Risk and Resilience Factors of Post-Traumatic Stress Disorder: A Review of Current Research

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Abstract

Traumatic events can occur among both the military and the civilian population and a small but clinically meaningful subset of trauma-exposed individuals develops a post-traumatic stress disorder (PTSD). Essentially, this refers to a pattern of severe negative responses in the aftermath of a traumatic event.

Aim: Despite its event-based aetiology, PTSD is not exclusively and directly caused by a traumatic stressor. As a traumatic event does not invariably result in the expression of PTSD, an understanding of the antecedent conditions is paramount. In recent years, numerous studies have addressed the precipitating and preventive factors of PTSD development and revealed interesting but conflicting data.

Overview: To address the discrepant results, this brief summary attempts to outline the state of research 2006 onwards. By synthesizing results from meta-analyses and systematic reviews, the present work seeks to advance our understanding of vulnerability and resilience mechanisms associated with PTSD susceptibility and expression.

Conclusion: Overall, prior work has consistently implicated posttrauma stressors in the development of PTDS whereas pretrauma variables seem only weakly associated with the disorder. These findings are encouraging, since posttrauma factors might be more adjustable and modifiable than relative static demographic variables. By implication, the dynamic risk factors operating subsequent to trauma might provide an access for targeted interventions. Before extrapolating more specific implication for screening and treatment, the apparent inconsistencies in the extant literature accentuate the need for more standardized and systematic research strategy. Better insights into the predictive and protective factors of PTSD may inform the development of screening tools and preventive interventions for at-risk population.

Phenomenology and Diagnosis

PTSD represents the only psychiatric condition where the exposure to a situational stressor and the subsequent reaction constitutes a diagnostic criterion. The ICD–10 criteria for diagnosing PTSD require that the individual [1] has been exposed to a traumatic incident [2] suffers from distressing re-experiencing symptoms elicited by the trauma. According to the DSM, three clusters of symptoms – intrusive memories, avoidance and arousal - must have been experienced for a period of at least one month. The apparent differences between the two diagnostic systems have been discussed more extensively in the guidelines published by the National Institute of Clinical Excellence [1]. However, the three-factorial DSM–IV framework raised controversies and a revision of diagnostic criteria has been proposed for the DSM-V [2]. Investigating a non-clinical sample, Elhai et al. [3] found that 67% of the healthy participants reported at least one traumatic event as defined in the DSM-IV, while 59% would meet the trauma criteria proposed in the DSM-V. Similarly, converging lines of evidence have called into question the conceptual distinction between delayed-onset and immediate-onset forms of PTSD introduced in the DSM-III [4].

To date, the diagnostic classification approaches forwarded by the ICD and DSM primarily operate on a categorical basis. They are almost exclusively focused on the presence or absence of symptoms within a specified period and not yet sensitive for different trajectories. In response to dissatisfaction with the traditional paradigm, a new line of research emerged that departs from a categorical understanding of PTSD and shifts attention towards its developmental mechanisms. A veritable amount of literature has now been generated on the diverse avenues and outcomes of PTSD As a comprehensive review of 54 studies indicates, several dimensions traditionally conceived as symptoms might actually be antecedents of PTSD [5]. Even some of the hallmark features such as arousal have been designated as pretrauma factors that may contribute to the aetiology of PTSD. Further research is required then for discerning the antecedents from the consequences of PTSD research.

In an effort to systematize the heterogeneous pathways of PTSD, Bering [6] forwarded an empirically-derived typology that divides between the dependent, paranoid-hallucinating, suicidal and pain-related phenomenological subtypes of PTSD. They can be distinguished with respect to the presentation, duration and severity of their symptoms and potential comorbidities. Patients who belong to the dependent trajectory class tend to misuse substances in an effort to cope with traumatic experiences. Those within the paranoid-

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hallucinating class were vulnerable to borderline and paranoid personality disorders and delusions. Suicidal trajectories are associated with parasuicidal tendencies. Persons with a pain-related trajectories suffered from somatic problems, including lower back pain. Each of these pathways develops in response to a specific interaction of antecedent and situational factors and is then maintained by individual's habitual coping style. Fully consonant with the paradigm of multifinality and quality, the constellation of individual predisposition and situational stressors can elicit entirely different trauma pathways. Clinical and empirical evidence has been obtained that substantiates this compelling and intuitively appealing framework.

Aetiology of PTSD

While the vulnerability-stress model applies to almost every psychiatric disorder, its explanatory power becomes evident when considering the aetiology of PTSD. As has been pervasively demonstrated in past studies, exposure to a traumatic event constitutes a necessary but not the singular condition for PTSD. Some individuals never display clinically meaningful symptoms, despite having experienced a severe trauma [7]. Indeed, the majority of trauma victims seem to adjust in the aftermath of the critical event and less than 10% of them develop PTSD [8]. One compelling explanation for the differential effects relates to the well-documented principles of multifinality and equifinality, derived from extensive research on developmental psychopathology [9]. Since its very inception, the notion of multifinality and equifinality attracted considerable research interested and has been transferred to PTSD. According to the notion of multifinality, a certain stressor does not invariably result in the expression of a disorder but can evoke a range of responses. These are a function of individual differences in vulnerability, which predisposes for specific disorders. Equifinality describes the mechanisms whereby a variety of developmental pathways and antecedent condition result in the same end state [10]. With respect to the aetiology of PTSD, different types of trauma can elicit the same symptom clusters. Conversely, exposure to the same traumatic stressor can result in entirely different responses, ranging from subclinical to pathological ones. By implication, the traumatic stressor itself seems to be a catalyst that exacerbates the vulnerability conferred by biological, behavioural and social risk factors.

There has been extensive research on risk factors beyond the traumatic experience itself that might precede chronic forms of PTSD. Protective factors go beyond the mere absence of risks and actively operate under adverse conditions. They possess a unique protective value that contributes to positive developmental and mental health outcomes in high-risk contexts [11]. Therefore, protective and risk are currently discussed as orthogonal rather than oppositional constructs. Traditionally, these predictors of PTSD have been stratified into pretrauma, peritrauma and posttrauma risk factors [12]. More recently, the specification of variables that precede and predict different PTSD trajectories has attracted extensive research coverage. Longitudinal data from a carefully designed study on the trajectories of PTSD in former political prisoners reveal some of the predictors of resilience and vulnerability [13]. To examine the prevalence and patterns of different trajectories, interviews were administered at two measurement points during a 14-year interval. A parsimonious and convincing four-factorial solution emerged from the data analysis and differentiates between chronic, resilient, recovered and delayed trajectories of PTSD. Among the sample consisting of 86 former political prisoners, the chronic course was the most prevalent one

(36%). A similar number of resilient (27%) and recovered (26%) trajectories have been detected, while delayed courses of PTSD appear to be less common (12%). In response to notable changes in symptom presentation, 38% of the participants were removed from their initial trajectory class and assigned to a different one. Hence, the diagnosis of a particular trajectory is not an ultimate and invariant one. Indeed, there is considerable variation in the phenomenology and symptom presentation between individuals and over prolonged periods. To explain this variability, the study investigated how pre-, peri- and posttrauma factors contribute to the course of PTSD.

Essentially, chronic trajectories were frequently observed in patients with severe trauma experiences, higher numbers of intermediate comorbidities, lower education levels and reduced availability of social support. Conversely, the recovered pathway was predicted by fewer comorbid diagnoses and higher levels of social support. Resilient trajectories were only preceded by factors operating subsequent rather than prior to or during the trauma; the predictors implicated in resilient pathways include a lower number of comorbidities and an alleviated impulse to disclose about the trauma. Individuals who experienced social support were more likely to belong to recover, whereas maladaptive self-disclosure decreased the probability of resilient pathways. Interestingly, participants with a lower treatment frequency and self-disclosure tendency were more likely to belong to the resilient group. These observations might be a function of reduced symptom severity; the resilient participants seem to experience less strain from the onset and therefore exhibit a reduced demand for treatment and self-disclosure. Overall, the longitudinal data underscores the contribution of specific risk factors to the development and long-term trajectories of PTSD. To elaborate these risk and resilience mechanisms, the following sections provide an outline of current research on different PTSD predictors.

Pretrauma Risk Factors

Regarding the pretrauma and demographic factors of PTSD, the disorder seems to be more prevalent among trauma survivors with premorbid trauma experiences [14], a low educational level, lack of subjective preparedness and a history of childhood adversity [15]. A 4-year long longitudinal study on the factors that precipitate PTSD in a military sample reported a greater prevalence of the disorder among individuals with premorbid mental health problems. However, their unique contribution to PTSD risk is relatively weak compared to that of group cohesion and combat exposure. When controlling for the effect of baseline psychic symptoms, the amount of variance explained by the other two predictors did not change significantly [16]. By implication, the mental health status is not necessarily predictive for PTSD susceptibility and expression. A similar conclusion applies to the risk conveyed by prior trauma that has only been associated with increased PTSD risk if the trauma survivor already developed the disorder in response to the first trauma [17]. Interestingly, the relationship status at the time of deployment seems to be predictive for PTSD development in military samples: an increased risk has been observed among military service individuals who were single, divorced or separated [15].

One of the most consistent findings in PTSD research is the higher risk of this disorder in women. There is considerable support for a greater PTSD prevalence in female trauma survivors [17,18]. Tolin and Foa [19] conducted a comprehensive meta-analysis of gender differences in PTSD and observed a twofold risk for women. Compared to males, females were twice as likely to fulfil the diagnostic

criteria for PTSD. By implication, exposure to a traumatic event appears to induce a higher PTSD risk in women than in men. However, the evidence for significant gender differences is mixed and inconclusive to date. While researchers reported a twofold risk for PTSD among female survivors of an industrial disaster [20], others detected considerable [21-23] or no gender differences in the military [15,24] but not in the civilian population [25]. Overall, contribution of gender to PTSD susceptibility and expression seems to depend on its interaction with other moderating factors such as trauma type. When comparing gender differences in PTSD across different types of trauma, only those involving physical or sexual assault seem place women at a greater risk than men [8]. Somewhat contrasting findings have been observed in a military sample, where males developed more severe symptoms of PTSD and distress than females in response to sexual abuse [26]. A closer inspection of the available findings reveals potential moderating factors that might account for the gender specific PTSD risks. Compared to women, men are more inclined to consume alcohol as a maladaptive coping strategy and this might confound disclosure and diagnosis of PTSD symptoms [26]. Also, there is ample evidence for the contribution of increased trait anxiety and subjective threat perceptions to PTSD and these predictors are more pronounced in females than in males. Complex interactions between multiple risk factors rather than linear gender effects can predispose females to develop PTSD. Women might not be inherently vulnerable to the disorder but exposed to specific conditions that amplify their risk for PTSD susceptibility and expression. To account for the gender differential in PTSD risk, a consideration of the distinctive predictors and vulnerability mechanisms in males and females is paramount. While rape and intimate partner violence have been investigated extensively among women, the risks they convey for men merits future research.

With respect to biological predisposition, an empirical synthesis of twin studies identified pretrauma reduced hippocampal volume, lower general intellectual ability and deficits in executive function, attention and declarative memory as prominent risk factors. Zhou et al. [26] screened 14.798 adult survivors six months after a severe earthquake and observed that old age, female gender and living alone represent salient risk factors for PTSD. Using standardized psychiatric instruments, Naeem et al. [27] obtained data from 1200 adult survivors of a severe earthquake in Pakistan and pervasively demonstrated that living in a joint family predicted resilience against PTSD. Results from a comprehensive meta-analysis inform about the risk conveyed by a set of pre-, peri- and posttrauma variables [28]. A total of 64 studies with 32,238 participants aged 6-18 have been selected from the extant literature. Pretrauma and demographic parameters such as age and premorbid psychiatric status yielded small to moderate effects and seem only weakly implicated in PTSD development. Consequently, their value as a predictor and target variable for screening is deemed as low. Discrepant findings on the predictive power of pretrauma psychopathology have been obtained by another meta-analysis, that examined predictive and protective factors of accident related PTSD in children and adolescents [29]. As the meta-analysis was exclusively focused on PTSD following, only 14 single studies fulfilled the inclusion criteria. From the range of predictors that have been examined, pretrauma psychopathology emerged as a prominent risk factor for PTSD. Given the restricted scope and sample size of the study, the outcomes need to be interpreted with caution and may not apply to other trauma types and populations. By implication, only a subset of pretrauma risk and demographic factors has been consistently associated PTSD development. As these variables seem

relatively invariant and difficult to change, they may not be an effective target for intervention but potentially helpful for screening purposes.

Peritrauma Risk Factors

Of the factors that predict the development of PTSD, those operating during the event are among the principal ones. Trauma type, frequency and impact of the event as well as level of perceived distress are well-documented peritrauma risk factors in the military population [7]. Based on an examination 4762 military service individuals, perceived threat to life and the length of the traumatic episode have been designated as a major predictors of PTSD symptoms [15]. Concordantly, a meta-analysis comprising 45 single studies and a total of 31,422 subjects revealed trauma severity and peritrauma dissociation as prominent risk factors [14]. In a meta-analysis of PTSD predictors in children and adolescents, perceived trauma severity generated medium to large effect sizes. Subjective appraisals of trauma severity then appears to be associated with PTSD risk in younger sample.In response to consistent findings on the profound effect of trauma severity on PTSD susceptibility and expression, a dose-response model has been formulated [30,31]. Advocates of this model implicate the magnitude of a traumatic event in the aetiology of PTSD and conceive it as a major predictor for symptom severity [18,32]. While the dose-response model seems intuitively appealing and not without empirical support, the measures of trauma magnitude used in previous studies are inconsistent and complicated further by subjective appraisals of the critical event. Additionally, the dose-response model suggests a linear and direct effect of trauma severity on symptom presentation without sufficiently taking other well-documented social and cognitive influences into the equation [33,34]. Indeed, the extent of social cohesion within a military unit seems to be a protective moderating factor that attenuates the risk conveyed by trauma dose [35].

Recent work departs from an almost exclusive concern with trauma magnitude and shifts research attention to the types of trauma, as these seem to possess a greater predictive utility for PTSD. More specifically, trauma types have been divided with respect to the degree of intentionality. Compared to traumatic incidences without human contributions such as natural disasters and motor vehicle accidents, rape and assault that implicate conscious harmful actions are significantly more likely to result in PTSD [36]. A systematic review compared the prevalence and trajectories of PTSD in non-intentional and intentional trauma exposed populations [37]. Measures of PTSD were compared one month and one year after trauma exposure. Overall, the mean prevalence of PTSD across all samples trended down from the first (28.8%) to the second measurement point 17.0%. A closer inspection of the data revealed a differential effect of trauma type on prevalence rates: Whereas a decline in PTSD rates has been observed among survivors of non-intentional trauma develop, the prevalence increased from 11.8% to 23.3%. Additionally, intentional trauma events have been associated with chronic courses of PTSD. In effect, the differentiation between intentional and non-intentional traumata might assist screening and intervention planning. Regarding the risk conferred by dissociation during the traumatic event, the data are discrepant and yet inconclusive. According to some scholars, the dissociative subtype constitutes a unique form of PTSD with distinctive clinical features that are invariably concealed in the traditional classification systems [38,39]. To others, the association between peritrauma dissociation and symptom severity is not yet sufficiently specified and the dissociation subtype of dubious value

[40]. While numerous studies related peri-trauma dissociation to negative PTSD outcomes [41], others were unable to detect a clinically meaningful effect and reported at moderate associations at best [42,43].

To clarify the apparently inconsistent findings, a meta-analysis has addressed this issue and explored the outcomes of carefully selected studies. In essence, the variability observed in PTSD symptoms seems to be a function of methodological differences rather than dissociation [44]. Consequently, there is no consensus regarding the classification of peri-traumatic dissociation as a global risk factor for PTSD [26]. Recent evidence lends support to a differential effect of peri-trauma dissociation that appears to be moderated by individual characteristics including gender and prior learning experience [45]. In effect, the risk conferred by peri-trauma dissociation might be expressed in a subset of patients with specific features. More specifically, it is vital to consider gender differences in the expression of peri-trauma dissociation. Women are at a greater risk for sexual assault and might be predisposed to dissociate during the trauma; the interplay of these vulnerability conditions together with their differential effects need to be elaborated in future studies. Compared to pretrauma factors, the stressors that operate during the trauma seem to be more predictive for PTSD.

Posttrauma Risk Factors

Compared to other parameters, posttrauma risk factors were ranked as the most powerful predictor for the outcome of PTSD across different trajectory types [46]. Within the group of posttrauma factors, the provision of social support appears to be the principal one [12,27]. An elevated risk for PTSD has been observed in veterans with problematic relationship and reduced social support [47]. Further evidence for the significance of psychosocial factors emerged from a compelling study with 272 veterans of the military operations "Enduring Freedom" and "Iraqi Freedom." Rigorous measures for screening PTSD, social support and resilience revealed a strong association between social support and PTSD [48]. Similar results been obtained from a longitudinal study on military service individuals deployed in Iraq. In essence, low social support was associated with an increased PTSD risk [15]. While the extant literature on social support and PTSD is intriguing, the relationship between these parameters remains to be elobarated and validated by future research. Specifically the association between the quality of personal or intimate relationships and symptom presentation remains to be investigated further. Capitalizing on the findings obtained in past research, PTSD seems associated with negative forms of dyadic coping that can perpetuate the disorder.

Higher levels of co-morbidity were designated as another principal risk factor for PTSD in diverse populations such as former political prisoners [49] children and adolescents [31] and military personnel [50]. Data gathered from a meta-analysis on PTSD risks in children and adolescents revealed substantial effect sizes for posttrauma parameters, including social support and co-morbidity. From various comorbid disorders, depression confer the greatest risk for PTSD [31]. Interestingly, the risk conferred by co-morbid disorders has been moderated by the type of trauma and was greater in intentional than in unintentional ones [31]. Alternatively, the differential effect of comorbid disorders could be attributed to social context variables. Such an interpretation is not without rationale, as the young survivors of intentional and interpersonal trauma might be exposed to adverse environmental conditions. Together with posttrauma variables, those

related to the trauma itself seem paramount in the development of PTSD. Overall, posttrauma risk factors have a considerable predictive utility as targets for screening tools [31]. Contrary to these results, a meta-analysis encompassing 32 studies revealed no significant association between comorbidity and combat-related PTSD risk. One explanation for the mixed findings refers to the heterogeneous sample composition across studies; the meta-analysis on the antecedents of combat-related PTSD has exclusively investigated data from military population [33]. Another reservation concerns the classification of comorbidity as a pretrauma or posttrauma factor. While comorbid psychological problems are frequently conceived as posttrauma variables, they might belong to the predisposing conditions. Data from previous studies report disparate findings as to whether comorbid psychological problems precede or follows PTSD [51]. Further research is warranted and necessary to reveal the causal ordering of comorbidity and PTSD.

A similar caveat applies to cognitions dimensions that have been implicated in the development and maintenance of PTSD. There is pervasive evidence for an association between dysfunctional cognitions and PTSD: Elsesser and Sartory [49] investigated dysfunctional cognitions in a group of recent trauma victims, PTSD patients and controls. Compared to controls and trauma-exposed controls, PTSD patients were more likely to express more negative appraisal and more dysfunctional thought control strategies. However, these tendencies might have already been present prior to the trauma and a contributor rather than a response to PTSD. Findings on the predictive power of posttrauma factors such as social support have practical implications because these are potentially modifiable and a promising treatment target.

Discussion and Conclusion

As has been vigorously documented in past research, a traumatic incidence alone is not sufficient to produce PSTD. To become pathogenic, a traumatic experience requires antecedent conditions that potentiate and release its effects. Individuals with traumatic experiences may be predisposed to develop PTSD but whether or not the disorder is actually expressed depends on the frequency, nature and intensity of several parameters ranging from biological to psychosocial ones [50]. Such insights underscore the need to introduce vulnerability and protective factors into the equation. Compared to other classes of factors, those operating subsequently to the trauma seem to possess considerable explanatory power. These are located within the scope of psychosocial interventions and more adaptive to treatment than relative static factors, such as demographic variables. In effect, the results on the predictive value of posttrauma parameters point to an optimistic message concerning PTSD treatment and symptom reduction.

A major objection that can be raised against prior research relates to methodological inconsistencies, as exemplified by the diverse sample and measures. Self-reports are among the most widely used measures, but subject to inherent limitations such as recall and selection biases and therefore of questionable methodological value [13,33] While it arguably difficult to attain objective data, the line of research on risk factors might benefit from using more standardized self-reports. Only a few risk factors have been regularly and systematically examined across studies. Therefore, discrepancies observed in prior studies accentuate the need for a more systematic research strategy. Different factors have been assessed with a variety of measures and different samples, resulting in inconclusive results. Given these large

methodological variations between the available studies, different outcomes are simply to be expected and do not necessarily implicate opposing results. Also, many insights into the risk and resilience factors are drawn from military samples and may apply less to other subsets of the population. Hence, the conclusion derived from combat-related PTSD might be tentative sampling biases need to be taken into consideration. To arrive at a more conclusive evidence base, the use of standardised and robust methods across different samples is advocated.

Several intriguing research avenues emerge from this review and merit further investigation. First, there remains a strong need for additional research on processes of multifinality and equifinality implicated in PTSD. While the majority of risk and resilience factors reviewed here have been extrapolated from a veritable body of pervasive studies, a specification their interactive and differential effects is necessary. An inherent complexity associated with the identification of risk factors relates to their chronological ordering. By implication, the differential and interactive effects conferred by multiple risk factors together with the heterogeneous expression of PTSD confound attempts to discern singular predictors [26]. Indeed, the well-documented principles of multifinality and equifinality cast doubt about monolithic explanations. Second, further research is warranted to explain why the symptoms may vary and persist over long periods. Data collected in previous studies proliferate an understanding of the antecedents but reveal little about the mechanisms underlying the diverse trajectories and their unique phenomenology. Research suggests heterogeneity not just in risk factors but also on the course and presentation of PTSD symptoms, as evidenced by different trajectory types. As various parameters contribute to PTSD, the expression of symptoms and the trajectories differ considerably within and between individuals [26]. Detecting the factors that are implicated in different trajectories is paramount for advancing screening and intervention efforts. Indeed, the mechanisms associated with resilient or recovered trajectories remain to be specified. Not only the types but also the quantity of risks and resilience factors that precede different PTSD trajectories should be elaborated in further study. It is not without theoretical rationale to associate PTSD risk and severity with the number of risks that an individual is exposed to. Such cumulative models are certainly not new, but merit further investigation.

There is consistent evidence for the predictive and protective function of social support and relationship quality. By implication, the dyadic coping in couples where one partner has been exposed to traumatic experiences constitutes a promising area for further investigation. Future work on predisposing and protective factors can inform intervention providers and facilitate targeted treatment. However, evidence on the predisposing conditions is not yet fully conclusive needs to be substantiated further. A mega-analysis that encompasses meta-analytic data might be a promising strategy for synthesizing the evidence and deriving practical implications.

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