of this two-factor model is presented in Figure 1.

Additional models were tested on the basis of the modification indices, and a model with three factors (Intrusion, Avoidance, and Emotional Numbing) was tested. These models were tested in the total sample ($N = 1,588$). Next, the best-fitting model found in the total sample was tested in the three samples. Finally, multiple group analyses were conducted to investigate whether the adequately fitting model was equivalent across the three samples.

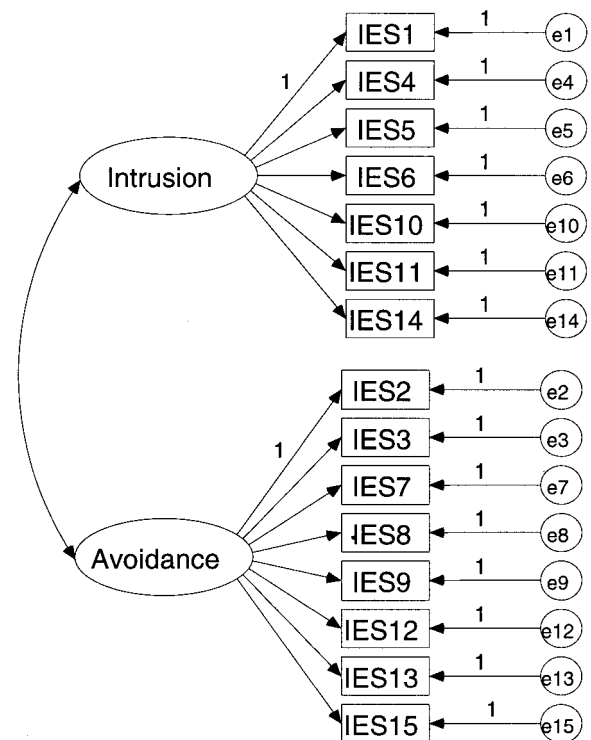


Figure 1. Hypothesized model of factorial structure of the Impact of Event Scale (IES). e1–e15 = measurement error for Items 1–15, respectively.

Results

Endorsement, Means, and Standard Deviations

Endorsement, means, and standard deviations of single items, subscales, and total score on the IES are given in Table 2. The three samples significantly differed on the Intrusion subscale, $F(2, 1585) = 5.6, p < .01$; the Avoidance subscale, $F(2, 1585) = 4.6, p < .05$; and the total score, $F(2, 1585) = 5.0, p < .01$, of the IES. Post hoc tests indicated that the scores of the sample of participants who were confronted with work-related events were significantly lower on the Intrusion subscale and on the total score of the IES than the two other samples (war and disaster). The scores on the Avoidance subscale were significantly lower in the sample of participants of work-related events compared with those of the sample of participants of war-related events.

Reliability

Cronbach's alphas were calculated for the total sample and for the three samples (see Table 3). The reliability coefficients ranged from .85 to .95 for the Intrusion subscale, from .77 to .91 for the Avoidance subscale, and from .87 to .96 for the total score. In all samples, the internal consistency of the subscales and the total of the IES was good.

CFA

CFA in the total sample. Model 1 is a model with one latent variable, a general factor containing all 15 manifest variables, and

Table 2
Endorsement, Means, and Standard Deviations of the Single Items, Subscales, and Total Score of the Impact of Event Scale (IES) in All Three Samples

IES item number or subscale	Sample 1			Sample 2			Sample 3		
	% end.	<i>M</i>	<i>SD</i>	% end.	<i>M</i>	<i>SD</i>	% end.	<i>M</i>	<i>SD</i>
1	58.5	1.8	1.9	51.3	1.7	2.0	71.9	2.3	1.9
2	37.2	1.1	1.7	29.5	1.3	1.8	40.4	1.3	1.9
3	38.0	1.3	1.9	38.0	1.4	2.0	40.9	1.4	1.9
4	33.7	1.0	1.7	34.0	1.1	1.8	42.7	1.6	2.0
5	48.5	1.4	1.7	44.6	1.4	1.8	63.2	1.7	1.7
6	26.2	0.7	1.4	35.2	1.1	1.7	29.2	0.8	1.5
7	24.4	0.8	1.6	34.1	1.2	1.9	22.8	0.7	1.5
8	19.6	0.6	1.3	22.0	0.6	1.4	38.6	1.3	1.9
9	27.0	0.8	1.5	36.2	1.2	1.9	26.3	0.8	1.6
10	53.0	1.6	1.8	54.9	1.8	1.9	67.8	2.2	1.9
11	48.0	1.4	1.7	50.8	1.7	2.0	65.5	1.9	1.8
12	33.9	1.0	1.6	41.0	1.3	1.8	37.4	1.0	1.6
13	35.6	1.1	1.8	39.0	1.3	1.9	40.9	1.2	1.8
14	41.8	1.2	1.7	45.9	1.7	2.1	52.0	1.5	1.8
15	22.2	0.6	1.7	27.9	0.9	1.6	35.1	0.8	1.4
Intrusion subscale**		9.1	10.0		10.4	11.5		12.1	9.3
Avoidance subscale*		6.4	8.6		7.9	9.8		7.6	7.5
Total score**		15.5	17.7		18.2	20.4		19.7	15.0

Note. Values in the “% end.” (% endorsement) columns represent the percentage of item responses greater than zero.

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

Model 2 is based on the two components of the original IES (Intrusion and Avoidance). These models were evaluated in the total sample (consisting of the three samples; $N = 1,588$) by using CFA. In Table 4, we report the fit indices for the confirmatory factor models. The chi-square statistic indicated that Model 2 represented a significantly better explanation of the data than did Model 1, $\Delta\chi^2(1, N = 1,588) = 769.38, p < .05$.

On the basis of modification indices, a third and a fourth model were tested. The modification indices suggested that Item 2 should be fitted on the subscale Intrusion (“I avoided letting myself get upset when I thought about it or was reminded of it”). In Model 2a, Item 2 loaded on the first factor (Intrusion); in Model 2b, this item loaded on both factors. As Table 4 shows, Models 2a and 2b appeared to be better than Model 2. The improvement of Model 2a over Model 2 could not be tested because the same number of degrees of freedom were involved. The chi-square was lower; the CFI and the RMSEA were the same. Model 2b showed a significant improvement with regard to Model 2, $\Delta\chi^2(1, N = 1,588) =$

108.46, $p < .05$. Earlier research on the structure of the IES (Brom & Kleber, 1985; Joseph et al., 1992; Schwarzwald et al., 1987) indicated that there could be a third factor, Emotional Numbing, consisting of two items (Items 8 and 15). Finally, a fifth model (Model 3) with three factors, Intrusion, Avoidance, and Emotional Numbing, was tested. The results of this analysis are presented in Table 4. Although there appeared to be a slight improvement, we decided to accept the original structure introduced by Horowitz et al. (1979) because the Emotional Numbing factor consisted of only two items.

Although the chi-square values presented in Table 4 were significant for all tested models, this should not lead to a rejection of any model, as a large sample size increases the power of the test. In other words, in large samples the chi-square tends to be significant, although the model fits the data. In these cases, inspection of the other fit indices is warranted. The other fit indices (e.g., RMSEA and CFI) suggested that Model 2 represents an adequate explanation of the data. In further analyses, we focused on the original structure of the IES (Model 2). In Table 5, we present the factor loading of the original structure of the IES in the total sample.

CFA in the three samples. The original structure of the IES was examined in the three samples separately. Table 4 represents the fit indices for the factor models in the three samples. The fit indices indicated adequate fit in Samples 1 and 2, that is, the samples with victims of work-related and war-related events. In Sample 3 (disaster-related events), Item 8 (“I felt as if it didn’t happen or it wasn’t real”) was found to be not significant. An additional CFA testing an adjusted original model (without Item 8) was conducted. In Table 5, we present the factor loadings of the original structure of the IES in the three samples.

Table 3
Cronbach’s Alphas of the Subscales and the Total Score of the Impact of Event Scale in the Total Sample and in the Three Samples

Sample	Intrusion	Avoidance	Total score
Total sample ($N = 1,588$)	.93	.90	.95
Sample 1 ($n = 581$)	.93	.89	.94
Sample 2 ($n = 836$)	.95	.91	.96
Sample 3 ($n = 171$)	.85	.77	.87

Table 4
Fit Indices for Confirmatory Factor Models of the Impact of Event Scale (IES) in the Total Sample, the Three Samples, and the Multiple Group Analyses

Sample and model	χ^2	df	RMSEA	CFI
Total sample ($N = 1,588$)				
Model 1	1,839.72*	90	.11	.90
Model 2	1,070.34*	89	.08	.94
Model 2a	1,044.87*	89	.08	.94
Model 2b	961.88*	88	.08	.95
Model 3	957.32*	87	.08	.95
Sample 1 ($n = 581$)				
Model 2	546.34*	89	.09	.92
Sample 2 ($n = 836$)				
Model 2	717.11*	89	.09	.94
Sample 3 ($n = 171$)				
Model 2	179.30*	89	.08	.90
Model 2c	147.92*	76	.07	.91
Multiple group				
Model 2a ₁	1,586.53*	295	.05	.93
Model 2a ₂	1,583.07*	294	.05	.93
Model 2a ₃	1,548.48*	294	.05	.93
Model 2a ₄	1,561.99*	293	.05	.93

Note. Model 2a: Item 2 loads on Intrusion instead of Avoidance; Model 2b: Item 2 loads on Intrusion and Avoidance; Model 2c: additional confirmatory factor analysis on IES (original model without Item 8); Model 3: three factors (Intrusion, Avoidance, and Numbing); Model 2a₁: most restrictive model; Model 2a₂: Item 8 free in Sample 3; Model 2a₃: correlation free in Sample 3; and Model 2a₄: Item 8 and correlation free in Sample 3. RMSEA = root-mean-square error of approximation; CFI = confirmatory fit index. Sample 1 = work-related trauma; Sample 2 = war-related trauma; Sample 3 = disasters.

* $p < .05$.

Multiple group analyses. To test equivalence of structure of the IES across the three samples, we carried out a multiple group analysis. According to the most restrictive model, the three samples were expected to have exact similar population covariance matrices. In addition, a less restrictive model was tested. The fit indices of the multiple group analyses are presented in Table 4. First, the most restrictive model hypothesizing similarity of factor loadings was tested; all loadings were constrained. This model revealed adequate fit. On the basis of the analyses in the separate samples, there was an indication that the structure in the sample with individuals who were confronted with a disaster (Sample 3) was different from the structure in the sample with individuals who were confronted with work-related incidents (Sample 1) or victims of war (Sample 2). Item 8 had a nonsignificant loading, and the correlation between Intrusion and Avoidance was quite different in Sample 3 (.68) compared with Sample 1 (.87) and Sample 2 (.90). In the following analyses, the parameters were constrained in Sample 1 and Sample 2, but in Sample 3 one or more parameters were free (Model 2a₂: Item 8 was free in Sample 3; Model 2a₃: The correlation between Intrusion and Avoidance was free in Sample 3; and Model 2a₄: Both parameters were free in Sample 3). These three additional models were compared with the most restrictive model (Model 2a₁). Both Models 2a₃ and 2a₄ showed a better fit—Model 2a₁ versus Model 2a₂: $\Delta\chi^2(1, N = 1,588) = 3.46, ns$; Model 2a₁ versus Model 2a₃: $\Delta\chi^2(1, N = 1,588) = 38.05, p < .05$; Model 2a₁ versus Model 2a₄: $\Delta\chi^2(1, N = 1,588) = 24.54, p < .05$. Once again, the structure in the sample with victims of a

disaster was slightly different from the structure in the samples with work-related or war-related traumatic experiences.

Convergent Validity

Convergent validity was examined by computing Pearson correlations between, on the one hand, the subscales of the IES and the total score and, on the other hand, the total score on the DES and the scores on the various subscales of the SCL-90 (see Table 6). The correlations between IES and DES were significant and moderately positive. Respondents who reported more intrusive and avoiding symptoms on the IES also reported more dissociative symptoms. The correlations between the IES subscales and the SCL-90 subscales were also significant and moderately positive. All correlations varied between .42 and .70. The subscales Anxiety and Depression as well as the SCL-90 total score showed the largest correlations with Intrusion, Avoidance, and the IES total score.

Discussion

In this study, support was found for the construct validity of the Dutch version of the IES across different samples of people stricken by violence, calamities, or war. The two-factor model of intrusion and avoidance originally formulated by Horowitz et al. (1979) was found to describe the data adequately. This finding is relevant because the IES is a popular and widely used instrument in heterogeneous groups of victims of violence, accidents, and (people-made) disasters (for reviews, see Joseph, 2000; Sundin & Horowitz, 2002; Weiss & Marmar, 1997).

The scale indicates the extent to which people are bothered by memories of a major life event and by other characteristic reac-

Table 5
Latent Variables (Factors) in the Final Model (Original Structure) and Their Manifest Items in the Total Sample and in the Three Samples

Subscale and item	Factor loading			
	Total sample ($N = 1,588$)	Sample 1 ($n = 581$)	Sample 2 ($n = 836$)	Sample 3 ($n = 171$)
Intrusion				
1	.81	.82	.85	.64
4	.80	.78	.84	.76
5	.85	.85	.88	.71
6	.76	.73	.82	.57
10	.84	.84	.86	.74
11	.78	.77	.81	.60
14	.86	.83	.89	.70
Avoidance				
2	.76	.74	.80	.67
3	.80	.80	.81	.76
7	.77	.75	.81	.51
8	.44	.50	.49	.13
9	.73	.66	.80	.48
12	.75	.74	.78	.51
13	.87	.85	.90	.84
15	.59	.60	.61	.43

Note. Sample 1 = work-related trauma; Sample 2 = war-related trauma; Sample 3 = disasters.

Table 6

Pearson Correlations Between Impact of Event Scale (IES) Subscales and Other Scales (SCL-90 and DES) in the Three Samples

Scale	Sample 1 (n = 323)			Sample 2 (n = 836)			Sample 3 (n = 137)		
	Intrusion	Avoidance	IES total	Intrusion	Avoidance	IES total	Intrusion	Avoidance	IES total
Agoraphobia ^a	.49	.52	.54	.53	.49	.54			
Anxiety	.63	.64	.68	.62	.58	.63			
Depression	.61	.67	.58	.59	.54	.59			
Somatic complaints	.54	.56	.62	.61	.57	.57			
Insufficiency	.55	.62	.56	.56	.52	.57			
Distrust	.48	.58	.54	.52	.51	.51			
Hostility	.48	.54	.61	.51	.48	.52			
Sleep disturbances	.59	.55	.57	.55	.51	.51			
General health symptoms	.63	.69	.70	.64	.60	.65	.66	.50	.66
Dissociation ^b				.44	.42	.45			

Note. All correlations were significant at $p < .001$.

^a Assessed with the Symptom Checklist-90 (SCL-90). ^b Assessed with the Dissociation Experience Scale (DES).

tions to a traumatic experience. It has been shown that the scale is able to reliably measure changes in reactions to traumatic events (Sloan, 1988). Moreover, the instrument has been successfully used in the evaluation of therapeutic treatments of trauma-related disorders, particularly PTSD (Brom et al., 1989; Resick, Jordan, Girelli, & Hutter, 1988). Correlations between IES scores and the presence of PTSD are very high (e.g., Maercker & Schützwohl, 1998). Furthermore, the IES is an attractive instrument for its solid theoretical background, in accordance with both the classical theories on the consequences of traumatic experiences (Breuer & Freud, 1895/1952; Janet, 1889/1973) and the modern cognitive approaches to the sequelae of traumatic events (Brewin, Dagleish, & Joseph, 1996; Creamer, 1995; Horowitz, 1976). The emphasis in these various theories is on the oscillation between intrusion and avoidance. As such, the IES is an operationalization of these theories.

It was found in our study that the structure in the data was adequately described by the two factors of Intrusion and Avoidance in independent groups of people who had experienced different traumatic incidents. Both factors as well as the entire scale were found to be (statistically) reliable in the comprehensive data set. This implies that the use of the IES as an instrument with regard to posttraumatic responses is warranted. It validly assesses coping tendencies after a bank robbery, the sinking of a ship, or experiences of war (see also Shevlin et al., 2000). The robustness of the structure of the scale across different groups of people stricken by violence, war, or calamities has not been demonstrated before.

Although the two-factor model satisfactorily described the data, some deviations were found. In particular, among people who had been involved in traffic accidents or in a shipping disaster, a relatively modest correlation between intrusion and avoidance as well as ambiguous factor loadings of two particular items (Items 2 and 8) were revealed. The ambiguousness of Item 2 has been repeatedly referred to (cf. Joseph, 2000). It is probably due to its long formulation and double-message content. Item 8 (and in other studies Item 15 as well) has been suggested either to be difficult to comprehend or to belong to an independent factor of passive or emotional avoidance (Emotional Numbing). However, in our large data set, there was not enough evidence for this third factor. A

model with three factors showed a marginally better fit than the model with the original structure. With regard to Item 8, we found a comparatively high mean and endorsement in the sample concerning accidents. These feelings of derealization with regard to traffic accidents and the sinking of the cruise ship appeared more prevalent in these survivors than in people struck by war or those who experienced work-related trauma. Besides, the participants in the accident samples filled out the IES 1 month after the event. This is in contrast with the respondents in the two other samples, for whom more time had passed before they answered the items. The effects of the time interval between events and responding to the IES clearly demand scientific study. The time interval may also account for the comparatively modest association between intrusion and avoidance in the sample concerning accidents. It can be argued that over time the differentiation between Intrusion and Avoidance as independent factors weakens. Some evidence supporting this hypothesis was reported by Zilberg et al. (1982).

Convergent validity was studied by examining the relationship between the IES on the one hand and self-reported mental health problems (as assessed by the SCL-90 and its subscales) and dissociation (as assessed by the DES) on the other hand. The correlations between the IES and the DES were moderate. They were found to be slightly higher than the correlations mentioned by Amdur and Liberzon (2001) in their study of combat veterans. Correlations between the IES scores and the various subscales of the SCL-90 were also moderate. As posttraumatic stress responses are closely related to anxiety (PTSD is an anxiety disorder) and depression (Kleber & Brom, 1992; Van der Kolk et al., 1996), these subscales of the SCL-90 were found to show the highest correlations with the IES. These results indicated adequate convergent validity. The IES assessed information that was related to, but not captured by, inventories assessing associated mental health symptoms (for a review, see Sundin & Horowitz, 2002).

Our study has limitations. The focus has been primarily on construct validity as indicated by the analysis of the structure by using CFA. No conclusions can be drawn with regard to the criterion validity because data were not compared with clinical interviews. From other research (Sundin & Horowitz, 2002), it is known that the IES shows a strong relation with observer-diagnosed PTSD. Another limitation concerns the fact that our

samples differed to some extent with respect to number, gender, and age of participants and to procedures followed.

Comprehensive samples, combining clinical as well as nonclinical groups, were analyzed in this study. It may be hypothesized that there are qualitative and not only quantitative differences in the responses of patients and nonpatients. Clinical respondents may have a view on health-related issues that is colored by their being ill. Items such as the questions in the IES may be perceived differently by patients as opposed to healthy respondents (Vassend & Skrondal, 1999). Although we did not specifically examine these differences in responses across the various samples, future research is recommended to address this issue.

The intensity of responses not only is determined by the severity of traumatic events but also may be influenced by the specific cultural background of the participants. The cross-cultural validity of well-known standardized questionnaires is not self-evident (see Knipscheer & Kleber, 1999). Nevertheless, the scale structure of the Dutch version of the IES was found to be comparable to the reports published earlier on versions in Bosnian, Croatian, English, or Hebrew (Dyregrov et al., 1996; Mooren & Kleber, 2001; Schwarzwald et al., 1987; Zilberg et al., 1982). The scale structure was found to be comparable to the structure of other translations of the IES.

On the basis of our findings, we recommend further use of the original two-factor structure. The implication is that comparison with international studies is possible. We came across some suggestions to modify the factor structure that could improve the model underlying the IES. These modifications were minor, however. Therefore, we recommend further use of the original two-factor model. This model also revealed adequate fit. It can be concluded that the Dutch IES is a valid instrument with a robust factor structure. Empirically, support has been provided in this study for the valid distinction between intrusion and avoidance in the aftermath of violent experiences.

References

- Amdur, R. L., & Liberzon, I. (2001). The structure of posttraumatic stress symptoms in combat veterans: A confirmatory factor analysis of the Impact of Event Scale. *Journal of Anxiety Disorders, 15*, 345–357.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Arbuckle, J. L., & Wothke, W. (1999). *Amos 4.0 user's guide*. Chicago: SmallWaters.
- Arrindell, W. A., & Ettema, J. H. M. (2003). *SCL-90—Handleiding bij een multidimensionele psychopathologie indicator* [SCL-90—Manual for a multidimensional psychopathology indicator]. Lisse, the Netherlands: Swets & Zeitlinger.
- Bernstein, E. M., & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease, 174*, 727–735.
- Bramsen, I. (1995). *The long-term psychological adjustment of World War II survivors in the Netherlands*. Delft, the Netherlands: Eburon Press.
- Breslau, N. (1998). Epidemiology of trauma and posttraumatic stress disorder. In R. Yehuda (Ed.), *Psychological trauma* (pp. 1–29). Washington, DC: American Psychiatric Press.
- Breuer, J., & Freud, S. (1952). *Studien über Hysterie* [Studies on hysteria]. London: Imago Publishing Company. (Original work published 1895)
- Brewin, C. R., Dagleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review, 103*, 667–686.
- Brom, D., & Kleber, R. J. (1985). De Schok Verwerkings Lijst [The Dutch version of the Impact of Event Scale]. *Nederlands Tijdschrift voor de Psychologie, 40*, 164–168.
- Brom, D., Kleber, R. J., & Defares, P. B. (1989). Brief psychotherapy for posttraumatic stress disorders. *Journal of Consulting and Clinical Psychology, 57*, 607–612.
- Brom, D., Kleber, R. J., & Hofman, M. C. (1993). Victims of traffic accidents: Incidence and prevention of posttraumatic stress disorder. *Journal of Clinical Psychology, 49*, 131–140.
- Brom, D., Kleber, R. J., & Witzum, E. (1991). The prevalence of post-traumatic psychopathology in the general and the clinical population. *Israel Journal of Psychiatry and Related Sciences, 28*, 53–63.
- Chemtob, C. M., Roitblat, H. L., Hamada, R. S., Carlson, J. G., & Twentyman, C. T. (1988). A cognitive action theory of posttraumatic stress disorder. *Journal of Anxiety Disorders, 2*, 253–275.
- Creamer, M. (1995). A cognitive processing formulation of posttrauma reactions. In R. J. Kleber, C. R. Figley, & B. P. R. Gersons (Eds.), *Beyond trauma: Cultural and societal dynamics* (pp. 55–74). New York: Plenum Press.
- Derogatis, L. R. (1983). *SCL-90-R: Manual II*. Towson, MD: Clinical Psychometric Research.
- Dyregrov, A., Gjestead, R., & Raundalen, M. (2002). Children exposed to warfare: A longitudinal study. *Journal of Traumatic Stress, 15*, 59–68.
- Dyregrov, A., Kuterovac, G., & Barath, A. (1996). Factor analysis of the Impact of Event Scale with children in war. *Scandinavian Journal of Psychology, 37*, 339–350.
- Eland, J., Kleber, R. J., Ten Veen, P., Van der Velden, P. G., & Steinmetz, C. H. D. (1990). *Geweldservaringen en werkomstandigheden: Een inventariserend onderzoek bij de Gemeentelijke Sociale Dienst Amsterdam rayonkantoor Noord* [Acts of violence and work circumstances: A survey of civil social service workers in Amsterdam North]. Utrecht, the Netherlands: Institute for Psychotrauma.
- Foa, E. B., Steketee, G., & Rothbaum, B. O. (1989). Behavioral–cognitive conceptualizations of posttraumatic stress disorder. *Behavior Therapy, 20*, 155–176.
- Green, B. L., Grace, M. C., Vary, M. G., Kramer, T. L., Gleser, G. C., & Leonard, A. C. (1994). Children of disaster in the second decade: A 17-year follow-up of Buffalo Creek survivors. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 71–79.
- Hendrix, C. C., Jurich, A. P., & Schumm, W. R. (1994). Validation of the Impact of Event Scale on a sample of American Vietnam veterans. *Psychological Reports, 75*, 321–322.
- Herman, J. L. (1992). *Trauma and recovery: The aftermath of violence—from domestic abuse to political terror*. New York: Basic Books.
- Horowitz, M. J. (1976). *Stress response syndromes* (1st ed.). New York: Jason Aronson.
- Horowitz, M. J., Wilner, N., & Alvarez, W. (1979). The Impact of Event Scale: A measure of subjective stress. *Psychosomatic Medicine, 41*, 209–218.
- Hu, L., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 76–99). London: Sage.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.
- Janet, P. (1973). *L'automatisme psychologique* [Psychological automatism]. Paris: Société Pierre Janet. (Original work published 1889)
- Janoff-Bulman, R. (1985). The aftermath of victimization: Rebuilding shattered assumptions. In C. R. Figley (Ed.), *Trauma and its wake* (Vol. 1, pp. 15–35). New York: Brunner/Mazel.
- Joseph, S. (2000). Psychometric evaluation of Horowitz's Impact of Event Scale: A review. *Journal of Traumatic Stress, 13*, 101–113.
- Joseph, S. A., Williams, R., Yule, W., & Walker, A. (1992). Factor analysis

- of the Impact of Events Scale with survivors of two disasters at sea. *Personality and Individual Differences*, 13, 693–697.
- Kardiner, A. (1941). *The traumatic neuroses of war*. New York: Paul Hoeber.
- Kleber, R. J., & Brom, D. (1992). *Coping with trauma: Theory, prevention and treatment*. Lisse, Netherlands: Swets & Zeitlinger.
- Kleber, R. J., Figley, C. R., & Gersons, B. P. R. (Eds.). (1995). *Beyond trauma: Cultural and societal dynamics*. New York: Plenum Press.
- Knipscheer, J. W., & Kleber, R. J. (1999). Conceptual and methodological issues in mental health research with migrants in the Netherlands. *Gedrag & Gezondheid*, 27, 67–75.
- Larsson, G. (2000). Dimensional analysis of the Impact of Event Scale using structural equation modeling. *Journal of Traumatic Stress*, 13, 193–204.
- Lundin, T., & Bodegard, M. (1993). The psychological impact of an earthquake on rescue workers: A follow-up study of the Swedish group of rescue workers in Armenia, 1988. *Journal of Traumatic Stress*, 6, 129–139.
- MacCallum, R. C., Brown, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, 1, 130–149.
- Maercker, A., & Schützwohl, M. (1998). Erfassung von psychischen Belastungsfolgen: Die Impact of Event Skala—revidierte Version (IES-R) [Assessment of posttraumatic stress reactions: The Impact of Event Scale—Revised (IES-R)]. *Diagnostica*, 44, 130–141.
- Malt, U. F., Hoivik, B., & Blikra, G. (1993). Psychological consequences of road accidents. *European Psychiatry*, 8, 227–228.
- Mooren, G. T. M., & Kleber, R. J. (1996). *Gezondheid en herinneringen aan de oorlogsjaren van Indische jeugdige oorlogsgetroffenen* [Health and war memories among child survivors from the former Dutch Indies]. Utrecht, the Netherlands: Universiteit Utrecht.
- Mooren, G. T. M., & Kleber, R. J. (2001). The impact of war in Bosnia and Herzegovina: Devastated trust. *International Journal of Mental Health*, 30, 6–22.
- Resick, P. A., Jordan, C. G., Girelli, S. A., & Hutter, C. K. (1988). A comparative outcome study of behavioral group therapy for sexual assault victims. *Behavior Therapy*, 19, 385–401.
- Schnyder, U., Moergeli, H., Klaghofer, R., & Buddeberg, C. (2001). Incidence and prediction of posttraumatic stress disorder symptoms in several injured accident victims. *American Journal of Psychiatry*, 158, 594–599.
- Schwarzwald, J., Solomon, Z., Weisenberg, M., & Mikulincer, M. (1987). Validation of the Impact of Event Scale for psychological sequelae of combat. *Journal of Consulting and Clinical Psychology*, 55, 251–256.
- Shalev, A. Y., & Yehuda, R. (1998). Longitudinal development of traumatic stress disorders. In R. Yehuda (Ed.), *Psychological trauma* (pp. 31–66). Washington, DC: American Psychiatric Association.
- Shevlin, M., Hunt, N., & Robbins, I. (2000). A confirmatory factor analysis of the Impact of Event Scale using a sample of World War II and Korean War veterans. *Psychological Assessment*, 12, 414–417.
- Sloan, P. (1988). Posttraumatic stress survivors of an airplane crash-landing: A clinical and exploratory research intervention. *Journal of Traumatic Stress*, 1, 211–229.
- Sundin, E. C., & Horowitz, M. J. (2002). Impact of Event Scale: Psychometric properties. *British Journal of Psychiatry*, 180, 205–209.
- Van der Kolk, B. A., McFarlane, A. C., & Weisaeth, L. (1996). (Eds.). *Traumatic stress: The effects of overwhelming experience on mind, body, and society*. New York: Guilford Press.
- Van der Velden, P. G. (1996). *Inventarisatie onveilige situaties in supermarkten* [An inventory of unsafe situations in department stores]. Utrecht, the Netherlands: Institute for Psychotrauma.
- Van der Velden, P. G., Eland, J., Ten Veen, P., & Kleber, R. J. (1991). *Psychische gevolgen van overvallen en werkbelasting bij een geldtransportbedrijf* [Psychological effects of robberies and work overload at a money transport company]. Utrecht, the Netherlands: Institute for Psychotrauma.
- Van der Velden, P. G., & Kleber, R. J. (1995). *Stressvolle gebeurtenissen in de luchtveiligheidsbewaking: Incidentie, gevolgen en crisis opvang* [Stressful events in air traffic control: Incidence, impact and crisis counseling]. Utrecht, the Netherlands: Institute for Psychotrauma.
- Van der Velden, P. G., & Kleber, R. J. (1997). Een traumatische vakantie: Een onderzoek naar slachtoffers van een scheepsramp [A traumatic holiday: A study among victims of a shipping disaster]. *Gedrag & Gezondheid*, 25, 176–189.
- Van der Velden, P. G., & Kleber, R. J. (2002). *Het gebruik van de EMDR-techniek bij de psychotherapeutisch behandeling van werkgerelateerde traumaproblematiek: Een vergelijkende studie* [The use of EMDR in the psychotherapeutic treatment of work-related trauma disturbances: A comparative study]. Zaltbommel, the Netherlands: Institute for Psychotrauma.
- Van der Velden, P. G., Van der Burg, S., Steinmetz, C. H. D., & Van den Bout, J. (1992). *Slachtoffers van bankovervallen* [Victims of bank robberies]. Houten, the Netherlands: Bohn Stafleu Van Loghum.
- Vassend, O., & Skrandal, A. (1999). The problem of structural indeterminacy in multidimensional symptom report instruments: The case of SCL-90-R. *Behaviour Research and Therapy*, 37, 685–701.
- Weiss, D. S., & Marmar, C. R. (1997). The Impact of Event Scale—Revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399–411). New York: Guilford Press.
- Yehuda, R., & McFarlane, A. C. (1995). Conflict between current knowledge about posttraumatic stress disorder and its original conceptual basis. *American Journal of Psychiatry*, 152, 1705–1713.
- Zilberg, N. J., Weiss, D. S., & Horowitz, M. J. (1982). Impact of Event Scale: A cross-validation study and some empirical evidence supporting a conceptual model of stress response syndromes. *Journal of Consulting and Clinical Psychology*, 50, 407–414.

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