

Research Article

Life Events and Recovery from Trauma: A Three-Year Follow-Up after Post-Disaster Teacher-Mediated Intervention

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Abstract

Background: There is growing interest regarding the link between adversity and subsequent adaptation. Some argue that moderate stress is beneficial, while others claim that is deleterious. This study explored the association between pre-disaster stressful life events (SLEs) and the long-term post-disaster functioning of children who survived an earthquake and underwent a psychological intervention. These children displayed better functioning than non-intervention children three years later.

Method: The sample included 66 children who participated in a teacher-delivered intervention. Pre-intervention (Time 1), we assessed SLEs experienced on the year prior to the earthquake and posttraumatic symptoms (PTS). Three years later (Time 2), PTS and daily functioning were assessed. One-way ANOVAs compared PTS, PTS decline and daily functioning of SLE categories.

Results: Marginally significant and significant main effects were found for PTS at Time 1 and PTS decline, respectively. Post-hoc analyses showed greater SLEs were associated with higher PTS at Time 1, greater PTS decline, and better functioning at Time 2.

Limitations: Due to the nature of disaster research, a parallel non-intervention control group was not assessed.

Conclusion: Though suffering more in the short-term, children experiencing higher pre-disaster adversity have the potential to function better if helped to process the trauma.

ABBREVIATIONS

SLE: Stressful Life Events; PTS: Post Traumatic Symptoms

INTRODUCTION

Human life presents challenges, often triggering stress, and inviting bio-psycho-social coping and adaptation. Specialists, however, are divided concerning the developmental functional value of stress, as either enhancing resilience or increasing vulnerability. Dienstbier's [1,2] research supports the theory that psycho-physiological toughness could be promoted by exposure to moderate stress and lead to emotional stability. He stipulated that opportunities to develop general, non-specific toughness, would better equip individuals to appraise crises as manageable and react more adaptively to stressors. In line with his theory, some data show antecedent stress is associated with positive future outcomes. For example, among war veterans, peripheral

combat exposure, more so than no exposure, has been associated with positive changes in MMPI scores [3]. Furthermore, Billings and Moos [4] found that among men, experiencing more SLEs predicted lower future depressive and physiological symptoms.

On the opposite side of the debate, a body of research suggests that cumulative stress holds negative physical and mental health consequences. For example, Benner, Roskies, and Lazarus [5] see hope as allowing the preservation of a predictable, meaningful world within which one struggles for adaptation. They suggested that traumatic events shatter the capacity to operate hope as an existential function thus leading to malfunctioning distress. McEwen [6] suggested that frequent, successive stress causes impairment to the body's ability to deactivate its stress-invoked response once the threat subsides, subsequently hindering physical and psychological health thus affecting biological and psychological well-being [7].

The latter contention is empirically supported by associations between stress and impairment. In a meta-analysis of 77 articles, Brewin, Andrews and Valentine [8] found that while trauma-related factors (exposure duration and severity) logically predicted PTSD, so did other, demographic and prior adversity factors (e.g., childhood adversity). Similarly, among 1,467 children, Finkelhor, Ormrod and Turner [9] found lifetime adversity was associated with increased posttraumatic symptoms. Furthermore, Laor et al. [10], found that, among adolescents exposed to continuous terrorism, increased SLEs were associated with increased levels of dissociative, grief and posttraumatic symptoms.

Within this debate, the work by Seery and colleagues offers a less polarizing view, depicting a curvilinear association between adversity and functioning. They showed that a history of a moderate lifetime SLEs predicts better mental health and functioning following 9/11 compared to a history of zero or high SLEs [11], and that people with a history of moderate SLEs react more adaptively to laboratory induced stress [12]. In this study, we tested the association between stressful life events (SLEs) experienced before a major earthquake and the long-term functioning of children who took part in a post-disaster psychological intervention.

The present study

On August 17, 1999, the East Marmara region of Turkey was struck by a major earthquake, rendering 18,000 people dead and 150,000 homes destroyed [13]. Four months later, the authors facilitated a classroom-based program in a city severely damaged by the event. The intervention entailed eight 2-hour sessions delivered by teachers over the course of four weeks, and its main focus was facilitating emotional processing and imagery control [14-17] of the trauma and of related aspects. Information concerning exposure, SLEs and PTS was collected prior to, and following the intervention and again 3 years later. After the intervention, the mean severity of PTS decreased significantly, and the proportion of children expected to receive a PTSD diagnosis dropped from 32% to 17% [13]. At follow-up, children that did and did not partake in the intervention showed similar symptom levels. However, the former showed better adaptive daily functioning [18].

This study aims to fill a gap in our understanding of the association between SLEs and children's posttraumatic reactions [19,20]. We intended to tackle the polarization regarding stress and adaptation by examining the association between SLEs history and long-term outcomes (PTS and functioning) in children exposed to a natural disaster within a longitudinal context that included participation in a trauma-focused teacher-delivered intervention. To the best of our knowledge, this issue has not been explored amongst children.

MATERIALS AND METHODS

Participants

The sample included 66 children (56.9% girls) aged 6-10 ($M= 8.22$, $SD= 1.18$) who studied in three schools located in the disaster area and had participated in the intervention described above (33% of the original sample). Due to the conditions that

characterize post-disaster stages, the rest of the original sample could not be assessed because children were dispersed in other locations. Importantly, these 66 participants were representative of the original group in post-intervention PTS, gender, age, and stress experienced [18].

Procedure

We report on data collected 4 months following the earthquake (Time 1; pre-intervention) and 3 years later (Time 2). After the earthquake, children filled out the Turkish version [21] of the Child Post-Traumatic Stress Disorder Reaction Index (CPTSD-RI; [22]), inquiring as for reactions to the traumatic event on 20 items (ranging from 0 to 4) assessing intrusion, avoidance/numbing and arousal (Cronbach's $\alpha= .86$). On this occasion, data was also collected regarding SLEs transpiring on the year preceding the disaster. Based on the finding that the accumulation of 3 or more SLEs are associated with increased post-exposure symptoms [13], participants were divided into 4 pre-earthquake SLEs groups: 0 SLEs (36.4%), 1 SLE (30.3%), 2 SLEs (15.2%) and 3 or more SLEs (18.2%).

Three years later, children completed the CPTSD-RI once more, and teachers (unaware to children's intervention participation) assessed children's functioning on three domains: social behavior, general conduct, and academic performance (1=very bad, 5=very good) combined into a general measure of daily functioning (Cronbach's $\alpha= .81$). The study was approved by the Institutional Review Board of Marmara University.

Data analysis

Our main analysis concerned testing the association between SLEs experienced pre-trauma and long-term posttraumatic functioning (PTS and adaptive functioning). Because our dependent variables were normally distributed, we performed four one-way ANOVA analyses with Duncan post-hoc tests with SLEs experienced on the year prior to the earthquake (4 sub-groups) as the independent variable and PTS at Times 1 and 2; PTS decline (Time 1 - Time 2); and adaptive functioning at Time 2 as the dependent variables.

RESULTS

We first tested whether the SLE sub-groups had different PTS levels at Times 1 and 2. The main effect at Time 1 was marginally significant. Post-hoc analysis showed that experiencing 3 or more SLEs was associated with significantly higher symptom levels reporting 0 or 1 ($p < .05$). At Time 2, SLEs were not associated with PTS. We also found a significant main effect for PTS decline. Post-hoc analysis indicated that reporting 3 or more SLEs was associated with a greater symptom decline than reporting 0 or 1 ($p < .05$) SLEs. With respect to adaptive functioning at Time 2, the main effect was non-significant, but post-hoc analysis indicated that children who experienced 3 or more SLEs on the year prior to the earthquake functioned *better* 3 years later, than those who experienced 0 SLEs ($p < .05$) (Table 1).

DISCUSSION

The purpose of this study was to explore the longitudinal effect of SLEs experienced in the year prior to enduring a massive trauma by children who underwent a teacher-delivered

Table 1: Descriptive Statistics.

Dependent variables	0 SLEs	1 SLE	2 SLEs	3 or more SLEs	F(3,62)	partial η^2
PTS Time 1	30.75 ^a (16.37)	28.40 ^b (13.22)	34.60 (15.84)	42.17 ^{ab} (11.26)	2.47+	.107
PTS Time 2	27.37 (14.43)	25.40 (15.29)	21.10 (11.71)	19.42 (13.27)	1.06	.049
PTS decline (1-2)	3.37 ^a (13.92)	3.00 ^b (16.53)	13.50 (16.13)	22.75 ^{ab} (15.74)	5.51*	.210
Functioning Time 2	11.54 ^a (2.69)	12.11 (2.45)	12.60 (1.96)	13.42 ^a (1.68)	1.89	.084

Note. Means are presented within the body of the table and standard deviations presented in parentheses.
^{ab}Groups' means significantly different from one another according to Duncan post-hoc analyses at $p < .05$.
^{*} $p < .005$; ⁺ $p = .07$

trauma-focused emotional processing intervention. Our findings support the claim that among these children, pre-trauma SLEs are positively associated with long-term adaptation reflected in lower (though non-significant) PTS and greater symptom decline.

These findings complement Seery et al. [11], in regard to *untreated adults with various degrees of exposure* (direct, live media, media in retrospect) to 9/11 who reported on *lifetime SLEs*. They suggested that a moderate level of life adversity is optimal for generating non-specific psychological toughness. Our findings with children suggest that an increased rate of life adversity before the traumatic exposure turns child survivors more prone to short-term PTS (pre-treatment), yet better long-term respondents to the psychological intervention.

An explanation of our findings could be offered within an immunological framework in which vaccination offers the body a controlled encounter with live attenuated pathogens [23]. The biological assault challenges the immunological system, triggering the development of antibodies. The latter, storing immunological memory, help fight future similar pathogenic intruders. However, an overwhelmed immunological system (e.g., by unexpected virulent strains or hormonal functional compromise of the system) may result in a serious unremitting illness. Persons who suffer from other serious medical vulnerabilities may display full blown illness and worse pathology [24]. By analogy [25], in our case of children following disaster who display PTS, previous mild and moderate stressful experiences may be conceived as attenuated challenges that help inoculate against normative adversity. Seery's initial upward slope may reflect this process [11]. However, extreme traumatic events may present an uncontrollable challenge compromising acquired coping strategies. Serious outcomes may ensue - general symptomatology (e.g., anxiety, depression) and/or a broader collapse of one's coping structure [26]. Therefore, previously developed coping mechanisms would not be able to support the processes to resume functioning.

Furthermore, under uncontrolled traumatic events, children who experience more SLEs may present more psycho-biological vulnerability [13]. As the response to the challenges is seriously compromised, these children may perceive their failing as a stress-related reminder, thus reactivating previous hurts as additional sources of stress, leading to graver symptoms. This process may explain why the initial post-disaster response of these children was positively correlated with the SLEs in the year previous to the disaster.

How would one explain that three years following the intervention, children with more SLEs in the year prior to the

disaster displayed a better adaptation than those with fewer SLEs? We tentatively suggest that previous spontaneous cognitive and emotional processing of stress was primed by the intervention, counteracting the destructive process and activating the previously acquired abilities. These children may have first used these abilities throughout the intervention to recuperate and, later, improve on their academic, social and behavioral functioning. The significant relief from symptoms may have opened for these children the opportunity to develop better and show improved adaptation based on coping skills acquired earlier and improved via the intervention. These results suggest the importance of facilitating the processing of traumatized cognition, imagery and emotion of children exposed to massive trauma, particularly of those with significant pre-exposure adversity. These children, as stated, may be the most prone to react severely in the short-term but with more favorable long-term adaptation following interventions.

Several limitations are of note. First, the present sample is relatively small. Hence, the external validity is somewhat decreased and the quadratic association depicted in Seery's work, as well as subtler variations in SLEs amounts, could not be tested. That being said, the sample is representative of the original intervention, and showed statistical significance with regard to variations in adaptive functioning. Future research with larger samples could validate our findings. Second, potential biases could compromise the findings' validity regarding PTS, collected via self-report. To minimize this bias, adaptive daily functioning was assessed by teachers unaware of children's participation in the intervention. Lastly, the lack of an exposed and not-treated control group did not allow exploring whether a similar pattern appears regardless of intervention participation. However, it should be stressed that conducting disaster research is extremely complex and was performed as a secondary agenda to follow the ethical and moral duty to provide child-survivors with the intervention.

A question remains concerning the impact of pre-exposure inoculation on the adaptation of traumatized children with different levels of SLEs. Psychological studies of stress inoculation with adults have been found effective (e.g., [27]). In addition, the outcome of a resilience enhancement intervention implemented prior to massive rocket attacks was supported in a control study in school-aged children [28]. Non-treated children displayed higher symptoms and about 50% more cases of PTSD compared to treated children. One may conclude that, unlike usual triage practices during mass disaster that guide clinicians to focus primarily on the moderately injured individuals, universal interventions need to be applied also to severely affected

children. In a world flooded by violence, stress, war, terrorism and natural disasters, a proper response to this issue is an urgent matter of child-centered public health responsibility.

CONCLUSION

Though suffering more in the short-term, children experiencing higher pre-disaster adversity have the potential to function better if helped to process the trauma.

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