

Impact of Event Scale: psychometric properties

EVA C. SUNDIN and MARDI J. HOROWITZ

Background For more than 20 years, the Impact of Event Scale (IES) has been widely used as a measure of stress reactions after traumatic events.

Aims To review studies that evaluated the IES's psychometric properties.

Method Literature review.

Results The results indicated that the IES's two-factor structure is stable over different types of events, that it can discriminate between stress reactions at different times after the event, and that it has convergent validity with observer-diagnosed post-traumatic stress disorder. The use of IES in many psychopharmacological trials and outcome studies is supportive of the measure's clinical relevance.

Conclusions The IES is a useful measure of stress reactions after a range of traumatic events, and it is valuable for detecting individuals who require treatment.

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Horowitz' Impact of Event Scale (IES; Horowitz *et al*, 1979) was created for the study of bereaved individuals, but soon it was used for exploring the psychological impact of a variety of traumas. It was constructed before the diagnosis of post-traumatic stress disorder (PTSD) was entered into the DSM-III (American Psychiatric Association, 1980), and although many measures of PTSD symptoms have emerged (Wilson & Keane, 1997), the IES remains widely used. It may be argued that the IES is obsolete, since it does not measure the hyperarousal symptoms of the PTSD diagnosis in DSM-IV (American Psychiatric Association, 1994). Typically, this type of question is examined through evaluating the instrument's psychometric properties. This study aims to assess the psychometric properties of the IES on the basis of a comprehensive list of studies.

METHOD

Selection of studies

Studies that examined the IES' psychometric properties were selected from the accumulation of articles assembled in a meta-analytical study to be reported elsewhere (further details available from the author upon request). In addition, 43 studies were found in a direct library search. In all, 66 studies that analysed the IES' reliability and validity were located, and findings from 40 of these studies were selected on the basis of psychometric soundness and clinical relevance and reviewed for this study. Results from the statistical analyses from 23 of these studies are presented, as a potentially useful comparison resource in future studies of stress reactions related to traumatic events.

Following the American Psychological Association's *Standards for Educational and Psychological Tests* (1985), reliability will be presented in terms of internal consistency and stability. In reviewing the IES'

validity we discuss: theoretical formulation; content validity; construct validity; and external validity. When multiple comparisons are made, the likelihood of error-rate inflation is significant, and therefore the minimum interpretable alpha for any computed analysis is set at 0.01.

RESULTS

Reliability

Internal consistency

Table 1 presents 18 estimates of the internal consistency of the IES intrusion and avoidance for different populations.

For IES intrusion, mean $\alpha=0.86$ (range 0.72–0.92), for IES avoidance mean $\alpha=0.82$ (range 0.65–0.90). Using the 0.80 criterion set by Carmines & Zeller (1979), both IES sub-scales are consistent, which indicates that each of them measures a homogeneous construct.

Stability

In the original report on the IES (Horowitz *et al*, 1979), adequate test-retest reliabilities were reported for the two sub-scales (0.87 and 0.79); time between measurements was 1 week. Test-retest estimates were also presented by Solomon & Mikulincer (1988), who found test-retest reliabilities of 0.56 and 0.74 respectively; time between measurements was 1 year. Weiss & Marmar (1997) reported test-retest reliabilities for IES sub-scales based on two different samples. For the first sample, the average time since event was 3.1 years and time between measurements was 6 months. The second sample completed the IES 6 weeks after the event and follow-up was 6 months later. Test-retest reliability for the first sample was 0.57 for IES intrusion and 0.51 for IES avoidance; for the second sample, reliabilities were 0.94 and 0.89.

These estimates of test-retest reliability show that the shorter time interval (<0.6 weeks) between measurements in Horowitz *et al* (1979) and the second sample in Weiss & Marmar (1997) contributed to higher estimates of stability compared with the estimates obtained when a longer time interval was used (>1 year).

Validity

Theoretical formulation

The IES is based on clinical studies of psychological response to stressful events, and

Table 1 Internal consistencies measured with Cronbach's alpha (Cronbach & Meehl, 1955) for the Impact of Event Scale (Horowitz *et al.*, 1979): intrusion and avoidance sub-scales

Study author	Type of event	n	Sub-scale used in correlation	
			Intrusion	Avoidance
Zilberg <i>et al.</i> , 1982	Death of a parent, measurement 1	72 (21 female)	0.86	0.86
	Death of a parent, measurement 2	66	0.89	0.90
	Death of a parent, measurement 2	51 female	0.89	0.89
Unpublished data ⁵	Earthquake: residents	83 (75 female)	0.72	0.65
Weiss & Marmar, 1997	Earthquake: rescue workers, residents, measurement 1	429	0.87 ¹	0.85
	Earthquake: rescue workers, residents, measurement 2	175	0.87 ¹	0.86
	Earthquake: workers, insurance company, measurement 1	197	0.91 ¹	0.84
	Earthquake: workers, insurance company, measurement 2	175	0.92 ¹	0.85
Bowler <i>et al.</i> , 1996	Exposure to sulphuric acid spill	103 female	0.86	0.86
Classen <i>et al.</i> , 1998	Threat of violence	36 (24 female)	0.89	0.88
Kopel & Friedman, 1997	Threat of violence	50 male	0.79	0.69
Maercker & Schützwohl, 1997	Violent acts, political imprisonment	182 (42 female)	0.91 ¹	0.80
Robbins & Hunt, 1996	Combat exposure	281 male	0.86	0.73
Schwarzwald <i>et al.</i> , 1987	Combat exposure	400 male	0.92	0.82 ²
Tunis <i>et al.</i> , 1994	Crack cocaine users	57 male	0.79 ³	0.72 ³
Brom & Witztum, 1992	Psychiatric illness	76 (39 female)	0.89	0.85 ⁴
Horowitz <i>et al.</i> , 1979	Bereavement, violence, accidents, illness	60 (50 female)	0.79	0.82
Briere & Elliott, 1998	Upsetting events	498 (55% female)	0.90	0.90

1. An intrusion scale with 7 items is used: 6 items from the original intrusion scale plus one new item.

2. An avoidance scale with 7 of the 8 items from the original avoidance sub-scale is used.

3. All intrusion and avoidance items are slightly modified.

4. An intrusion scale with 9 items and an avoidance scale with 5 items are used; 2 of the original avoidance items are included in the intrusion scale.

5. Further details available from the author upon request.

on Horowitz' (1976) theory about stress response syndrome, which offers an understanding of how people proceed through trauma. The clinical studies revealed two common responses to stress: intrusion and avoidance. Intrusion involved 'unbidden thoughts and images, troubled dreams, strong pangs or waves of feelings, and repetitive behavior' and avoidance involved 'ideational constriction, denial of meanings and consequences of the event, blunted sensation, behavioral inhibition or counterphobic activity, and awareness of emotional numbness' (Horowitz *et al.*, 1979). According to Horowitz (1976), intrusions and avoidances tend to oscillate during the same time period. Avoidant behaviour often results from the operation of unconscious control processes, and function to restore emotional equilibrium, prevent emotional flooding and reduce conceptual disorganisation. These defensive efforts are disrupted by intrusive experiences. Such dreaded states sharply contrast with a desired state of equilibrium. To restore stability, people react with heightened

defensive control. Since individuals are not expected to report unconscious aspects of the control processes, the term avoidance was used instead of denial.

Content validity

We found 12 studies that examined the validity of IES' two-factor structure based on data collected after various events. In three out of 10 studies that successfully reproduced the intrusion and avoidance factors, a third factor was obtained, and this factor was labeled 'emotional numbing' (Joseph *et al.*, 1994; Foa *et al.*, 1995; McDonald, 1997). Results from two more studies suggested an underlying structure with one factor only (Hendrix *et al.*, 1994; Weiss & Marmar, 1997).

In the initial report on the IES (Horowitz *et al.*, 1979), the correlation between IES intrusion and avoidance was 0.41. This correlation between IES intrusion and avoidance along with results from 11 more studies are shown in Table 2. Mean correlation was 0.63, which suggested that

the sub-scales were relatively independent of one another, each of them representing a different type of reaction in the face of stressful events.

Construct validity

The moderate correlation between intrusion and avoidance obtained in a number of studies that used the IES (see Table 2) is consistent with Horowitz' (1976) prediction that people tend to present an oscillating pattern wherein intrusive symptoms are followed by avoidance. Horowitz (1976) also postulated that intrusive and avoidant symptoms will become less frequent over time as the implications of the stressor event are digested. Several studies reported results that are consistent with this assumption (e.g. Sloan *et al.*, 1994; Kelly *et al.*, 1995).

According to Horowitz (1976), strong avoidance of painful thoughts may reduce dreaded states; however, it may also prevent adaptation to traumatic experiences. This assumption was supported by several

Table 2 Correlations between the Impact of Event Scale (Horowitz *et al*, 1979) intrusion and avoidance sub-scales

Study author	Type of event	<i>n</i>	Correlation
Zilberg <i>et al</i> , 1982	Death of a parent, treatment group, measurement 1	35 (33 female)	0.15
	Death of a parent, treatment group, measurement 2	33	0.57**
	Death of a parent, treatment group, measurement 3	22	0.78**
	Death of a parent, comparison group, measurement 1	37 (19 female)	0.70**
	Death of a parent, comparison group, measurement 2	30	0.69**
	Death of a parent, comparison group, measurement 3	29	0.62**
Weiss & Marmar, 1997	Earthquake: citizens, measurement 1	197	0.74**
Buelow & Koeppel, 1995	Alcohol-induced blackout	196 (126 female)	0.75**
Croyle <i>et al</i> , 1997	Breast cancer gene mutation test	60 female	0.68**
Hodkinson & Joseph, 1995	Bank staff experiencing an armed bank raid	147 female	0.63***
Maercker & Schützwohl, 1997	Exposure to violent acts, political imprisonment	182 (42 female)	0.61**
Neal <i>et al</i> , 1994	War imprisonment	30 male	0.49**
Solomon & Mikulincer, 1988	Combat exposure	716 male	0.58**
Robbins & Hunt, 1996	Combat exposure	281 male	0.64**
Tunis <i>et al</i> , 1994	Thoughts about cocaine in crack users	57 male	0.44***
Spurrell & McFarlane, 1995	Psychiatric illness	48 (34 female)	0.77**
Horowitz <i>et al</i> , 1979	Bereavement, violence, accidents, illness	66 (50 female)	0.42**

P* < 0.01; *P* < 0.001.**Table 3** Correlations between the Impact of Event Scale (Horowitz *et al*, 1979) intrusion and avoidance sub-scales and other measures

Study authors	Variable and measure	Sub-scale used in correlation	
		Intrusion	Avoidance
Arata <i>et al</i> , 1991	PTSD symptoms (SCL-90)	0.46***	0.31***
Davidson & Baum, 1986	Anxiety (SCL-90)	0.54**	0.32**
Kelly <i>et al</i> , 1995	Anxiety (GHQ)	0.43**	0.37**
Spurrell & McFarlane, 1995	Anxiety (GHQ)	0.53**	0.37*
	Depression (GHQ)	0.44**	0.52**
Davidson & Baum, 1986	Depression (SCL-90)	0.48**	0.33**
Tunis <i>et al</i> , 1994	General mood disturbance (PMS)	0.35*	n.s.
Davidson & Baum, 1986	Global symptom level (SCL-90)	0.53**	0.33**
Neal <i>et al</i> , 1994	Global symptom level (SCL-90)	0.75***	0.71***
Kelly <i>et al</i> , 1995	Social dysfunction (GHQ)	0.30**	0.23*
Spurrell & McFarlane, 1995	Social dysfunction (GHQ)	0.44**	0.47**
Davidson & Baum, 1986	Somatic symptoms (SCL-90)	0.52**	0.27**
Kelly <i>et al</i> , 1995	Somatic symptoms (GHQ)	n.s.	0.30*
Spurrell & McFarlane, 1995	Somatic symptoms (GHQ)	0.48**	0.38**
Hodkinson & Joseph, 1995	Global symptom level (GHQ)	0.60***	0.44***
Classen <i>et al</i> , 1998	Dissociation (SASRQ)	0.58**	0.61**
	Avoidance (SASRQ)	0.52**	0.49**
	Hyperarousal (SASRQ)	0.53**	n.s.
	Re-experiencing (SASRQ)	0.73***	0.49**
Davidson & Baum, 1986	Norepinephrine	0.32**	0.22**
	Cortisol	0.40**	0.27**
	Epinephrine	0.21*	n.s.
	Heart rate	0.19*	0.20*
Buelow & Koeppel, 1995	Alcohol dependence (BMAST)	0.33***	0.32***
Tunis <i>et al</i> , 1994	Craving for cocaine	0.62**	0.31*

SCL-90, Symptom Checklist-90; GHQ, General Health Questionnaire; PMS, Profile of Mood States; SASRQ, Stanford Acute Stress Reaction Questionnaire; BMAST, Brief Michigan Alcoholism Screen Test.

P* < 0.05; *P* < 0.01; ****P* < 0.001.

researchers, for example McFarlane (1988) found that individuals who developed PTSD at 8 months after trauma had reported more avoidance on the IES at 4 months after the event as compared with those without PTSD.

Convergent validity

Table 3 presents studies that assessed the convergent validity of the IES, grouped according to the variable assessed in the study, for example, anxiety, depression, and general symptoms. In Table 4, correlations between the IES sub-scales and PTSD as diagnosed with six different instruments are presented. The correlations indicated that these relationships were moderate, indicating that IES intrusion and avoidance contribute information that is not captured with other symptom inventories and measures of PTSD.

Clinical validity

The review of studies that examined the reliability and/or validity of the IES suggested that the IES is a psychometrically sound measure, and thus it is appropriate to explore the measure's clinical validity: is the information obtained with the IES relevant to clinical practice? For instance, can self-rated symptom severity serve a screening purpose, and enhance decision-making about treatment options? Several studies showed that the IES discriminates between people with severe and mild stress

Table 4 Correlations between the Impact of Event Scale (Horowitz *et al.*, 1979) intrusion and avoidance sub-scales and post-traumatic stress disorder (PTSD) diagnosis

Study authors	PTSD diagnosis	Intrusion	Avoidance
McFall <i>et al.</i> , 1990	Structured Clinical Interview for DSM–III–Revised	0.49***	0.32**
	Mississippi Scale for Combat-Related PTSD	0.56**	0.29**
Neal <i>et al.</i> , 1994	Structured Clinical Interview (CAPS–I)	0.75***	0.79***
	Intensity Score, CAPS–I	0.77***	0.80***
	PTSD–Minnesota Multiphasic Personality Inventory	0.76***	0.73***
Solomon & Mikulincer, 1988	PTSD Inventory	0.79**	0.60**

** $P < 0.01$; *** $P < 0.001$.

CAPS–I, Clinician-Administered Post-Traumatic Stress Disorder scale.

reactions. For example, a study of psychological responses to testing for the breast cancer gene *BRCA1* reported that gene carriers manifested higher levels of intrusion and avoidance than non-carriers (Croyle *et al.*, 1997). Women who considered genetic testing reported significantly higher breast-cancer-specific distress but similar levels of general psychological morbidity when compared with a group of matched controls (Lloyd *et al.*, 1996). Studies of other groups, such as bereaved individuals (e.g. Horowitz *et al.*, 1984) and war veterans (e.g. Solomon & Kleinhaus, 1996), have showed that the IES can aid the clinician in identifying individuals who need treatment.

Furthermore, the IES has been used in many psychopharmacological trials (e.g. Frank *et al.*, 1988; Davidson *et al.*, 1993; Brady *et al.*, 1995; Rothbaum *et al.*, 1996), and outcome studies (Horowitz *et al.*, 1984; Tunis *et al.*, 1994; Chemtob *et al.*, 1997; Grisaru *et al.*, 1998), which yield additional evidence of the measure's clinical relevance.

DISCUSSION

We have summarised studies of the psychometric properties of the IES. A crucial issue is whether the two types of stress reactions measured by the two subscales actually are relatively independent from each other.

IES two-factor structure

Twelve studies examined the IES' dimensionality and 10 of these replicated the intrusion and avoidance scales despite considerable differences between the samples and elapsed time since the event. Three of these studies reported that the avoidant factor was split in two: one avoidant and a second, labelled 'emotional numbing'. Foa

et al. (1995) maintained that this finding contributes to the understanding of trauma victims' coping strategies: when dreaded states involving intrusive experiences cannot be warded off with avoidant behaviour, emotion is stifled (i.e. emotional numbing). Two more studies that examined the factorial structure of the IES obtained one meaningful factor only. The authors of one of these studies, Hendrix *et al.*, 1994, interpreted the result to mean that over time, the distinction between intrusion and avoidance blurs, and the two merge into one over-all pattern of stress reactions or general level of distress. This general distress appears to contain both intrusive and avoidant symptoms as measured with the IES.

Stability of IES intrusion and avoidance

Both studies that used the original IES and the ones that used slightly altered sub-scales reported internal consistencies of a similar magnitude; all of them indicated that intrusion and avoidance sub-scales have good reliabilities and thus each sub-scale measures a relatively homogeneous construct. The fact that the correlation between the two sub-scales when averaged over 11 studies was moderate (0.63) suggested that intrusion and avoidance are separable constructs. The original intrusion and avoidance sub-scales shared approximately the same amount of variance as obtained when slightly altered scales were used, which indicates the stability of the IES.

IES – a measure of PTSD?

It has been suggested that the IES is a valid measure of post-traumatic stress symptoms

but should not be used as a measure of PTSD. One reason is that the IES does not measure the hyperarousal symptoms included in the criteria for the diagnosis in the most recent version of the DSM.

The results summarised here add to the support of IES' reliability and validity. Particularly, the high correlation between IES intrusion and avoidance and PTSD diagnosis obtained in a number of studies validates the usage of the subject-rated IES as a screening measure for PTSD. Since the IES is a short self-report measure, it provides a low-cost measure to detect PTSD (Rothbaum *et al.*, 1992). Moreover, a number of the studies summarised here reported that the IES is well suited to assessing outcome from various types of treatment, and its sensitivity for drug-placebo differences has been confirmed.

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CLINICAL IMPLICATIONS

■ A review of many studies that use the Impact of Event Scale (IES) showed that the measure is a reliable index of degree of subjective distress from a particular trauma, and can be used to compare one group of trauma victims with another, or hence one trauma or one type of victim with another.

■ The review showed that the IES can be used as a repeated measure to track a trajectory of degree of subjective distress over time in a person or a group of people.

■ The IES sub-scales were found to be useful for examination of variations in constellations of intrusion and avoidance symptoms over time in different people, including those with PTSD.

LIMITATIONS

■ Limitations due to the self-report nature of the measure, which means that subjects may be influenced by a bias for reporting more or less distress, were not examined.

■ The relationship between the avoidance component of the measure and unconscious denials was not explored.

■ The relationship between the original IES and an eight-item version of the IES for children was not examined and so a potential difference between the two remained unknown.

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