Self-report screening instruments for post-traumatic stress disorder (PTSD) in survivors of traumatic experiences (Protocol)

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TABLE OF CONTENTS

[Diagnostic Test Accuracy Protocol]

Self-report screening instruments for post-traumatic stress disorder (PTSD) in survivors of traumatic experiences

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ABSTRACT

This is the protocol for a review and there is no abstract. The objectives are as follows:

To assess and compare the diagnostic accuracy of different PTSD self-report instruments.

BACKGROUND

Target condition being diagnosed

After a traumatic event, some survivors will develop a psychiatric disorder such as post-traumatic stress disorder (PTSD). PTSD is characterised by symptoms of re-experiencing of the traumatic event, avoidance of thoughts and behaviours related to the traumatic event, emotional numbing and hyperarousal. In the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV),* acute PTSD is diagnosed if symptoms are present for at least one month, and chronic PTSD is diagnosed if symptoms persist for three months or longer. In addition, the disturbance should cause clinically significant distress or functional impairment (American Psychiatric Association 1994). PTSD is associated with substantial health care and economic costs (Walker 2003; Chan 2009).

The risk of development of PTSD after trauma ranges from about 6% in accident victims to 21% in assault victims (Kessler 1995). Although incidence rates vary between populations and samples studied, longitudinal studies (e.g. O'Donnell 2003) and epidemiological surveys (e.g. Breslau 2009) generally show patterns of decreased prevalence during the first year after trauma. However, some trauma survivors do not show a decrease during the first year, and a minority experience delayed onset of PTSD, meaning that at least six months has passed between the trauma and the onset of symptoms (American Psychiatric Association 1994, p. 465).

The presence of PTSD is usually established with a comprehensive diagnostic interview such as the Clinician-Administered PTSD Scale (CAPS; Blake 1995), the Structured Clinical Interview for

DSM-IV Axis I Diagnosis-Patient Edition; First 1996), the Structured Interview for PTSD (SI-PTSD; Davidson 1997) and the M.I.N.I. Neuropsychiatric Interview (Sheehan 1998), or with a full assessment of PTSD symptoms by a clinician. Interviews consist of semi-structured questions based on symptoms in *DSM-IV* or the tenth revision of the *International Classification of Diseases (ICD-10)*; these assessment tools have multiple response categories and are administered face-to-face by mental health care professionals such as psychologists, psychiatrists or trained nurses. Although the administration time of these interviews varies (e.g. about 15 minutes for the PTSD module of the SCID I/P and up to 25 to 45 minutes for the CAPS), in general they are relatively time-consuming.

Efforts to prevent PTSD using brief single-session or multiple-session interventions for all victims involved in the traumatic event have been unsuccessful (see Rose 2009 and Roberts 2009 for reviews). A more beneficial prevention strategy may be to select trauma survivors with a probable clinical diagnosis of acute PTSD using a self-report instrument for further diagnostic procedures, after which they may receive treatment. A recent Cochrane review showed that trauma-focused cognitive behavioural therapy (TFCBT) is effective in the treatment of acute PTSD (Roberts 2010).

Randomised clinical trial evidence suggests that chronic PTSD can be effectively treated with psychological treatments such as TFCBT or eye movement desensitization and reprocessing (EMDR; see Bisson 2007; Bisson 2007a, Powers 2010 for reviews). Pharmacological treatments such as selective serotonin reuptake inhibitors (SSRIs) may also be effective (Stein 2009), but some clinical guidelines and consensus statements (e.g. National 2005, Institute of Medicine 2008) recommend them as a second line of treatment after TFCBT.

Index test(s)

To facilitate more rapid identification of trauma survivors with a probable diagnosis of PTSD than is possible with semi-structured interviews, self-report instruments have been developed. Examples of such instruments are the Impact of Event Scale (IES; Horowitz 1979), the PTSD Checklist- Civilian Version (PCL-C; Weathers 1993), the Posttraumatic Stress Symptom Scale- Self-Report Version (PSS-SR; Foa 1993), the Davidson Trauma Scale (Davidson 1997a) and the Trauma Screening Questionnaire (TSQ; Brewin 2002). Although most of these instruments consist of items based on the 17 PTSD symptoms outlined in *DSM-IV,* shorter and longer questionnaires have been developed. Most instruments provide sum scores for each symptom cluster (re-experiencing, avoidance and hyperarousal) and a total PTSD sum score. Usually, the scores of these self-report instruments are interpreted without additional information, such as details of functional impairment or personal suffering or background characteristics.

In practice, PTSD self-report instruments are administered in specialised care as well as in public health settings. For example, they are administered by psychologists and psychiatrists in treatment settings but also by other professionals or non-professionals involved in the care of individuals exposed to a traumatic event, such as nurses, social workers or management staff in professions at high risk of experiencing traumatic events. In addition, they can be completed at home and returned by mail or administered through the Internet (e.g. Read 2009). In addition to the fact that they save time, an advantage offered by these instruments is that their administration does not require the involvement of trained clinicians. However, self-report instruments may also offer disadvantages in comparison with interviews. Items may not always be understood, or they may be understood differently by different patient groups. For instance, the PTSD *DSM-IV* C3 criterion "inability to recall an important aspect of the trauma" may be endorsed by many accidental injury victims as the result of unconsciousness during the event. A recent study in soldiers deployed to Afghanistan found that scores obtained with the PSS-SR overestimated true PTSD rates by a factor of about 3.5 (Engelhard 2007a), possibly because symptoms may have been endorsed that stem not from a traumatic event (according to the *DSM-IV* definition) but rather from another type of stressful experience (e.g. a divorce, a discharge), or symptoms may have been endorsed that were already present before the traumatic event, such as hyperarousal symptoms. In addition, several PTSD symptoms overlap with symptoms of other anxiety disorders or affective disorders, and this may result in inflated scores on self-report measures (Engelhard 2007). Finally, translation versions may not perform as well as original language instruments because of cultural differences or translation problems.

Clinical pathway

In general, PTSD self-report instruments may be used for two purposes. First, they may be useful as a triage test. Rather than undertaking a clinical interview with all individuals, the self-report instrument is administered first as a selection tool. Only those individuals who achieve a score above a threshold go on to the interview to obtain a diagnosis. If the self-report instrument is sufficiently accurate (sensitive), such a strategy saves resources and costs (Bossuyt 2006). For example, triage may be carried out in the aftermath of mass trauma. In fact, after the 2005 London bombings, survivors were sent a two-page brief questionnaire, which included the TSQ (Brewin 2010). Individuals who screened positive were invited for a more detailed assessment that included the SCID I/P. Other target groups for triage with PTSD self-report instruments may include injured trauma patients in general hospitals (e.g. O'Donnell 2008), victims applying for assistance at victim support agencies (e.g. Dekkers 2009), victims reporting a crime to the police (e.g. Wohlfarth 2003), soldiers returning from deployment in war zones (e.g. Bliese 2008), primary care patients

(e.g. Ouimette 2008) and members of the general population (e.g. Terhakopian 2008).

Second, self-report instruments may replace the structured interview. Although, by definition, an index test (the self-report instrument) cannot perform better than the reference standard (the structured interview), replacement of the time-consuming interview with a much simpler self-report instrument with satisfactory accuracy may be worthwhile. For example, this approach may be useful for monitoring treatment outcomes in mental health care settings, or for research purposes.

Rationale

As has been discussed, a considerable risk for development of PTSD has been noted in trauma-exposed individuals. Several strategies have been proposed for prevention or early treatment of PTSD. It is important to note that brief early psychological interventions for all, such as debriefing, have proved ineffective and in some cases even harmful (Rose 2009), whereas early treatment of PTSD patients using TFCBT has been shown to be an efficacious alternative (see Roberts 2009). Accurate self-report instruments would facilitate the identification of individuals with PTSD before they are referred for treatment.

In recent years, the number of studies evaluating the sensitivity and specificity of early screening questionnaires in identifying trauma survivors with early symptoms of PTSD has grown rapidly. 'Sensitivity' refers to the percentage of individuals with a diagnosis of PTSD who were correctly identified as such with use of the self-report instrument, whereas 'specificity' refers to the percentage of individuals without PTSD who were correctly identified as such with use of the instrument. The purpose for which the test is used determines whether sensitivity or specificity is considered more important. For instance, when a PTSD self-report instrument is to be used as a triage test, it should be very sensitive so that as many true cases as possible can be detected and referred for a more in-depth clinical interview. On the other hand, if a PTSD self-report instrument is used to replace a diagnostic interview, a more balanced trade-off between sensitivity and specificity is required.

The diagnostic accuracy of PTSD self-report instruments has been described in reviews by Brewin 2005 and Connor 2006. Brewin 2005 reviewed 13 separate instruments and found that the sensitivities of these instruments ranged between .60 and 1.00 and specificities between .60 and .99. However, until now, no meta-analysis on the diagnostic accuracy of self-report instruments has been carried out. Therefore, it is not clear whether some instruments are more accurate than others, or whether accuracy of screening instruments varies between groups of trauma-exposed individuals.

It is possible that the accuracy of PTSD self-report instruments depends on the type of trauma to which individuals were exposed. Some instruments may better tap into post-traumatic stress reactions after accidental injury, whereas others may be phrased to better reflect combat stress reactions. In addition, the accuracy of self-report instruments may depend on the time between assessment and the traumatic incident. In the first months after trauma, it may be more difficult to distinguish PTSD symptoms from transient stress reactions.

We will carry out a systematic review of studies evaluating the diagnostic accuracy of PTSD self-report instruments (the index test) in relation to the reference standard, which is a clinical *DSM* or *ICD* diagnosis of PTSD made with a structured interview. We will include studies of victims of all types of traumatic events, including assault, road traffic accidents and disasters. We will focus on the accuracy of self-report instruments in diagnosing PTSD rather than predicting PTSD. *DSM-IV* states that symptoms should be present for at least one month before PTSD may be diagnosed; therefore we will include studies in which the self-report instrument(s) and the interview were administered at least one month after the trauma and simultaneously (i.e., within a maximum period of seven days).

OBJECTIVES

To assess and compare the diagnostic accuracy of different PTSD self-report instruments.

METHODS

Criteria for considering studies for this review

Types of studies

We include cross-sectional studies of victims of traumatic events that compared a PTSD diagnosis obtained with one or more PTSD self-report instruments with a PTSD diagnosis obtained with a structured or semi-structured clinical interview for PTSD used as the reference (golden) standard. We include studies evaluating one test in one sample and studies comparing the diagnostic accuracy of two or more instruments within the same study sample.

Randomised comparisons of test accuracy will be included if data on sensitivity and specificity of the instruments are provided.

The study population should have been selected randomly or consecutively. Studies that have included patients and healthy controls separately will not be considered.

Studies are included if the PTSD self-report instrument and the semi-structured interview were administered within the same week (seven days). The reason for this is that a longer delay may lead to misclassification as the result of spontaneous recovery, benefit from treatment, progression to a more advanced stage of the disease or occurrence of new symptoms.

We include studies only when at least four studies have reported on the accuracy of the same index test in question. These four studies should have been evaluated by at least two (independent) research groups. The criterion of at least four studies is arbitrary. The reason for inclusion of this criterion is that we were concerned that we would include many studies evaluating self-report instruments that have never been re-tested in independent samples. This would reduce generalisablity of the study results.

Finally, we will include studies that examined the accuracy of self-report instruments in diagnosing PTSD, but not studies aimed at distinguishing 'true' PTSD from PTSD feigning or malingering. Previous studies have evaluated whether individuals who were instructed on *DSM-IV* PTSD symptoms could feign a PTSD diagnosis (e.g. Calhoun 2000). This issue may be relevant for compensation cases in the legal context but is beyond the scope of our review.

Participants

We will consider all adult (age $\geq$ 18 years) study participants, regardless of gender or ethnicity, who experienced a traumatic incident according to the *DSM-IV* PTSD A1 criterion (i.e. "the person experienced, witnessed or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others", American Psychiatric Association 1994) at least one month before the index test was administered.

We will include participants studied in all settings (e.g. community (public health services), victim support agencies, primary care, the army, outpatient clinics, hospital settings).

Index tests

The evaluated index test should be a PTSD self-report instrument based on *DSM* or *ICD* symptoms of PTSD, or aimed at diagnosing PTSD. General anxiety or psychopathology measures that do not include a PTSD scale will not be considered.

The following index tests will be considered:

- PTSD Checklist (PCL or PCL-C)
- Civilian Mississippi Scale (CMS)
- Davidson Trauma Scale (DTS)
- Impact of Events Scale (IES)
- Impact of Events Scale - Revised (IES-R)
- Aberdeen Trauma Screening Index
- My Mood Monitor (M-3)
- Penn Inventory for Posttraumatic Stress Disorder (Penn)
- Perdue Posttaumatic Stress Disorder Scale
- PK scale of the MMPI-2 (PK)
- Posttraumatic Diagnostic Scale (PDS)
- Posttraumatic Stress Symptom Scale - Self-Report Version (PSS-SR)
- Posttraumatic Stress Disorder Questionnaire (PTSD-Q)
- Symptom Checklist-90-Revised Crime-Related PTSD Scale (SCL-90-R)
- Short Form of the PTSD Checklist
- Short Screening Scale for PTSD
- SPAN
- Short Post-Traumatic Stress Disorder (PTSD) Rating Interview (SPRINT)
- Trauma Screening Questionnaire (TSQ)
- Distressing Event Questionnaire (DEQ)
- Los Angeles Symptom Checklist (LASC)
- Mississippi Scale for Combat-Related PTSD
- Modified PTSD Symptom Scale (MPSS-SR)
- Trauma Symptom Inventory (TSI)
- Self-Rating Scale for PTSD (SRS-PTSD)
- Millon Clinical Multiaxial Inventory
- Harvard Trauma Questionnaire (HTQ)
- Self-Rating Inventory for Posttraumatic Stress Disorder (SRIP)
- Zelfinventarisatielijst Posttraumatische Stressstoornis (ZIL)
- Screen for Posttraumatic Stress Symptoms (SPTSS)
- Brief DSMPTSD-III-R and DSMPTSD-IV (BPTSD-6)
- Disaster-Related Psychological Screening Test (DRPST)
- Posttraumatic Adjustment Scale
- Los Angeles Symptom Checklist (LASC)
- Mississippi Scale for Combat-Related PTSD
- Acute Stress Disorder Scale
- Modified PTSD Symptom Scale (MPSS-SR)

If the literature search yields a PTSD self-report instrument not listed here, we will consider it for inclusion.

Target conditions

PTSD as defined by *DSM* (American Psychiatric Association 1994) or *ICD* (World Health Organization 2007) criteria.

Reference standards

The reference ('golden') standards that are considered appropriate for establishing a diagnosis of PTSD are semi-structured clinical interviews for *DSM-IV* or *ICD-10* diagnoses of PTSD. These interviews include the Structured Clinical Interview for *DSM-IV* Axis I Diagnosis-Patient Edition; First 1996), the Composite International Diagnostic Interview (CIDI; World Health Organization 1997), the M.I.N.I. Neuropsychiatric Interview (Sheehan 1998), the Diagnostic Interview Schedule (DIS; Robins 2000), the Clinician-Administered Posttraumatic Stress Disorder Scale (CAPS; Blake 1995), the Structured Interview for PTSD (SI-PTSD; Davidson 1997) and the PTSD Symptom Scale- Interview Version (PSS-I; Foa 1993).

Both the original versions and the translations of these reference standards will be considered.

These reference standards will be regarded as appropriate only if the diagnosis is made by a clinician (psychologist, psychiatrist or other trained professional such as a nurse) or under the close supervision of a clinician.

Search methods for identification of studies

The search will incorporate the following methods to identify completed or ongoing studies.

Electronic searches

Relevant studies will be obtained by searching the following sources:

- MEDLINE (1950 to date)
- PsycINFO (1970 to date)
- EMBASE (1980 to date)
- PILOTS (Published International Literature on Traumatic Stress, US Department of Veterans Affairs) (1871 to date)
- OpenGrey
- OAISTER
- MEDION

MEDLINE and PsycINFO search strategies (Appendix 1) will be translated into appropriate strategies for EMBASE, PILOTS, OpenGrey, OAISTER and MEDION using relevant controlled vocabulary and free-text terms, where appropriate. The strategies listed in this protocol have been cross-validated against known reports of relevant diagnostic test accuracy (DTA) studies.

Searching other resources

We will also search the following:

- Reference lists of relevant studies;
- Annual conference abstracts of the International Society of Traumatic Stress Studies;
- Contact investigators, relevant authors seeking information about unpublished or incomplete studies; and
- Non-English language literature for all searches (when considered likely to meet inclusion criteria, studies will be translated).

Data collection and analysis

Selection of studies

Two review authors (MS, NPR) will screen the titles and abstracts retrieved by the searches. Studies identified as potentially relevant will be obtained as full text articles, which will be assessed for inclusion using a checklist based on pre-defined inclusion criteria. Screening studies for inclusion will be conducted by two review authors independently (MS, NPR), with disagreements resolved by consultation with a third review author (JBR).

Data extraction and management

Two review authors (MS, NPR) will independently extract all relevant data from included studies using a data extraction form. Disagreements between review authors in data extracted will be resolved by consultation with a third review author (JIB). Data extracted will include numerical data to fill in the 2 × 2 table of true positives, false positives, false negatives and true negatives, as well as cut-off scores, details for assessment of quality, study setting, country, eligibility criteria of study, sample size, age distribution and gender ratio, prevalence of PTSD and time period between traumatic incident and assessment. If incomplete data are reported, we will contact the authors to request additional data.

Assessment of methodological quality

All included studies will be assessed for the likelihood of bias by two review authors independently, using the QUADAS-2 (quality assessment tool for systematic reviews of diagnostic test accuracy studies; Whiting 2011). Disagreements will be resolved by discussion with a third review author. QUADAS-2 is a generic set of criteria (see Appendix 2) consisting of four key domains: patient selection, index test, reference standard and flow of patients through the study and timing of the index test and reference standard. Signalling questions are included to allow judgement of the risk of bias across the four domains (Whiting 2011).

We adapted the original QUADAS-2 instrument by adding signalling questions relevant to this review to account for biases specific to the use of semi-structured clinical interviews. For the domain "index test", the following signalling question was added: "Was internal consistency within an acceptable range (i.e. was Cronbach's alpha higher than .70)? (Bernstein & Nunnally 1994)". For the domain "reference standard", extra signalling questions included the following: "Was the *DSM-IV* criterion F (clinically significant distress or functional impairment) included in the PTSD diagnosis?" and "Were data on interviewer variation (i.e. inter-rater reliability or agreement) for the semi-structured interview within an acceptable range (i.e. Cohen's kappa or Intraclass correlation coefficient higher than .60; Landis 1977)?" With respect to the fourth domain ("flow and timing"), we decided that the time interval between administration of the index test and the reference standard should be less than eight days. This (arbitrary) time interval was chosen to avoid (natural) fluctuations in PTSD symptoms that are likely to affect the accuracy of the index test(s) and thus may lead to risk of bias.

Statistical analysis and data synthesis

We will plot the estimates of sensitivity and specificity of all instruments studied in forest plots and in receiver-operating characteristic (ROC) space. These plots will allow visualisation of the variation in accuracy between studies.

We will meta-analyse pairs of sensitivity and specificity using the bi-variate random-effects approach (Reitsma 2005) in those studies with a comparable cut-off value. Summary estimates of sensitivity and specificity together with associated confidence and prediction intervals will be calculated for each type of instrument. This approach incorporates the following issues relevant for diagnostic reviews: (1) imprecision by which sensitivity or specificity has been measured within each study, (2) variation beyond chance in sensitivity and specificity between studies, and (3) correlation that might exist between sensitivity and specificity.

Summary measures of accuracy at a common threshold will be calculated to determine the consequences in absolute numbers (numbers of true positives, false positives, etc.) when the test is used in practice. If studies vary in the threshold they have applied, a summary ROC curve rather than a single summary point of sensitivity and specificity will be estimated.

To compare the accuracy of different instruments, the bi-variate model will be extended with covariates indicating the type of instrument. This allows for formal comparison of differences in mean sensitivity and/or specificity between instruments. Formal meta-regression analysis will be performed if at least three studies are included in each subgroup.

All statistical analyses will be performed with statistical software SAS, release 9.1 (SAS Institute Inc., Cary, North Carolina, USA).

Investigations of heterogeneity

The following factors will be examined to determine whether they are sources of variation in this review: threshold scores, types of traumatic experiences (e.g. combat, disaster, accidental injury, crime), time period between the traumatic event and administration of the instrument, short (fewer than the 17 items corresponding to the 17 symptoms in the *DSM-IV* PTSD diagnosis) versus long (17 or more items) instruments, instruments referring to PTSD symptoms experienced during the past week versus the past month (because instruments were found to use either of these time periods for symptoms assessments), original language instruments versus translations of the original, and differences in the administration procedure of the reference standard, such as inclusion of the functional impairment criterion in the PTSD diagnosis. Study-level covariates will be added to the bi-variate model to determine whether there are differences in sensitivity or specificity or both between subgroups of studies based on the level of the covariate. We will present absolute differences with 95% confidence intervals, P values, and reduction in between-study variances. One exception is the analysis of differences in threshold. We will use the hierarchical summary ROC approach (HSROC) to analyse and visualise the impact of differences in threshold.

Sensitivity analyses

We will examine the influence of methodological quality on our results by comparing results reported in high-quality studies with those reported in all studies. A study is categorised as a high-quality study if risk of bias or applicability is judged as "low" on all QUADAS-2 domains (Whiting 2011). In addition, if studies with direct comparisons between index tests are included, we will examine whether results including only these studies differ from results including all studies.

Assessment of reporting bias

Given the uncertainty about the mechanisms behind reporting bias in diagnostic accuracy studies and the limited power of available tests, we will not examine reporting bias in this review.

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* *Indicates the major publication for the study*

APPENDICES

Appendix 1. OVID MEDLINE Search strategy

OVID MEDLINE

[Target Condition]

1. STRESS DISORDERS, POST-TRAUMATIC/
2. (PTSD or posttrauma* or post trauma* or post-trauma*).tw.
3. or/1-2

[DTA Filter]

4. "SENSITIVITY AND SPECIFICITY"/
5. "LIMIT OF DETECTION"/
6. ROC CURVE/
7. "PREDICTIVE VALUE OF TESTS"/
8. REPRODUCIBILITY OF RESULTS/
9. (validat* or validity or cross-validat*).tw.
10. likelihood ratio*.tw.
11. ((pre-test or pretest or post-test or posttest) adj probabilit*).tw.
12. ((re-test or retest or test-retest) adj reliability).tw.
13. receiver operating characteristic*.tw.
14. (ROC adj5 (analy* or curve or curves)).tw.
15. or/4-14

[Index Test (i) General terms for 'self-report' measures]

16. DIAGNOSTIC SELF EVALUATION/
17. SELF-ASSESSMENT/
18. SELF DISCLOSURE/
19. (self adj (administer* or complet* or evalu* or measure* or rate* or rating* or report*)).tw.
20. (self adj2 (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw.
21. (diagnos* adj (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or measure* or method*1 or procedure*1 or questionnaire* or scale* or tool*)).tw.
22. (brief instrument* or brief measure* or brief screen*).tw.

23. QUESTIONNAIRES/
24. Questionnaire*.tw.

[Index Test (ii) Named self-report instruments for PTSD]

25. (impact of event* or IES or IES-R).tw.
26. (BPTSD* or CMS or DEQ or DRPST or DSMPTSD* or DTS or HSCL* or HTQ or LASC or MMPI* or MPSS* or PAS or PCL* or PDS or PDEQ or PSS-SR or PTSD-Q or SCL-90-R or SPAN or SPTSS or SPRINT or SRIP or SRS-PTSD or TSCYC or TSI or TSQ or ZIL).tw.
27. (Aberdeen or Los Angeles or Mississippi).ti,ab.
28. (Davidson or Harvard or Hopkins or Horowitz).ti,ab.
29. Minnesota Multiphasic Personality Inventory.ti,ab.
30. Millon Clinical Multiaxial Inventory.tw.
31. (Mood Monitor or M-3).tw.
32. (Penn or Perdue).ti,ab.
33. (Short Post-Traumatic Stress Disorder adj3 Rating Interview).tw.
34. Zelfinventarisatielijst.ti,ab,ot.
35. ((PTSD or posttrauma* or post trauma* or post-trauma* or trauma* or psychotrauma* or stress*) adj3 (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw.
36. ((PTSD or posttrauma* or post trauma* or post-trauma* or trauma* or psychotrauma* or stress*) adj1 measure*).tw.
37. ((distress* or screening) adj2 (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw.
38. (screening adj (method*1 or measure* or procedure*)).tw.
39. Screen for Posttraumatic Stress Symptoms.tw.
40. Disaster-Related Psychological Screening Test.tw.
41. Posttraumatic Adjustment Scale.tw.
42. (symptom adj (checklist* or inventory or scale*)).tw.
43. STRESS DISORDERS, POST-TRAUMATIC/di [diagnosis]
44. or/16-43

[Reference Standards]

45. INTERVIEW, PSYCHOLOGICAL/
46. ((PTSD or posttrauma* or post trauma* or post-trauma*) adj3 interview*).tw.
47. ((clinical* or clinician or diagnos* or neuropsychiatric or schedule*or structured or semi-structured or symptom scale) adj3 interview*).tw.
48. ((clinical* or clinician*) adj3 (administered or checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw.
49. clinical diagnosis.tw.
50. (CIDI or PTSD-RI or SCID or SI-PTSD).tw.
51. (((PTSD or posttrauma* or post trauma* or post-trauma*) adj3 disorder scale) or CAPS).tw.
52. (PTSD symptom scale-interview or PSS-I).tw.
53. (reaction index or CPTS*).tw.
54. ((PTSD or posttrauma* or post trauma* or post-trauma*) and (DSM* or ICD-10)).tw.
55. STRESS DISORDERS, POST-TRAUMATIC/di [diagnosis]
56. or/45-43

[Combing Searches (i):Target Condition + DTA Filter + Index Tests]

57. (3 and 15 and 44)

[Combing Searches (ii):Target Condition + Index Tests + Reference Standards]

58. (3 and 44 and 56)

[Final set]

59. (57 or 58)

Note on search strategy:

Because the index test is a questionnaire (used for diagnosis and response to treatment) we need to limit the retrieval of large numbers of irrelevant hits, for example treatment studies where the diagnostic measure has been cited or DTA studies in victims of physical or psychological trauma but for depression, anxiety, mood, functional status not PTSD. We appreciate that including relevant terms for

the reference standard also introduces search redundancy but recognise this as a positive effect, increasing the sensitivity of the search towards STRESS DISORDERS, POST-TRAUMATIC/di [diagnosis].

OVID PsycINFO

A slightly more sensitive search will be used in OVID PsycINFO:

[Target Condition]

1. POSTTRAUMATIC STRESS DISORDERS/
2. (PTSD or posttrauma* or post trauma* or post-trauma*).tw,tm.
3. TRAUMATIC NEUROSIS/ or STRESS REACTIONS/
4. or/1-3

[DTA Filter]

5. TEST RELIABILITY/
6. TEST VALIDITY/
7. (validat* or validity or cross-validat*).tw.
8. likelihood ratio*.tw.
9. ((pre-test or pretest or post-test or posttest) adj probabilit*).tw.
10. ((re-test or retest or test-retest) adj reliability).tw.
11. receiver operating characteristic*.tw.
12. (ROC adj5 (analy* or curve or curves)).tw.
13. ((screening or diagnostic) adj (checklist*1 or index or indexes or indices or inventory or inventories or instrument*1 or measure*1 or method or procedure*1 or questionnaire*1 or scale* or tool*1)).tw,tm.
14. or/5-13

[Index Test (i) General terms for 'self-report' measures]

15. SELF DISCLOSURE/
16. SELF REPORT/
17. (self adj (administer* or complet* or evalu* or measure* or rate* or rating* or report*)).tw,tm.
18. (self adj2 (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw,tm.
19. (diagnos* adj (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or measure* or method*1 or procedure*1 or questionnaire* or scale* or tool*)).tw,tm.
20. (brief instrument* or brief measure* or brief screen*).tw,tm.
21. QUESTIONNAIRES/
22. Questionnaire*.tw.

[Index Test (ii) Named self-report instruments for PTSD]

23. (impact of event* or IES or IES-R).tw,tm.
24. (BPTSD* or CMS or DEQ or DRPST or DSMPTSD* or DTS or HSCL* or HTQ or LASC or MMPI* or MPSS* or PAS or PCL* or PDS or PDEQ or PSS-SR or PTSD-Q or SCL-90-R or SPAN or SPTSS or SPRINT or SRIP or SRS-PTSD or TSCYC or TSI or TSQ or ZIL).tw,tm.
25. (Aberdeen or Los Angeles or Mississippi).ti,ab,tm.
26. (Davidson or Harvard or Hopkins or Horowitz).ti,ab,tm.
27. Minnesota Multiphasic Personality Inventory.ti,ab.
28. Millon Clinical Multiaxial Inventory.tw,tm.
29. (Mood Monitor or M-3).tw,tm.
30. (Penn or Perdue).ti,ab,tm.
31. (Short Post-Traumatic Stress Disorder adj3 Rating Interview).tw.
32. Zelfinventarisatielijst.ti,ab,ot,tm.
33. ((PTSD or posttrauma* or post trauma* or post-trauma* or trauma* or psychotrauma* or stress*) adj3 (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw.
34. ((PTSD or posttrauma* or post trauma* or post-trauma* or trauma* or psychotrauma* or stress*) adj1 measure*).tw.
35. ((distress* or screening) adj2 (checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw.
36. (screening adj (method*1 or measure* or procedure*)).tw.
37. Screen for Posttraumatic Stress Symptoms.tw,tm.
38. Disaster-Related Psychological Screening Test.tw,tm.

39. Posttraumatic Adjustment Scale.tw,tm.
40. (symptom adj (checklist* or inventory or scale*)).tw.
41. or/15-40

[Reference Standards]

42. exp PSYCHODIAGNOSTIC INTERVIEW/
43. INTERVIEWS/
44. ((PTSD or posttrauma* or post trauma* or post-trauma*) adj3 interview*).tw,tm.
45. ((clinical* or clinician or diagnos* or neuropsychiatric or schedule*or structured or semi-structured or symptom scale) adj3 interview*).tw,tm.
46. ((clinical* or clinician*) adj3 (administered or checklist* or index or indexes or indices or inventory or inventories or instrument*1 or questionnaire* or scale* or tool*)).tw.
47. (clinic* adj1 diagnos*).tw,tm.
48. (CIDI or PTSD-RI or SCID or SI-PTSD).tw,tm.
49. (((PTSD or posttrauma* or post trauma* or post-trauma*) adj3 disorder scale) or CAPS).tw,tm.
50. (PTSD symptom scale-interview or PSS-I).tw,tm.
51. (reaction index or CPTS*).tw.
52. ((PTSD or posttrauma* or post trauma* or post-trauma*) and (DSM* or ICD-10)).tw,tm.
53. or/42-52

[Combing Searches (Target Condition + DTA Filter) OR (Target Condition + Index Tests + Reference Standards)]

54. (4 and 14) or (4 and 41and 53)

Key:
ti=Title only; **tw**=Text Word [title; abstract; keywords; references]; **ot**=Original Title; **tm**=Test and Measures

Appendix 2. QUADAS-2

QUADAS-2 (Whiting 2011)	
Phase 1: State the review question *Patients (setting, intended use of index test, presentation, prior testing) :* *Index test(s):* *Reference standard and target condition:*	
Phase 2: Draw a flow diagram for the primary study	
DOMAIN 1: PATIENT SELECTION	

(*Continued*)

A. Risk of Bias	
Describe methods of patient selection:	
1. Was a consecutive or random sample of patients enrolled?	Yes/No/Unclear
2. Was a case-control design avoided?	Yes/No/Unclear
3. Did the study avoid inappropriate exclusions?	Yes/No/Unclear
Could the selection of patients have introduced bias?	**RISK: LOW/HIGH/UNCLEAR**
B. Concerns regarding applicability	
Describe included patients (prior testing, presentation, intended use of index test and setting):	
Is there concern that the included patients do not match the review question?	**CONCERN: LOW/HIGH/UNCLEAR**
DOMAIN 2: INDEX TEST(S)	
If more than one index test was used, please complete for each test.	
A. Risk of Bias	
Describe the index test and how it was conducted and interpreted:	
1. Were the index test results interpreted without knowledge of the results of the reference standard?	Yes/No/Unclear
2. If a threshold was used, was it pre-specified?	Yes/No/Unclear
3. Was internal consistency within an acceptable range (i.e. was Cronbach's alpha higher than .70; Bernstein & Nunnally 1994)	Yes/No/Unclear
Could the conduct or interpretation of the index test have introduced bias?	**RISK: LOW /HIGH/UNCLEAR**

(*Continued*)

B. Concerns regarding applicability	
Is there concern that the index test, its conduct or interpretation differ from the review question?	**CONCERN: LOW/HIGH/UNCLEAR**
DOMAIN 3: REFERENCE STANDARD	
A. Risk of Bias	
Describe the reference standard and how it was conducted and interpreted:	
1. Is the reference standard likely to correctly classify the target condition?	Yes/No/Unclear
2. Were the reference standard results interpreted without knowledge of the results of the index test?	Yes/No/Unclear
3. Was the DSM-IV criterion F (clinically significant distress or functional impairment) included in the PTSD diagnosis?	Yes/No/Unclear
4. Were data on interviewer variation (i.e. inter-rater reliability or agreement) for the semi-structured interview within an acceptable range (i.e. Cohen's kappa or Intraclass correlation coefficient higher than .60; Landis 1977)?	Yes/No/Unclear
Could the reference standard, its conduct, or its interpretation have introduced bias?	**RISK:** **LOW /HIGH/UNCLEAR**
B. Concerns regarding applicability **Is there concern that the target condition as defined by the reference standard does not match the review question?**	**CONCERN: LOW/HIGH/UNCLEAR**
DOMAIN 4: FLOW AND TIMING	
A. Risk of Bias	
Describe any patients who did not receive the index test(s) and/or reference standard or who were excluded from the 2x2 table (refer	

(*Continued*)

to flow diagram):	
Describe the time interval and any interventions between index test(s) and reference standard:	
1. Was the time interval between administration of the index test (s) and reference standard less than 8 days?	Yes/No/Unclear
2. Did all patients receive a reference standard?	Yes/No/Unclear
3. Did patients receive the same reference standard?	Yes/No/Unclear
4. Were all patients included in the analysis?	Yes/No/Unclear
Could the patient flow have introduced bias?	**RISK:** **LOW /HIGH/UNCLEAR**

CONTRIBUTIONS OF AUTHORS

MS has written the protocol, and all authors have commented on it. MS and NPR will screen the titles and abstracts retrieved by the searches, with disagreements resolved by consultation with JBR. MS, NPR and LPS will extract all relevant data from included studies and will assess studies using the QUADAS-2 instrument. MS and JBR will perform statistical analyses. All authors will contribute to the final review.

DECLARATIONS OF INTEREST

None declared.