TECHNICAL COMMENTARY

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Cognitive and psychological factors

Introduction

Personal characteristics, such as cognitive and psychological factors, can influence one's degree of risk for developing PTSD. How such personal characteristics may affect the development of PTSD would be influenced by other personal characteristics as well as differences in the trauma experience itself. This summary table presents the effects of cognitive and psychological factors on the risk of PTSD following trauma exposure.

Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2010 that report results separately for people with PTSD. Reviews were identified by searching the databases MEDLINE, EMBASE, and PsycINFO. When multiple copies of reviews were found, only the most recent version was included. We prioritised reviews with pooled data for inclusion.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist that describes a preferred way to present a meta-analysis[1]. Reviews with less than 50% of items checked have been excluded from the library. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach where high quality evidence such as that gained from randomised controlled trials (RCTs) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large or if there is a dose dependent response. We have also taken into account sample size and whether results are consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)[2]. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

Results

We found nine systematic reviews that met our inclusion criteria[3-11]

- Moderate quality evidence found shorter post-trauma amnesia and more memory of the traumatic event were both associated with increased risk of PTSD following a traumatic brain injury.
- Moderate to high quality evidence found depression and anxiety, negative subjective and objective birth experiences, fear of childbirth, history of PTSD, negative emotions, dissociation, poor coping and stress, previous psychological problems, and lack of control were all associated with increased risk of PTSD in women following childbirth.
- Moderate quality evidence found no differences in rates of PTSD after a fall between older people with or without anxiety.
- Moderate quality evidence found good negative predictive power and moderate positive predictive power of acute stress disorder in predicting PTSD. Positive predictive power is the proportion of people who developed PTSD who initially met the criteria for acute stress disorder. Negative predictive power is the proportion of people who did not develop PTSD who did not initially meet the criteria for acute stress disorder.

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- Moderate quality evidence found risk factors associated with PTSD following a burn injury include (in descending order of effect); more life threat perception, intrusion symptoms, alcohol use disorders, avoidance symptoms, dissociation, negative emotions or distress, acute stress symptoms, having previous psychiatric disorders, substance use disorders, need for psychological treatment, more anxiety and depression, having low openness and low narcissism, and feeling responsible for the burn injury.
- Moderate to high quality evidence found associations between increased PTSD symptoms after a spinal cord injury and depressed mood, poor cognition, distress, and anxiety.
- Moderate to high quality evidence found rates of PTSD following a coronavirus infection were greater in people with a sense of lack of control.
- Moderate to low quality evidence found medium-sized effects of increased rates of PTSD in adults and children who experienced fear during earthquakes.
- Moderate to high quality evidence found significant associations between more PTSD symptoms in children and adolescents exposed to any trauma and the following risk factors (in descending order of effect); post-trauma thought suppression, post-trauma blame others, post-trauma distraction, post-trauma psychological problem, peri-trauma fear, peri-trauma perceived life threat, post-trauma parental psychological problem, pre-trauma low intelligence, pre-trauma low self-esteem, pre-trauma psychological problem, and pre-trauma parent psychological problem.

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Ayers S, Bond R, Bertullies S, Wijma K

The aetiology of post-traumatic stress following childbirth: a meta-analysis and theoretical framework

Psychological Medicine 2016; 46: 1121-34

View review abstract online

Comparison	**The effects of cognitive and psychological factors on risk of PTSD following childbirth.**
Summary of evidence	**Moderate to high quality evidence (large samples, inconsistent, precise, direct) found depression and anxiety, negative subjective and objective birth experiences, fear of childbirth, history of PTSD, negative emotions, dissociation, poor coping and stress, previous psychological problems, and lack of control were all associated with increased risk of PTSD in women following childbirth.**
Childbirth	
Risk factors associated with PTSD (in descending order of effect); Depression after childbirth: 11 studies, N = 3,162, *r* = 0.60, 95%CI 0.57 to 0.62, Q*p* < 0.05 Negative subjective birth experiences: 6 studies, N = 4,622, *r* = 0.59, 95%CI 0.58 to 0.61, Q*p* < 0.05 Depression in pregnancy: 12 studies, N = 8,093, *r* = 0.51, 95%CI 0.50 to 0.53, Q*p* < 0.05 Fear of childbirth: 6 studies, N = 5,669, *r* = 0.41, 95%CI 0.39 to 0.43, Q*p* < 0.05 History of PTSD: 8 studies, N = 5,807, *r* = 0.39, 95%CI 0.37 to 0.41, Q*p* < 0.05 Negative emotions: 7 studies, N = 3,691, *r* = 0.34, 95%CI 0.31 to 0.36, Q*p* < 0.05 Dissociation: 7 studies, N = 2,964, *r* = 0.32, 95%CI 0.29 to 0.35, Q*p* < 0.05 Poor coping and stress: 10 studies, N = 2,688, *r* = 0.30, 95%CI 0.27 to 0.33, Q*p* < 0.05 Poor mental health: 7 studies, N = 2,017, *r* = 0.27, 95%CI 0.23 to 0.31, Q*p* < 0.05 Previous psychological problems: 6 studies, N = 4,458, *r* = 0.25, 95%CI 0.23 to 0.28, Q*p* < 0.05 Negative objective birth experience: 14 studies, N = 8,171, *r* = 0.25, 95%CI 0.23 to 0.27, Q*p* < 0.05 Lack of control or agency: 5 studies, N = 1,502, *r* = -0.23, 95%CI -0.28 to -0.18, Q*p* < 0.05 Anxiety: 10 studies, N = 6,765, *r* = 0.18, 95%CI 0.15 to 0.20, Q*p* < 0.05	
Consistency in results‡	Inconsistent
Precision in results§	Precise
Directness of results‖	Direct

Bloch F

Literature review and meta-analysis of risk factors for delayed post-traumatic stress disorder in older adults after a fall

International Journal of Geriatric Psychiatry 2017; 32: 136-40

View review abstract online

Comparison	**The effects of cognitive and psychological factors on PTSD symptoms in older adults after a fall (up to 24 weeks).**
Summary of evidence	**Moderate quality evidence (small sample, consistent, imprecise, direct) found no differences in rates of PTSD after a fall between older people with or without anxiety.**
Falls in the elderly	
There was no association with anxiety; 2 studies, N = 111, OR = 1.61, 95%CI 0.59 to 4.42, $p > 0.05$, $I^2 = 0\%$	
Consistency in results	Consistent
Precision in results	Imprecise
Directness of results	Direct

Bryant RA

Acute stress disorder as a predictor of posttraumatic stress disorder: a systematic review

Journal of Clinical Psychiatry 2011; 72: 233-9

View review abstract online

Comparison	**The effect of acute stress disorder on risk of PTSD.**
Summary of evidence	**Moderate quality evidence (large sample, inconsistent, appears imprecise, direct) found good negative predictive power and moderate positive predictive power of acute stress disorder in predicting PTSD. Positive predictive power is the proportion of people who developed PTSD who initially met the criteria for acute stress disorder. Negative predictive power is the proportion of people who did not develop PTSD who did not initially meet the criteria for acute stress disorder.**

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Acute stress disorder	
Good negative predictive power and moderate positive predictive power; Adults (3-24 month follow-up): 19 studies, N = 3,794, PPP range 25%-80%, NPP range 65%-96% Children (3-6 month follow-up): 3 studies, N = 686, PPP range 14%-33%, NPP range 89%-95% PPP = Positive predictive power is the proportion of people who developed PTSD who initially met the criteria for acute stress disorder. NPP = Negative predictive power is the proportion of people who did not develop PTSD who did not initially meet the criteria for acute stress disorder.	
Consistency in results	Inconsistent
Precision in results	Appears imprecise
Directness of results	Direct

Cnossen MC, Scholten AC, Lingsma HF, Synnot A, Haagsma J, Steyerberg PEW, Polinder S

Predictors of Major Depression and Posttraumatic Stress Disorder Following Traumatic Brain Injury: A Systematic Review and Meta-Analysis

Journal of Neuropsychiatry and Clinical Neurosciences 2017; 29: 206-24

View review abstract online

Comparison	**The effects of cognitive and psychological factors on PTSD symptoms following a traumatic brain injury.**
Summary of evidence	**Moderate quality evidence (medium-sized samples, consistent, imprecise, direct) found shorter post-trauma amnesia and more memory of the traumatic event were both associated with increased risk of PTSD following a traumatic brain injury.**
Traumatic brain injury	
Factors associated with increased risk of PTSD in people with a traumatic brain injury; Shorter post-trauma amnesia: 3 studies, N = 477, MD = -8.07, 95%CI -15.46 to -0.69, I^2 = 33% Memory of the traumatic event: 2 studies N = 240, OR = 5.15, 95%CI 2.37 to 11.21, I^2 = 0%	
Consistency in results	Consistent
Precision in results	Imprecise
Directness of results	Direct

Giannoni-Pastor A, Eiroa-Orosa FJ, Fidel Kinori SG, Arguello JM, Casas M

Prevalence and Predictors of Posttraumatic Stress Symptomatology Among Burn Survivors: A Systematic Review and Meta-Analysis

Journal of Burn Care and Research 2016; 37: e79-89

View review abstract online

Comparison	**The effects of cognitive and psychological factors on PTSD symptoms following a burn injury.**
Summary of evidence	**Moderate quality evidence (large samples, direct) found risk factors associated with PTSD following a burn injury include (in descending order of effect); more life threat perception, intrusion symptoms, alcohol use disorders, avoidance symptoms, dissociation, negative emotions or distress, acute stress symptoms, having previous psychiatric disorders, substance use disorders, need for psychological treatment, more anxiety and depression, having low openness and low narcissism, and feeling responsible for the burn injury.**

Burn injury

The following risk factors were associated with increased PTSD symptoms following a burn injury (in descending order of effect);

Life threat perception: 1 study, N = 428, *r* = 0.98

Intrusion: 3 studies, N = 154, *r* = 0.42

Alcohol use disorder: 1 study, N = 95, *r* = 0.37

Avoidance: 4 studies, N = 185, *r* = 0.35

Dissociation: 2 studies, N = 323, *r* = 0.33

Negative emotions or distress: 6 studies, N = 445, *r* = 0.32

Acute stress symptoms: 4 studies, N = 645, *r* = 0.29

Previous psychiatric disorders: 2 studies, N = 251, *r* = 0.28

Substance use disorder: 1 study, N = 95, *r* = 0.27

Need for treatment: 3 studies, N = 297, *r* = 0.27

Anxiety: 3 studies, N = 383, *r* = 0.24

Depression: 4 studies, N = 311, *r* = 0.23

Low openness: 4 studies, N = 214, *r* = 0.20

Low narcissism: 2 studies, N = 74, *r* = 0.17

Burn injury attribution of responsibility: 2 studies, N = 144, *r* = 0.13	
Consistency in results	No measure of consistency is reported.
Precision in results	No measure of precision is reported.
Directness of results	Direct

Pollock K, Dorstyn D, Butt L, Prentice S

Posttraumatic stress following spinal cord injury: a systematic review of risk and vulnerability factors

Spinal Cord 2017; 55: 800-11

View review abstract online

Comparison	**The effects of cognitive and psychological factors on PTSD symptoms following spinal cord injury.**
Summary of evidence	**Moderate to high quality evidence (large samples, mostly consistent, precise, direct) found associations between PTSD symptoms after a spinal cord injury and depressed mood, poor cognition, distress, and anxiety.**
Spinal cord injury	
Significant associations were found between more PTSD symptoms and the following risk factors (in descending order of effect); Depressed mood: 6 studies, N = 1,714, *r* = 0.64, 95%CI 0.54 to 0.72, $p < 0.001$, $I^2 = 87\%$ Poor cognition: 2 studies, N = 152, *r* = 0.63, 95%CI 0.52 to 0.72, $p < 0.001$, $I^2 = 0\%$ Distress: 2 studies, N = 512, *r* = 0.57, 95%CI 0.50 to 0.62, $p < 0.001$, $I^2 = 0\%$ Anxiety: 3 studies, N = 590, *r* = 0.56, 95%CI 0.49 to 0.61, $p < 0.001$, $I^2 = 0\%$ There were no significant associations with psychiatric history, or alcohol or substance use disorders.	
Consistency in results	Consistent, apart from depressed mood.
Precision in results	Precise
Directness of results	Direct

Rogers JP, Chesney E, Oliver D, Pollak TA, McGuire P, Fusar-Poli P, Zandi MS, Lewis G, David AS

Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic

The Lancet Psychiatry 2020; 7: 611-27

View review abstract online

Comparison	**The effects of cognitive and psychological factors on PTSD symptoms following a coronavirus illness (severe acute respiratory syndrome [SARS], Middle East respiratory syndrome [MERS], or coronavirus disease 2019 [COVID-19]).** **Follow-up time varied between 60 days and 12 years.**
Summary of evidence	**Moderate to high quality evidence (medium to large sample, appears inconsistent, precise, direct) found rates of PTSD following a coronavirus infection were greater in people with a sense of lack of control.**
Coronavirus infection	
Rates of PTSD were higher in people with a sense of lack of control; 4 studies, N = 402, OR = 1.22, 95%CI 1.09 to 1.37	
Consistency in results	Appears inconsistent
Precision in results	Precise
Directness of results	Direct

Tang B, Deng Q, Glik D, Dong J, Zhang L

A Meta-Analysis of Risk Factors for Post-Traumatic Stress Disorder (PTSD) in Adults and Children after Earthquakes

International Journal of Environmental Research and Public Health 2017; 14: 1537

View review abstract online

Comparison	**The effects of cognitive and psychological factors on PTSD symptoms following earthquakes.**
Summary of evidence	**Moderate to low quality evidence (unclear sample size, inconsistent, imprecise, direct) found medium-sized effects of increased rates of PTSD in adults and children who experienced**

	fear during earthquakes.
Earthquakes	
Medium-sized effects of increased rates of PTSD in adults and children who experienced fear; Adults: 4 studies, N not reported, OR = 2.97, 95%CI 1.78 to 4.95, I^2 = 93% Children: 2 studies, N not reported, OR = 2.24, 95%CI 1.52 to 3.32, I^2 not reported	
Consistency in results	Authors report data are inconsistent.
Precision in results	Imprecise
Directness of results	Direct

Trickey D, Siddaway AP, Meiser-Stedman R, Serpell L, Field AP

A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents

Clinical Psychology Review 2012; 32: 122-38

View review abstract online

Comparison	**The effects of cognitive and psychological factors on PTSD symptoms following any trauma in children and adolescents.**
Summary of evidence	**Moderate to high quality evidence (unclear sample size, consistent, precise, direct) found significant associations between more PTSD symptoms in children and adolescents exposed to any trauma and the following risk factors (in descending order of effect); post-trauma thought suppression, post-trauma blame others, post-trauma distraction, post-trauma psychological problem, peri-trauma fear, peri-trauma perceived life threat, post-trauma parental psychological problem, pre-trauma low intelligence, pre-trauma low self-esteem, pre-trauma psychological problem, and pre-trauma parent psychological problem.**
Any trauma exposure	
Significant associations were found between more PTSD symptoms and the following risk factors (in descending order of effect); Post-trauma thought suppression: 2 studies, N not reported, r = 0.70, 95%CI 0.51 to 0.88, p < 0.001, Qp > 0.05 Post-trauma blame others: 2 studies, N not reported, r = 0.47, 95%CI 0.14 to 0.81, p < 0.01, Qp < 0.01	

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Post-trauma distraction: 2 studies, N not reported, *r* = 0.47, 95%CI 0.11 to 0.83, *p* < 0.05, Q*p* > 0.05 Post-trauma psychological problem: 25 studies, N not reported, *r* = 0.40, 95%CI 0.34 to 0.47, *p* < 0.001, Q*p* < 0.05 Peri-trauma fear: 3 studies, N not reported, *r* = 0.36, 95%CI 0.13 to 0.59, *p* < 0.01, Q*p* > 0.05 Peri-trauma perceived life threat: 6 studies, N not reported, *r* = 0.36, 95%CI 0.31 to 0.42, *p* < 0.001, Q*p* > 0.05 Post-trauma parental psychological problem: 25 studies, N not reported, *r* = 0.29, 95%CI 0.22 to 0.36, *p* < 0.001, Q*p* > 0.05 Pre-trauma low intelligence: 2 studies, N not reported, *r* = 0.20, 95%CI 0.08 to 0.32, *p* < 0.01, Q*p* > 0.05 Pre-trauma low self-esteem: 2 studies, N not reported, *r* = 0.16, 95%CI 0.05 to 0.28, *p* < 0.05, Q*p* > 0.05 Pre-trauma psychological problem: 14 studies, N not reported, *r* = 0.15, 95%CI 0.11 to 0.20, *p* < 0.001, Q*p* > 0.05 Pre-trauma parent psychological problem: 4 studies, N not reported, *r* = 0.12, 95%CI 0.02 to 0.22, *p* < 0.05, Q*p* > 0.05

Consistency in results	Mostly consistent
Precision in results	Precise
Directness of results	Direct

Explanation of acronyms

CI = confidence interval, I^2 = the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance), N = number of participants, OR = odds ratio, *p* = statistical probability of obtaining that result, *r* = correlation coefficient, vs. = versus

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Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results; publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small[12].

† Different effect measures are reported by different reviews.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) that allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. Less than 0.4 represents a small effect, around 0.5 a medium effect, and over 0.8 represents a large effect[12].

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, a RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. A RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[13]. lnOR stands for logarithmic OR where a lnOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

Correlation coefficients (eg, r) indicate the strength of association or relationship between variables. They can provide an indirect indication of prediction, but do not

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confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the independent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. I^2 is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent considerable heterogeneity and over this is considerable heterogeneity. I^2 can be calculated from Q (chi-square) for the test of heterogeneity with the following formula[12];

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, these criteria should be relaxed[14].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and/or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available and is therefore inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.

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