

# The challenge of assessing Posttraumatic Stress Disorder (PTSD): An umbrella review on the PTSD prevalence following different types of traumatic events

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## Analysis

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## Abstract

Posttraumatic stress disorder (PTSD) is one of the most serious and incapacitating mental diseases that can result from trauma exposure. However, despite its relevance, there is still considerable confusion and debate surrounding its diagnosis. The aim of this umbrella review is to clarify the overall prevalence of PTSD. Furthermore, the study examined whether the diagnostic methodology applied (self-reported vs structured interviews) and the nature of the traumatic event (interpersonal vs not interpersonal) impact on PTSD prevalence. A systematic search of major databases and additional sources was conducted. Fifty-nine reviews met the criteria of this umbrella review. Overall PTSD prevalence was 23.95% (95% CI 20.74 - 27.15), with no publication bias or significant small-study effects, but a high level of heterogeneity between meta-analyses. Findings suggest that using structured clinical interviews results in a lower PTSD prevalence than using of self-report instruments, while no difference was found in the disorder prevalence when confronting interpersonal and non-interpersonal events. This analysis gives a solid foundation for future research and PTSD assessment.

## Introduction

Posttraumatic stress disorder (PTSD) is one of the most serious and incapacitating mental diseases that can result from trauma exposure. Traumatic events including natural disasters, accidents, sexual violence, and child abuse are common all over the world, and their mental health consequences, such as PTSD, are equally widespread. According to estimates, people experience on average about three traumatic events during their lifetime<sup>1</sup>.

Although the majority of people who experience traumatic situations recover spontaneously and exhibit a normal pattern of resilience<sup>2</sup>, a significant proportion of those who experience trauma do encounter psychological repercussions, such as acute stress disorder, difficult bereavement, adjustment disorder, and depression<sup>3</sup>. Among these, PTSD is one of the most common, with a 5.6% lifetime prevalence across those who have been exposed to trauma worldwide<sup>4</sup>. Numerous psychological and economical pre- and post-traumatic factors have been proven to raise the likelihood of developing and maintaining PTSD, including personality traits, prior mental health conditions<sup>5</sup>, female sex<sup>5,6</sup>, sociodemographic variables<sup>4</sup> and specific changes in gene expression<sup>5,6</sup>. After experiencing a traumatic incident, it is common to endure some psychological distress and PTSD-related symptoms<sup>7</sup>. However, many individuals with PTSD-related symptoms will see the majority or all of those symptoms completely disappear within a month, displaying trajectories of resilience and reflecting a path of natural recovery<sup>8</sup>; in other cases, symptoms will fluctuate throughout time, including remission and re-emergence<sup>9,10</sup>.

The *World Mental Health Surveys* (WMHS) (<https://www.hcp.med.harvard.edu/wmh/>) of the *World Health Organization* (WHO)<sup>11</sup> indicates that between 25 and 40% of PTSD diagnoses will recover within 12 months, with many of those cases resolving within the first 6 months<sup>4</sup>. According to meta-analytic statistics<sup>12,13</sup>, however, nearly 50% of PTSD sufferers will have a chronic condition, especially if the mental illness is not treated. Despite the relevance of the disorder, there is still considerable confusion and debate surrounding its diagnosis. A primary factor that creates a significant impediment to reaching agreement between professionals consist in the considerable discrepancies between the definitions of PTSD in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5)<sup>14</sup> and the eleventh edition of the *International Classification of Diseases* (ICD-11)<sup>11</sup>. Examples include: a different strategy in the revision process, whereby changes in DSM-5 were grounded on empirical basis, whereas ICD-11 relied on expert consensus; the introduction by ICD-11 of two "twin disorders", PTSD and complex PTSD (CPTSD); and the exclusion of certain symptoms from the ICD-11 diagnostic criteria. The presence of these discrepancies holds strong clinical implications. In fact, although in the DSM-5 Field Trials (i.e., studies that examined test-retest reliability, convergent validity, clinical utility, and feasibility of specific DSM-5 diagnoses) the diagnosis of PTSD was one with the highest interrater reliability ( $k=0.67$ )<sup>15</sup>, there is still the chance that two independent experts would reach two different conclusions regarding the diagnosis, especially if it is based on different taxonomies.

A second factor contributing to the debate is the choice of assessment methodology. There is now widespread agreement that diagnosing PTSD is a challenging endeavour that requires careful consideration of the person's presenting complaints, co-occurring psychological and physical issues, occupational and social functioning, as well as cultural and other contextual variables that may be associated with the presentation and progression of PTSD symptomatology<sup>16</sup>. As a result, a variety of methods for assessing PTSD have been developed, including structured diagnostic interviews conducted by a clinician, self-report psychological exams and questionnaires, and psychophysiological measurements. Structured and semi-structured diagnostic interviews are both common and recommended practices in research settings, but their use in clinical settings is less widespread<sup>17</sup>. In general terms, this may be due to the specialised training required to conduct these interviews properly, as well as time or financial restrictions<sup>16</sup>. Self-report assessments are typically more affordable and less time consuming than structured interviews<sup>16</sup>. They can be especially helpful when conducting PTSD screenings or when used in conjunction with structured interviews to provide physicians more information and monitor treatment outcomes over time. Nevertheless, to diagnose PTSD, self-report measures should not be employed in isolation since they lack the validity and reliability of structured clinical interviews<sup>18</sup>. Due to answer biases, misunderstandings, and contextual variables, any self-report measure has the potential to cause significant inaccuracy<sup>18</sup>. Additionally, these methodologies do not evaluate the occurrence or type of a traumatic incident, nor do they assess the clinical significance of reported symptoms<sup>19</sup>.

PTSD examination is further complicated when considering the features of the traumatic event that resulted in the disorder. It has been demonstrated that a person's chance for developing PTSD depends on the kind of stressful incident they experience<sup>20</sup>. Compared to other types of traumatic event exposures, sexual assault and other interpersonal trauma have been proven to have more severe and debilitating psychological effects<sup>21,22</sup>. Particularly, Santiago and colleagues<sup>20</sup> have revealed that traumatic experiences seen as "nonintentional" (e.g., natural disasters) are less likely to cause long-lasting symptoms of PTSD than "intentional" ones (e.g., rape). However, while traumatic experiences considered as "natural" (e.g., earthquakes, floods, avalanches, etc.) typically possess clear and measurable characteristics (e.g., intensity, duration, etc.), traumatic experiences considered as "interpersonal" (e.g., assault, rape, torture, etc.) are difficult to assess and quantify. Since PTSD requires exposure to a traumatic stressor, it is therefore difficult to distinguish between interpersonal traumas with factual evidence and those without, and this issue is particularly relevant and distressing when the traumatic event consists of sexual assault.

Considering the many challenges involved in assessing PTSD and the effect these have on the number of diagnoses made by professionals in disparate environments, it was decided to develop an umbrella review<sup>23,24</sup> to provide an examination of the prevalence of the disorder following various types of traumatic events and in different contexts, with the aim of offering useful references for both the clinical and forensic fields. More specifically, we performed an in-depth analysis to evaluate the variability in the prevalence of PTSD depending on the assessment method and the nature of the traumatic event.

## Results

The systematic search yielded 106 records. After duplicate removal and title and abstract screening, 77 full-text articles were retrieved. Out of them, 59 articles (including 65 meta-analyses, as one article<sup>25</sup> consist of 6 meta-analyses, one for each type of traumatic event) met the inclusion criteria for umbrella review (Fig. 1).

\*\*\*\*\*Please add Fig. 1 about here\*\*\*\*\*

## Characteristics of the included meta-analyses

The meta-analyses included in this umbrella review had examined the prevalence of PTSD in various populations (adults  $n = 41$ , adolescents and children  $n = 6$ , heterogeneous samples  $n = 18$ ) from different countries who have experienced multiple kinds of traumatic events, such as sexual violence ( $n = 1$ ), natural disasters ( $n = 10$ ), road traffic accidents ( $n = 4$ ), illnesses that were either their own or of their loved ones ( $n = 16$ ), circumstances related to armed conflicts and terrorist attacks ( $n = 13$ ), immigration status ( $n = 6$ ), incarceration ( $n = 2$ ), murder ( $n = 1$ ), etc. Thirty (46%) meta-analyses considered traumatic events of an interpersonal nature, 27 (42%) examined non-interpersonal trauma, and the final 8 (12%) examined the prevalence of PTSD in situations where the precise nature of the traumatic event could not be determined. Table 1 shows the characteristics of the 65 meta-analyses included in the present umbrella review.

Table 1  
Characteristics of the meta-analyses included in the umbrella review.

Author(s) and year of publication	Context	Assessment method	Type of study	Age	<i>k</i>	Events	Sample	Prev. (%)	(95% CI)	<i>I</i> <sup>2</sup> (%)	<i>p</i>	Amstar index
Abbey et al. (2015) <sup>47</sup>	Cancer	Interview + Self-report	Cross-sectional + Longitudinal	> 18	7	528	4189	12.6	7.4–20.7	79.2	< .01	Moderate
Agbaria et al. (2021) <sup>48</sup>	Political violence - children	Interview + Self-report	Cross-sectional + Longitudinal	< 18	25	5443	15121	36	30–41	98.6	< .001	Moderate
Alisic et al. (2014) <sup>64</sup>	Interpersonal trauma - children	Interview	Cross-sectional + Longitudinal	< 18	42	566	3563	15.9	11.5–21.5	NA	NA	Moderate
Al-saadi et al. (2022) <sup>27</sup>	Cancer – children	Interview + Self-report	Cross-sectional + Longitudinal	< 18	9	158	755	20.9	13.28–29.73	83.5	< .001	Low
Amiri (2022) <sup>65</sup>	Immigrants	Interview + Self-report	Cross-sectional + Longitudinal	> 14	51	10310	41240	25	22–29	99.47	< .001	Moderate
Arora et al. (2020) <sup>66</sup>	Covid-19	Interview + Self-report	Cross-sectional	> 18	6	1302	3945	33	0–86	99.7	< .001	High
Ayano et al. (2020) <sup>35</sup>	Homeless people	Interview + Self-report	Cross-sectional	> 18	19	5576	20364	27.38	21.95–33.57	97.67	< .001	Moderate
Badenes-ribera et al. (2020) <sup>26</sup>	Homicide	Interview + Self-report	Cross-sectional	> 14	11	321	754	42.6	38.0–47.4	19.5	0.405	Low
Baranyi et al. (2018) <sup>67</sup>	Prison	Interview + Self-report	Cross-sectional	> 18	50	2880	21099	13.65	10.4–17.3	93.5	NA	High
Blackmore et al. (2020) <sup>a</sup> <sup>68</sup>	Refugees – children and adolesc.	Interview	Cross-sectional	< 18	7	155	681	22.71	12.79–32.64	91.1	0	High
Blackmore et al. (2020) <sup>b</sup> <sup>69</sup>	Refugees	Interview	Cross-sectional	> 18	22	1459	4639	31.46	24.43–38.50	97.2	0	High
Burgess et al. (2021) <sup>36</sup>	Parents following paediatric medical events	Interview + Self-report	Cross-sectional	> 18	45	2043	6743	30.3	25.3–35.5	93.57	> .001	Moderate
Cabizuca et al. (2009) <sup>70</sup>	Parents of children with chronic illnesses	Interview + Self-report	Cross-sectional + Longitudinal	> 18	10	421	1845	22.8	16.4–29	NA	NA	Low
Cénat et al. (2020) <sup>71</sup>	Earthquake	Interview + Self-report	Cross-sectional + Longitudinal	> 6	24	2274	7997	28.44	17.68–42.37	99.31	NA	Low
Cénat et al. (2021) <sup>29</sup>	Covid-19	Self-report	Cross-sectional	> 18	13	6680	30449	21.94	9.37–43.31	99.85	NA	Moderate
Chen et al. (2015) <sup>72</sup>	Floods	Interview + Self-report	Cross-sectional	> 6	14	6390	40600	15.74	11.25–20.82	98.3	< .0001	Low
Cohen et al. (2015) <sup>73</sup>	War (military service)	Self-report	Cross-sectional + Longitudinal	> 18	20	39082	417985	9.35	5.8–12.9	NA	NA	Low
Cruz et al. (2020) <sup>74</sup>	Extreme weather events (UK)	Self-report	Cross-sectional	> 18	4	413	1359	30.36	11.68–49.05	99	< .01	Moderate
Dai et al. (2016) <sup>75</sup>	Earthquake	Interview + Self-report	Cross-sectional + Longitudinal	> 6	46	18005	76101	23.66	19.34–28.27	99.5	< .001	High

*Abbreviations:* *k*, number of studies included in the meta-analysis; events, number of PTSD diagnoses among people exposed to the traumatic event; sample, exposed to the traumatic event; CI, confidence interval; *I*<sup>2</sup>, heterogeneity; prev., prevalence; *p*, p-value; probab., probability; NA, not applicable.

\* No sample size provided.

Author(s) and year of publication	Context	Assessment method	Type of study	Age	<i>k</i>	Events	Sample	Prev. (%)	(95% CI)	<i>I</i> <sup>2</sup> (%)	<i>p</i>	Amstar index
Dai et al. (2018) <sup>37</sup>	Road traffic accidents – children and adolesc.	Interview + Self-report	Cross-sectional + Longitudinal	< 18	11	306	1532	19.95	13.63–27.09	90	< .01	Moderate
DiMaggio et al. (2006) <sup>*30</sup>	Terrorism	Interview + Self-report	Cross-sectional	> 18	42	NA	NA	15.9	0.6–35.9	NA	NA	Critical: low
Dworkin (2020) <sup>*31</sup>	Sexual violence	Interview	Cross-sectional	> 18	21	NA	NA	36.2	31–41	96.8	< .01	Moderate
Edmondson et al. (2012) <sup>38</sup>	Acute coronary syndrome	Interview + Self-report	Cross-sectional + Longitudinal	> 18	24	286	2383	12	9.0–16.0	80.85	< .001	Moderate
Edmondson et al. (2013) <sup>39</sup>	Stroke and transient ischemic attack	Interview + Self-report	Cross-sectional	> 18	9	148	1138	13	11.0–16.0	89.49	< .001	Moderate (10)
Fulton et al. (2015) <sup>76</sup>	War (freedom operations)	Interview + Self-report	Cross-sectional + Longitudinal	> 18	33	114250	494589	23.1	20–26	NA	NA	Moderate
Gualtieri et al. (2020) <sup>77</sup>	Prisoners' offspring	Interview + Self-report	Cross-sectional + Longitudinal	> 6	6	377	2512	15	0.81–24.9	92.637	< .001	High
Henkelmann et al. (2020) <sup>40</sup>	Refugees	Interview + Self-report	Cross-sectional + Longitudinal	> 6	59	3853	13288	29	23–36	99.2	< .001	High
Hines et al. (2014) <sup>*32</sup>	War (Iraq and Afghanistan)	Interview + Self-report	Cross-sectional + Longitudinal	> 18	55	NA	NA	10.13	8.06–12.20	99.4	< .001	Low
Hoell et al. (2021) <sup>41</sup>	Refugees	Interview + Self-report	Cross-sectional	> 6	25	3589	12002	29.9	20.8–38.7	NA	NA	High
Hoppen and Morina (2019) <sup>78</sup>	War (global pop.)	Interview	Cross-sectional	> 18	30	3901	16383	23.81	19.54–28.35	NA	NA	Moderate
Hoppen et al. (2021) <sup>79</sup>	War (global pop.)	Interview + Self-report	Cross-sectional	> 18	22	4088	15420	26.51	22.17–31.10	98	< .001	High
Hosseinnejad et al. (2021) <sup>49</sup>	Earthquake	Interview + Self-report	Cross-sectional + Longitudinal	> 6	16	4292	7719	55.6	49.9–61.3	96	0	Critical: low
Liang et al. (2021) <sup>80</sup>	Earthquake - elderly	Unknown	Cross-sectional	> 18	10	1208	4834	25	20–29	91.9	0.001	Moderate
Lin et al. (2018) <sup>50</sup>	Road traffic accidents	Interview + Self-report	Cross-sectional + Longitudinal	> 6	15	1514	6804	22.25	16.71–28.33	97.1	< .001	High
Loignon et al. (2019) <sup>*81</sup>	TBI -militar and civilia pop.	Interview + Self-report	Cross-sectional + Longitudinal	> 18	31	NA	NA	27.1	21.8–33.1	94.2	NA	Moderate
Morina et al. (2018) <sup>82</sup>	War (civilians)	Interview	Cross-sectional	> 18	30	4910	18886	26	0.23–0.31	97	< .001	High
Musanabaganwa et al. (2020) <sup>83</sup>	Genocide	Interview + Self-report	Cross-sectional	> 7	19	2937	11746	25	16–36	99.5	0	Moderate
Nagarajan et al. (2022) <sup>84</sup>	Covid-19	Interview + Self-report	Cross-sectional	> 18	13	175	1093	16	9.0–23	87.9	< .001	High
Nguyen et al. (2022) <sup>85</sup>	Refugees	Interview + Self-report	Cross-sectional + Longitudinal	> 18	5	341	1101	31	22–41	95.26	NA	High

*Abbreviations:* *k*, number of studies included in the meta-analysis; events, number of PTSD diagnoses among people exposed to the traumatic event; sample, exposed to the traumatic event; CI, confidence interval; *I*<sup>2</sup>, heterogeneity; prev., prevalence; *p*, p-value; probab., probability; NA, not applicable.

\* No sample size provided.

Author(s) and year of publication	Context	Assessment method	Type of study	Age	<i>k</i>	Events	Sample	Prev. (%)	(95% CI)	<i>I</i> <sup>2</sup> (%)	<i>p</i>	Amstar index
Rezayat et al. (2020) <sup>86</sup>	Earthquakes and floods – children and adolesc.	Interview + Self-report	Cross-sectional + Longitudinal	> 6	39	11212	58396	19.2	18.6–19.7	NA	NA	Critical/low
Rodrigues et al. (2021) <sup>87</sup>	Traumatic events of various kinds (not interp.)	Interview + Self-report	Cross-sectional + Longitudinal	> 6	26	4508	24276	18.57	13.8–23.87	96.22	<.0001	Moderate
Rona et al. (2016) <sup>28</sup>	War (UK service personnel)	Self-report	Cross-sectional + Longitudinal	> 18	8	85	3405	2.5	1.6–3.4	59.2	0.086	Low
Sahebi et al. (2021) <sup>88</sup>	Health care workers during Covid-19 pandemic	Interview + Self-report	Cross-sectional	> 18	7	43732	323459	13.52	9.06–17.98	65.5	0.008	Moderate
Sepahvand et al. (2019) <sup>a25a</sup>	Childbirth	Interview + Self-report	Cross-sectional	> 18	7	632	2527	25	14–37	97.82	NA	High
Sepahvand et al. (2019) <sup>b25b</sup>	Job (emergency staff)	Interview + Self-report	Cross-sectional	> 18	6	348	1161	30	4.0–66	99.35	NA	High
Sepahvand et al. (2019) <sup>c25c</sup>	Earthquake	Interview + Self-report	Cross-sectional	> 18	9	1980	3414	58	41–75	99.08	NA	High
Sepahvand et al. (2019) <sup>d25d</sup>	War	Interview + Self-report	Cross-sectional	> 6	9	3314	7052	47	32–63	98.84	NA	High
Sepahvand et al. (2019) <sup>e25e</sup>	Burn	Interview + Self-report	Cross-sectional + Longitudinal	> 18	2	53	133	40	27–66	NA	NA	High
Sepahvand et al. (2019) <sup>f25f</sup>	Accidents	Interview + Self-report	Cross-sectional	> 6	2	86	779	11	5.0–21	NA	NA	High
Sepahvand et al. (2019) <sup>g25g</sup>	Sexual violence	Interview + Self-report	Cross-sectional	> 18	2	148	200	74	67–80	NA	NA	High
Siqveland et al. (2017) <sup>42</sup>	Chronic pain	Interview + Self-report	Cross-sectional	> 18	21	655	6750	9.7	5.2–17.1	98.6	NA	High
Souza et al. (2011) <sup>89</sup>	Peacekeepers	Interview + Self-report	Cross-sectional	> 18	12	731	13782	5.3	3.4–7.2	96.8	NA	Critical/low
Steel et al. (2009) <sup>43</sup>	War (torture and other traumatic events)	Interview + Self-report	Cross-sectional	> 18	145	19696	64332	30.6	26.3–35.2	97.6	<.001	Low
Stein et al. (2021) <sup>90</sup>	War (human rights abuses - civilians)	Interview + Self-report	Cross-sectional	> 18	118	12458	40188	31	27–35	98.64	<.0001	Moderate
Suomi et al. (2021) <sup>91</sup>	Parents in child protection services	Interview + Self-report	Cross-sectional	> 16	11	1805	7848	23	17.0–29.0	97	0	Low
Swartzman et al. (2017) <sup>45</sup>	Cancer	Interview + Self-report	Cross-sectional + Longitudinal	> 18	76	1565	16755	9.34	4.96–20.2	NA	NA	Moderate
Van Praag et al. (2019) <sup>*34</sup>	TBI in civilian populations	Interview + Self-report	Cross-sectional + Longitudinal	> 18	31	NA	NA	15.64	12.88–18.40	82	<.00001	High
Wang et al. (2019) <sup>92</sup>	Typhoon or Hurricane	Interview + Self-report	Cross-sectional + Longitudinal	> 6	39	7680	43123	17.81	12.63–23.67	99.6	<.001	Moderate

*Abbreviations:* *k*, number of studies included in the meta-analysis; events, number of PTSD diagnoses among people exposed to the traumatic event; sample, exposed to the traumatic event; CI, confidence interval; *I*<sup>2</sup>, heterogeneity; prev., prevalence; *p*, p-value; probab., probability; NA, not applicable.

\* No sample size provided.

Author(s) and year of publication	Context	Assessment method	Type of study	Age	k	Events	Sample	Prev. (%)	(95% CI)	I <sup>2</sup> (%)	p	Amstar index
Warmerdam et al. (2019) <sup>93</sup>	Parents of children with cancer	Interview + Self-report	Cross-sectional + Longitudinal	> 18	31	2408	9262	26	22–32	96	NA	Low
Wilcoxon (2019) <sup>46</sup>	Child trauma effect on parents (doctoral thesis)	Interview + Self-report	Cross-sectional	> 18	41	743	4370	17	14.1–20.0	83.71	< .001	High
Woolgar et al. (2022) <sup>94</sup>	Various types of traumas – children	Interview	Cross-sectional + Longitudinal	< 7	18	417	1941	21.5	13.8–30.4	94.9	NA	High
Wu et al. (2016) <sup>95</sup>	Cancer	Interview + Self-report	Cross-sectional + Longitudinal	> 18	34	1543	16076	9.6	7.9–11.5	91.1	< .001	Moderate
Yildiz et al. (2017) <sup>96</sup>	Pregnancy and birth	Interview + Self-report	Cross-sectional + Longitudinal	> 18	59	1218	24267	5.02	3.52–7.12	NA	NA	Moderate
Yuan et al. (2021) <sup>97</sup>	Infectious disease pandemics in the 21st century	Interview + Self-report	Cross-sectional + Longitudinal	> 6	73	46066	203831	22.6	19.9–25.4	99.7	0	Moderate
Yunitri et al. (2022) <sup>98</sup>	Covid-19	Interview + Self-report	Cross-sectional + Longitudinal	> 18	63	21892	124952	17.52	13.89–21.86	NA	NA	High

*Abbreviations:* k, number of studies included in the meta-analysis; events, number of PTSD diagnoses among people exposed to the traumatic event; sample, exposed to the traumatic event; CI, confidence interval; I<sup>2</sup>, heterogeneity; prev., prevalence; p, p-value; probab., probability; NA, not applicable.

\* No sample size provided.

\*\*\*\*\*Please add Table 1 about here\*\*\*\*\*

All included meta-analyses, except six (<sup>25e</sup>, n = 133; <sup>25g</sup>, n = 200; <sup>25a</sup>, n = 681; <sup>26</sup>, n = 754; <sup>27</sup>, n = 755; <sup>25f</sup>, n = 779), included > 1000 cases, ranging from 1093 to 494,589. Of the 65 meta-analyses considered, 33 (51%) included studies with a cross-sectional research design, whereas 32 (49%) of them reported both longitudinal and cross-sectional studies. Regarding the methodologies used to evaluate PTSD, 53 (82%) of the meta-analyses included studies that used both clinical interviews and self-reports, 7 (11%) reported studies that used only interviews, 4 (6%) included studies that employed only self-report methods, and 1 (1%) did not specify the type of assessment. Furthermore, of the 65 meta-analyses, 25 (38.5%) were of high quality according to the AMSTAR-2 scoring system, 25 (38.5%) were of moderate quality, 11 (17%) received a low-quality rating, and 4 (6%) were considered of critically low quality (see Table 1).

## General prevalence of Posttraumatic Stress Disorder

The overall prevalence of PTSD varied widely across the 65 meta-analyses: ranging from a low of 2.5% (95% CI 1.6–3.4) in a British study by Rona and colleagues<sup>28</sup> on service personnel in conflict zones, to a high of 74% (95% CI 67–80) in a paper published by the Sepahvand-led research team<sup>25</sup> aimed at investigating the prevalence of PTSD following sexual violence. Figure 2 depicts the distribution of PTSD prevalence by the category of traumatic event. The studies included in the different meta-analyses were generally found to have high levels of heterogeneity ranging from 59.2%<sup>28</sup> to 92.64%<sup>29</sup>; the only exception was the study by Badenes-Ribera et al.<sup>26</sup> on the proportion of PTSD diagnoses following the commission of homicide (42.6%; 95% CI 38.0–47.4; I<sup>2</sup> = 19.5).

\*\*\*\*\*Please add Fig. 2 about here\*\*\*\*\*

Based on the random-effects meta-analysis model, the mean prevalence of PTSD was estimated to be 23.95% (95% CI 20.74–27.15; p < .0001; I<sup>2</sup> = 99.98%; SE = 0.0163). Five meta-analyses that lacked information on sample size and the number of PTSD diagnoses were ineligible for inclusion in the analysis<sup>30–34</sup>. The forest plot (see Fig. 3) illustrates both the PTSD prevalence from each meta-analysis and the overall prevalence. There was no evidence of publication bias or significant small-study effects, as suggested by the visual inspection of the funnel plot (please, see the Supplementary material S2) and by the Egger test, which was not statistically significant (p = 0.1886).

It is worthy of note the wide range in the prevalence of PTSD following time spent in conflict zones (Fig. 2), which ranges from a low of 2.5% (95% CI 1.6–3.4) in the study by Rona and colleagues<sup>28</sup> to a high of 47% (95% CI 32–63) in the study done by Sepahvand and colleagues<sup>25</sup>, despite the fact that it was not one of the research objectives of the present review.

\*\*\*\*\*Please add Fig. 3 about here\*\*\*\*\*

## Prevalence of PTSD using Structured clinical interviews vs. self-report measures

In order to ascertain whether there would be a difference in the number of PTSD diagnoses depending on the method of assessment used, a comparison of 16 meta-analyses that included both studies using structured clinical interviews and studies employing self-report instruments for the evaluation of PTSD

following the same traumatic experience was conducted. The results are displayed in Fig. 4. In 12 out of 16 meta-analyses, the use of structured clinical interview led to fewer PTSD diagnoses than the use of self-report instruments<sup>35-46a</sup>, and this difference was found to be statistically significant in nine studies<sup>35, 37-39, 42-46a</sup>. Regarding the remaining 4 meta-analyses<sup>47-50</sup>, two found no difference in the prevalence of PTSD based on the assessment method<sup>48, 49</sup>, whereas two reported the opposite finding<sup>47, 50</sup>, which in one instance was statistically significant<sup>50</sup>.

\*\*\*\*\*Please add Fig. 4 about here\*\*\*\*\*

## Prevalence of PTSD after Interpersonal vs. natural events

The Independent Samples T-Test performed on data from meta-analyses that separately examined interpersonal events (e.g., sexual violence, war, a loved one's death or illness) and non-interpersonal events (e.g., earthquakes, floods, and hurricanes) did not yield statistically significant results ( $p = 0.161$ ). Therefore, the results of the studies conducted by Breslau, Pietrzak and their respective research teams<sup>21, 22</sup> were not replicated.

## Discussion

In light of the many challenges involved in assessing PTSD and the impact these have on diagnoses, the main purpose of this umbrella review was to provide an examination of the disorder's prevalence following various types of traumatic events and on the basis of the assessment method used. To the best of our knowledge, this is the first umbrella review to compile the most recent data on the incidence of PTSD following different types of traumatic experience. The overall PTSD prevalence determined using a random-effects meta-analysis model amounted to 23.95% (95% CI 20.74–27.15) with no evidence of publication bias or significant small-study effects, but a high level of heterogeneity between the meta-analyses.

Variability in prevalence rates can be attributed to different factors and their interactions. The methodological differences between the meta-analyses and the studies contained in them, including small samples and sampling methods, the nature and severity of the traumatic event, the composition of the afflicted population (males vs. females, adults vs. children and adolescents), the diagnostic method selected, the number of stressful events already experienced by individuals, and so on, might have impacted the heterogeneity of prevalence estimates.

The investigation of PTSD prevalence based on the assessment method revealed an interesting outcome that is consistent with the scientific literature. It was discovered that, overall, the use of structured clinical interview results in a lower prevalence of PTSD than the use of self-report instruments after considering 16 meta-analyses of studies that had used both clinical interviews and self-report instruments to evaluate disorder prevalence following exposure to traumatic events of the same nature. This difference was found to be statistically significant in 8 out of 16 studies. Regarding the remaining meta-analyses, two studies showed no statistical difference in terms of the choice of assessment method, whereas the final two reported the opposite result, showing a lower prevalence following the use of self-report measures. The outcome of this comparison is in agreement with previous studies, which confirm that the prevalence of psychiatric disorders is often higher when measured with self-report instruments than when clinical interviews are conducted<sup>39</sup>. Indeed, although the use of questionnaire-based screening instruments is preferred by many practitioners for clinical settings due to the ease and velocity of administration, low cost, and wide availability in many languages, it is well known that there is considerable variation in sensitivity - the ability of the test to accurately recognize as positive those who present with the disorder (PTSD in this case) - and specificity - the ability of the test to correctly identify as negative those who do not present with the disorder - between diagnostic and screening instruments used to estimate the prevalence of PTSD<sup>35</sup>. Specifically, as questionnaires are often constructed for screening purposes, they provide cut-offs for the likely diagnosis of PTSD biased towards sensitivity rather than specificity<sup>42, 51</sup>. This is related to the fact that, as suggested by Henkelmann and colleagues<sup>40</sup>, self-report measures only provide the caseness of a mental disorder (i.e., a screening condition qualifying for thorough clinical assessment), whereas clinical interviews provide a formal diagnosis. This supports the perspective, shared by researchers such as Swartzman and colleagues<sup>45</sup>, that self-report measures, despite potentially effective indicators of symptomatology, should be used with caution as diagnostic tools. Regarding the opposite results recorded in the study conducted by Lin's<sup>49</sup> research group, the discrepancy might be attributed to the different origin of the samples taken into consideration by the individual studies. In particular, the studies that had employed structured interviews were more likely to recruit participants in clinical sites with more serious injuries, whereas the studies that had employed self-report questionnaires were more likely to recruit participants in population-based sites with moderate injuries. Finally, with respect to the meta-analyses in which no difference was recorded on the prevalence of PTSD based on the selection of evaluation technique, the inconsistency of the results with those of previous similar studies could be due to the imbalance in the proportion of studies that had used clinical interviews versus those that had used self-report instruments.

In terms of the traumatic event's nature, the independent samples t-tests conducted on data from meta-analyses that evaluated interpersonal events (e.g., sexual violence, war, a loved one's death or sickness) and non-interpersonal events (e.g., earthquakes, floods, hurricanes) did not generate statistically significant findings, although meta-analyses for which it was not possible to determine the nature of the event (e.g. refugees, homeless people, prisoners, etc.) were excluded from the analysis. This outcome does not line up with earlier research that demonstrated that sexual violence and other interpersonal or *intentional* traumas had more severe and incapacitating psychological effects than exposure to non-interpersonal or *non-intentional* traumatic events<sup>20-22</sup>. The lack of replication of these results might be due to the difficulty in distinguishing between the interpersonal and non-interpersonal components of specific events. For example, an individual who develops PTSD following a natural disaster may both have been in mortal danger or sustained injuries (*natural* or non-interpersonal component) as well as suffered the loss of a loved one (interpersonal component). Similarly, individuals diagnosed with PTSD because of being exposed to COVID-19 virus, may have developed the disorder in response to one or a combination of several factors, such as fear for their safety, grief caused by the illness or death of a loved one and forced isolation due to government restrictions and/or contagiousness.

To complete the discussion of the findings from this umbrella review, it is worthy to mention the appearance of an unexpected result that was not anticipated in the research objectives. This outcome consists of the enormous heterogeneity in the prevalence of PTSD among individuals who have spent time in war zones (see Fig. 2), which ranges from a low of 2.5% (95% CI 1.6–3.4) in the study by Rona and colleagues<sup>28</sup> to a high of 47% (95% CI 32–63) in the study



conducted by Sepahvand's research team<sup>25</sup>. This heterogeneity may be explained by several factors, including individual differences, the composition of the sample, the conflict's location, duration and severity, the degree of involvement in the military actions, the specific experience in the field (e.g., injuries sustained, death or injury of a loved one), the assessment method used to evaluate the presence of the disorder and the possible presence of incentives to simulate or exaggerate PTSD symptoms in view of potential compensation. Once again, further research will be required to properly evaluate the influence of each of the aforementioned factors on the overall PTSD prevalence following war exposure.

The present study's strengths include the meticulous execution of the systematic search, study selection, and data extraction, as well as the summary of current evidence in accordance with the established standards and recommendations for conducting umbrella reviews<sup>52,53</sup>. Additionally, inclusion criteria only allowed studies with an established diagnosis of PTSD defined by the ICD or the DSM, which was checked for each systematic review or meta-analysis. Therefore, there was no research which targeted PTSD symptoms and/or "probable PTSD". Furthermore, according to the AMSTAR-2 ranking system, 77% of the included meta-analyses were rated as being of high or moderate quality<sup>54</sup>.

This umbrella review also has several limitations which should be acknowledged. First, there may be selection bias due to the chance that databases not chosen and searched for this review might have included articles that would have satisfied its criteria. Second, we only collected data on parameters evaluated in meta-analyses, and papers that were not included in this type of publication were not eligible for inclusion. Third, we did not evaluate the individual studies that were part of the meta-analyses in terms of their quality (since it fell outside the scope of the umbrella review). Fourth, the 23% of the collected meta-analyses were of low to critically low quality, thus limiting the generalizability of the synthesised findings. Fifth, PTSD criteria have changed over time in different DSM and ICD editions; as a result, certain meta-analyses might have taken into account PTSD diagnoses based on symptom profiles that would not have satisfied the prior diagnostic criteria, or vice versa.

## Conclusions

PTSD is one of the most severe, disabling, and pervasive mental disorders that can come from trauma exposure, yet its assessment and diagnosis are still controversial, making it difficult to synthesise and apply knowledge. This umbrella review examined PTSD prevalence after various traumatic situations, taking into account different traumatic events. This analysis gives a solid foundation for future research, PTSD assessments, and forensic diagnosis evaluations.

Future studies should examine how each of the factors affects PTSD prevalence. In particular, new data and techniques to account for interfering variables are needed to determine whether the prevalence of the disorder varies by reference sample age, traumatic event type (interpersonal vs. non-interpersonal), and likelihood of filing a lawsuit for compensation. The existing information on PTSD requires combining clinical and forensic contexts to better understand its prevalence and analyse malingering with suitable psychological tools. To fully comprehend post-traumatic stress disorder and its components, more research must precisely and carefully analyse traumatic memories and fragmented recollections. This will allow scholars and clinicians to address the difficult concept of "fragmentation" and define adequate criteria to assess memory fragmentation in PTSD patients, hopefully leading to a high level of unanimity among assessors. Finally, evidence-based insights should be converted into an update of diagnosis guides accepted by the scientific community, precise assessment criteria, and suitable instructions to manage the disease in clinical and forensic contexts.

## Online Methods

The current umbrella review was carried out adopting the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) guidelines<sup>52</sup> and the *Joanna Briggs Institute* (JBI) methodology for umbrella reviews<sup>55</sup>. The PRISMA flowchart<sup>56</sup> was used to represent the screening phase and the selection process. The study protocol was pre-registered with the *International Prospective Register of Systematic Reviews* (PROSPERO; CRD42022322800).

### Review's aim and research questions

The current umbrella review aims to provide an answer to the following research questions:

1. What is the mean prevalence of PTSD pooling all the studies available where participants have been exposed to different traumatic events?
2. Does PTSD prevalence differ according to the type of traumatic event that a patient has experienced?
3. Does the prevalence of PTSD vary depending on the diagnostic tool used (i.e., self-report vs structured clinical interviews)?
4. Does PTSD prevalence vary depending on whether a patient has experienced natural disaster or interpersonal trauma?

### Search strategy

Google Scholar, EBSCO (CINAHL Complete, Psychology and Behavioral Sciences Collection, APA PsycInfo, APA PsycArticles), Web of Science, PubMed, Galileo Discovery were searched for systematic reviews with quantitative synthesis and meta-analyses of observational studies investigating PTSD prevalence. For each database, titles, abstracts, subject headings, and general keywords were searched with no language or time constraints. The literature search began on the 17th of March 2022, and all databases and additional sources were searched from inception until the 3rd of April 2022. Moreover, further studies were found by means of the "related articles" function provided by ConnectedPapers (<https://www.connectedpapers.com/>) and by tracing the references from review articles and the identified papers. If two or more meta-analyses included a complete or substantial overlap in primary studies, the most recent or broader one was employed (please, see Supplementary material S1 for the search strategy).

### Inclusion and exclusion criteria

Studies were included in the umbrella review if they met the following inclusion criteria:

- a. meta-analysis of individual observational studies (case-control, cohort, cross-sectional and ecological studies) that assessed the prevalence of PTSD;
- b. studies considering any established diagnosis of PTSD defined by the *International Classification of Diseases* (ICD) or the *Diagnostic and Statistical Manual of Mental Disorders* (DSM);
- c. studies including the lifetime prevalence of PTSD among survivors after traumatic events;
- d. studies reporting sufficient data for the analyses (e.g., number of PTSD diagnoses among people exposed to the traumatic event and number of individuals who experienced the traumatic event or PTSD prevalence).

Despite meeting the aforementioned inclusion criteria, some studies were rejected due to the following exclusion criteria:

- a. Meta-analysis that did not present study-level data with 95% confidence intervals (CI);
- b. Systematic reviews with no quantitative analysis;
- c. Reviews that incorporated theoretical studies or published opinion as their primary source of evidence.

Please, see Fig. 1 for the PRISMA flow diagram of study screening and selection.

### Data extraction and selection

A systematic approach was used to extract and select the data. First, the factors assessed in each systematic review or meta-analysis were identified. Second, each meta-analysis was checked to ensure that it met the eligibility criteria. Third, the previously identified factors were extracted (from the meta-analysis or, in some cases, from the individual studies): first author and year of publication; type of traumatic event; assessment method; type of study (cross-sectional or longitudinal); target population (adults, adolescents or children); number of cases and total sample size; PTSD prevalence and corresponding 95% confidence interval (CI); heterogeneity and p-value. The data extracted from the meta-analyses can be viewed in Table 1.

AMSTAR-2 (*A Measurement Tool to Assess Systematic Reviews*)<sup>54</sup>, a 16-point evaluation tool assessing the methodological quality of systematic reviews and meta-analysis, was used to evaluate the quality of the included meta-analyses. Test-retest reliability, content validity, and inter-rater agreement are all strong points of AMSTAR-2. The following categories served as the foundation for evaluating reviews: (a) formulation of the research question; (b) provision of an a priori design; (c) justification of the study designs of the included studies; (d) a thorough review of the literature; (e) study selection; (f) data extraction; (g) a list of excluded studies, as well as an explanation of why they were excluded; (h) thorough description of the key features of the included studies; (i) risk of bias assessment; (j) details regarding the funding sources; (k) techniques for statistically combining results; (l) assessment of the potential impact of individual study bias risk on the meta-analysis result; (m) discussion/interpretation of the potential impact of individual study bias risk on the meta-analysis result; (n) discussion of the heterogeneity seen in the study results; (o) probability of publication bias; and (p) conflict of interest disclosure for the study's authors. Seven of these 16 domains, referred to as "critical domains", can have a significant impact on the validity of the assessment and its result (domains *b, d, g, i, k, m* and *o*). There are three possible responses for each item: a full yes, a partial yes, or a no. Although AMSTAR-2 is not meant to be scored, it does provide a method for analysing flaws found in both critical and noncritical items: studies of "high-quality" reveal no or a single noncritical weakness; studies of "moderate-quality" reveal multiple noncritical flaws but no critical flaws; studies of "low-quality" reveal a single critical flaw with or without noncritical weaknesses; and studies of "critically low quality" reveal multiple critical flaws with or without noncritical weaknesses.

### Statistical analysis

The statistical analyses employed are the ones commonly used in standard meta-analyses. The analyses were carried out using the software R 4.2.1<sup>57</sup> with the packages *meta*<sup>58</sup> and *metafor*<sup>59</sup>. Due to the significant level of expected heterogeneity between reviews, a random-effects meta-analysis model was performed. The outcomes were the mean PTSD prevalence with its 95% CIs, heterogeneity, and p-value. Between-study heterogeneity was assessed with the  $I^2$  metric<sup>60</sup>.  $I^2$  has a range of 0% to 100%, and for values of 25%, 25-49%, 50-74%, and > 75%, it is categorised as low, moderate, big, and very large, respectively<sup>61</sup>.

Visual inspection of funnel plot and Egger tests<sup>62</sup> were used to ascertain whether there was evidence of small-study effects, where statistical significance would indicate potential reporting or publication bias in smaller studies<sup>63</sup>.

In order to fulfil the research objectives and assess the variability of PTSD prevalence depending on the aforementioned criteria, independent samples t-tests were applied to the samples under investigation, by considering the method of assessment (structured clinical interviews vs. self-report measures) and the nature of the event (natural vs. interpersonal) as independent variables and disorder prevalence as dependent variable.

## Declarations

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## Conflicts of interest

The authors have no competing or potential conflicts of interest to declare.

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## Figures

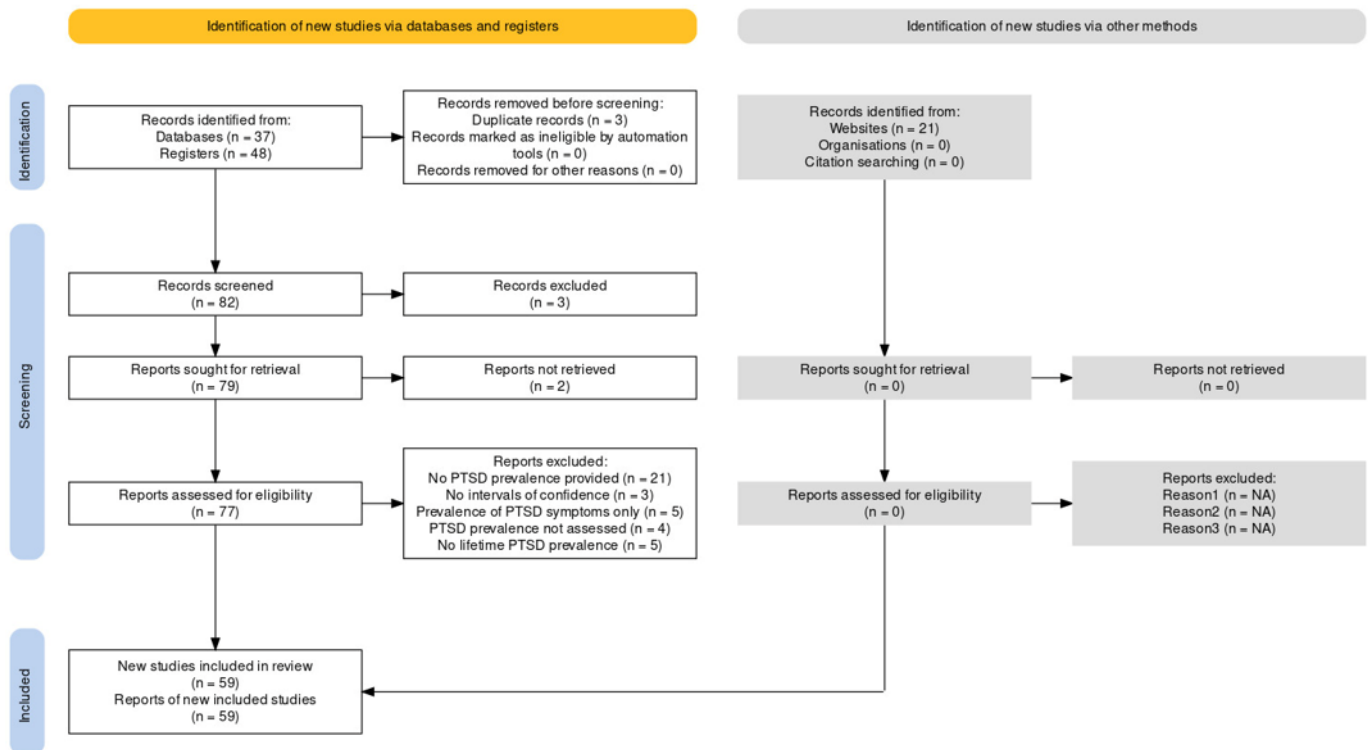
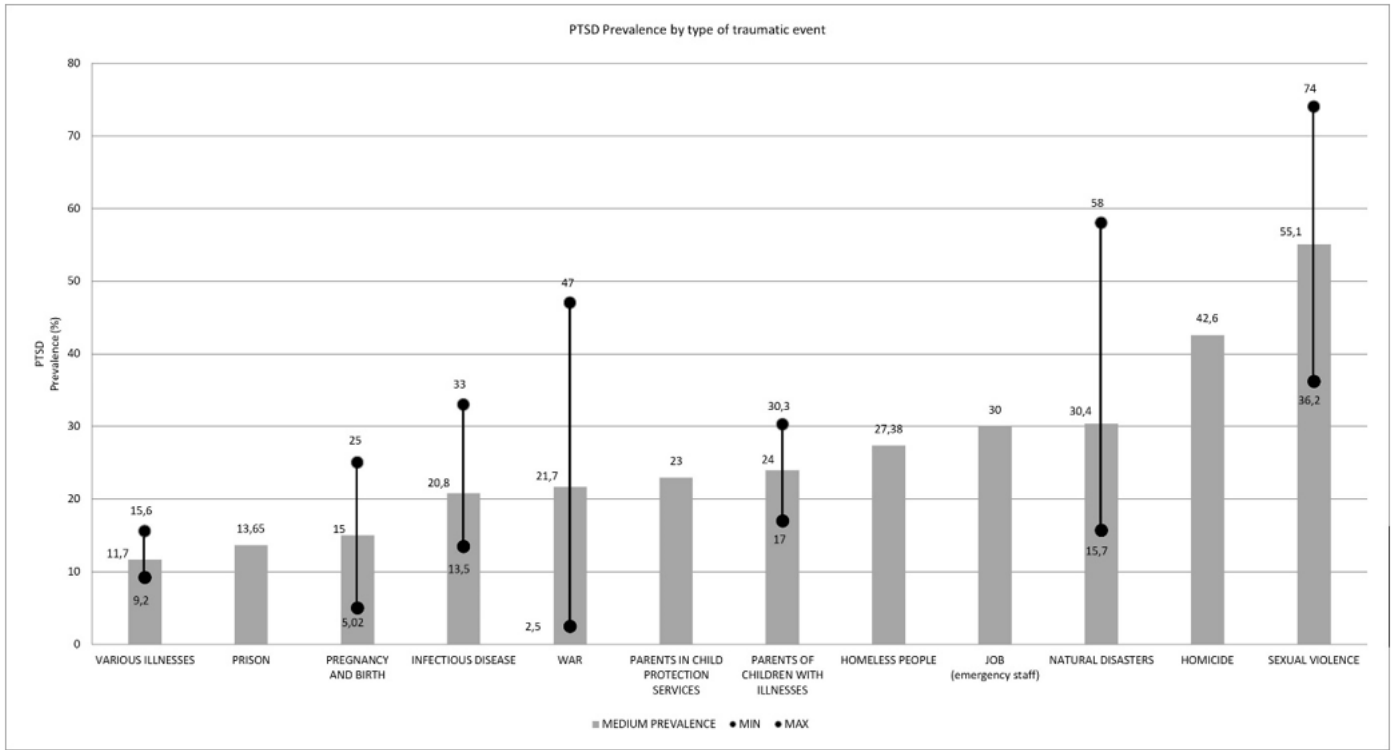


Figure 1

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram showing the literature search results.



**Figure 2**  
 PTSD Prevalence by type of traumatic event. Error bars represent the variability of the disorder prevalence for each type of traumatic event considered. Columns without minimum and maximum values refer to a single meta-analysis.

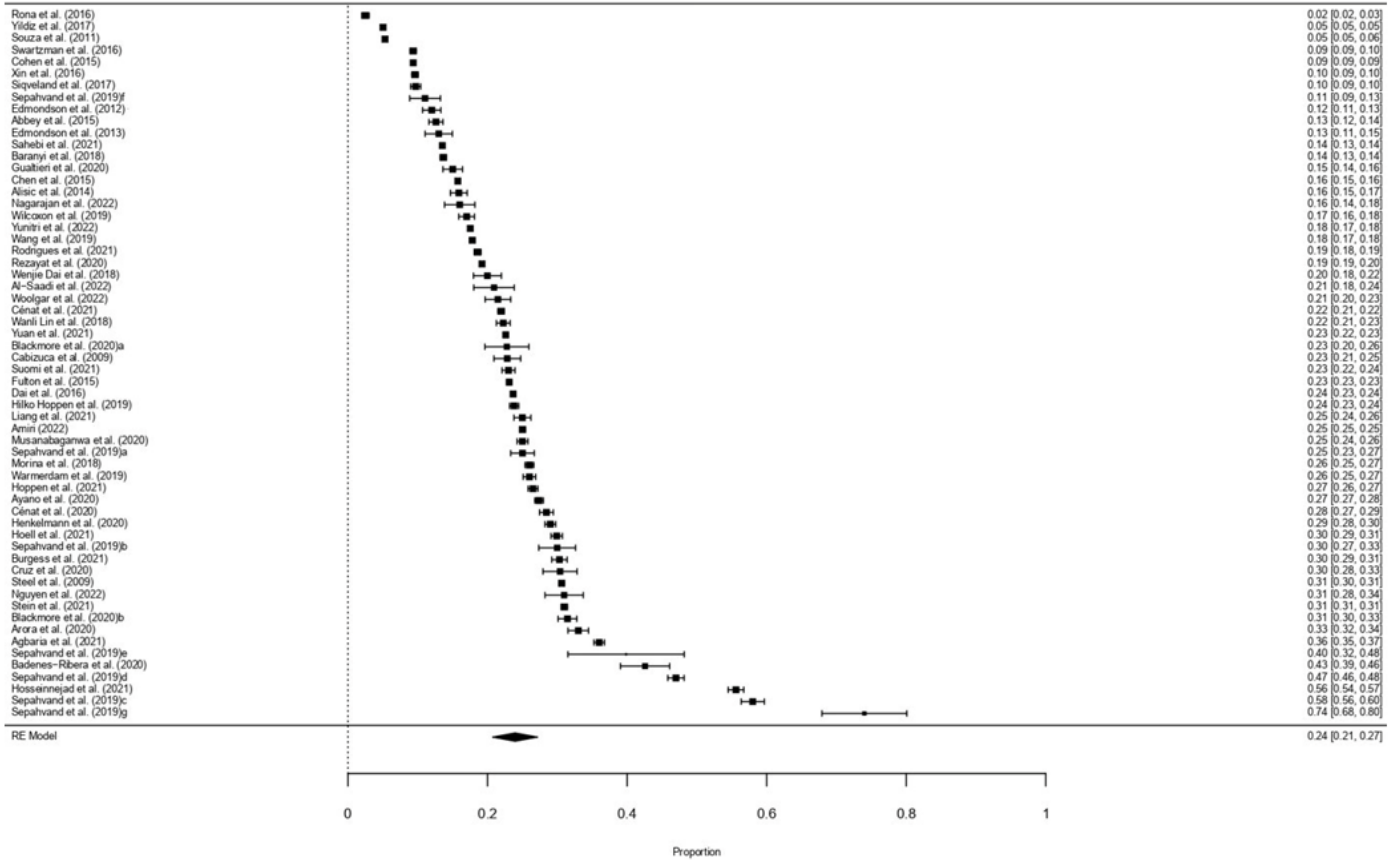


Figure 3

Forest Plot of PTSD prevalence reported by each meta-analysis and overall prevalence.

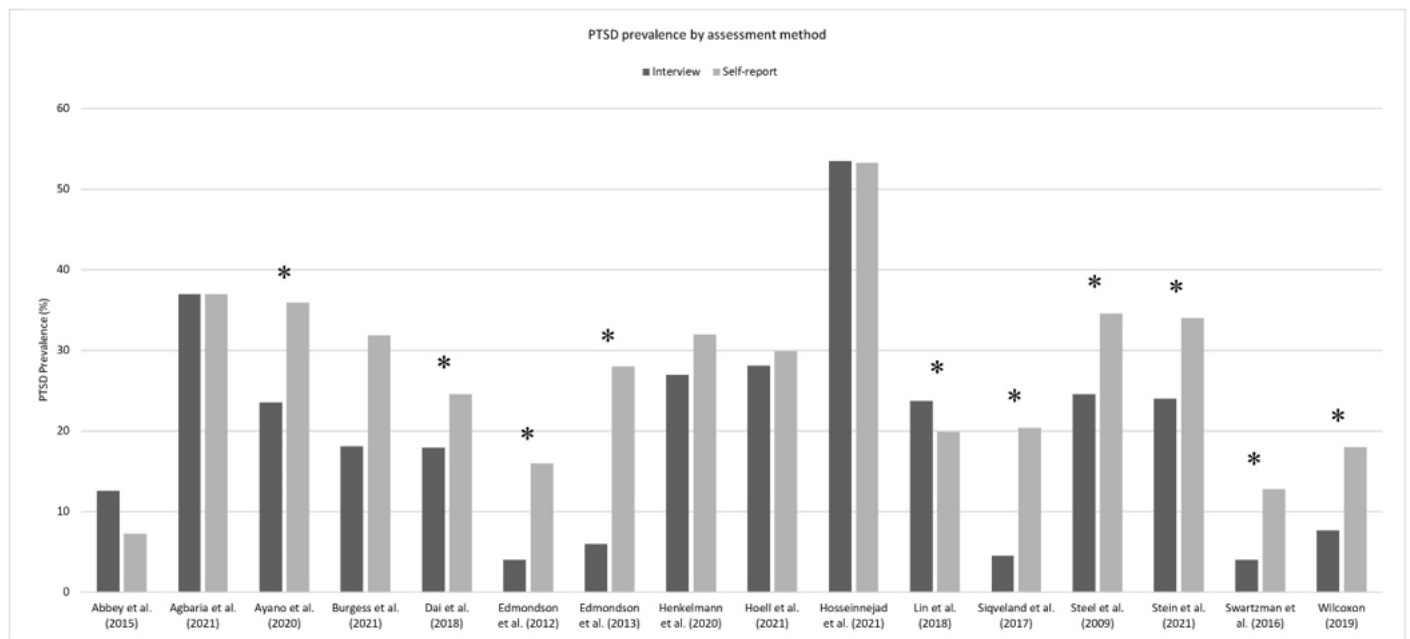


Figure 4

Comparison of the PTSD prevalence reported in 16 meta-analyses according to the assessment method (\* = statistically significant difference).



## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryMaterialS1.pdf](#)
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