

The linear and non-linear effects of cumulative Stressors and Traumas on Psychopathology: Are they mostly mediated by the centrality of event and existential anxieties

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Abstract

Objective

The study aimed to clarify and refine the concepts of cumulative stressors and trauma (CST), the centrality of an event to an identity (COE), the existential annihilation anxieties (EAA), and psychopathology. The study aimed to propose and test a model in which CST affects psychopathology directly but mostly indirectly through COE and the four different types of identity-based EAA (personal/ psychic identity, collective identity, physical identity, and status identity EAA's). Further, the study aimed to replicate the previous finding that the non-linear model of CST's effects on internalizing, externalizing, and thought disorders (the psychopathology three major components) explains more variance than the linear model.

Method

Using path analysis, PROCESS mediation analysis, curve estimation regression, on a combined sample (N = 1566) from Egypt (N = 490), Turkey (N = 420), Kuwait (N = 300), Syria (N = 179), and the UK (N = 177), we tested the study assumptions.

Results

Status identity EAA and the other types of EAA related to different identities and COE mediated the major part of CST impact on psychopathology; with "status identity, EAA" had the strongest effect size. The non-linear model of the impact of CST's cumulative dynamics on psychopathology, internalizing, externalizing, thought disorders, and physical health accounted for much more variance than the linear model.

Conclusions

Results supported the proposed assumptions. The implications of these results for a paradigm shift in understanding stress and traumatization dynamics that go beyond the current linear approach with the sole focus on a single past stressor or traumatic stressor were discussed.

Introduction

COVID-19 traumatic stress, with its multiple life and economic continuous existential threats, challenged the current dominant paradigm of traumatic stress that focuses more on the past single traumas and relatively ignores the impact of discrimination and inequality as one of the prime causes of disease, PTSD, and other mental health conditions. COVID-19 pandemic is a historic and golden opportunity to develop our perspective on stress and trauma, learn more about their dynamics and develop and expand more effective prevention and intervention strategies. It is a chance to achieve post-COVID-19 traumatic growth in the field of stress and trauma. Type III continuous traumatic stress was found to have the most severe impact compared to type I (the single event) and type II (the sequence of a repeated past event with a limited time scale) (Kira, 2021b). However, the cumulative stressors and traumas were found to account for a slightly higher variance in severe psychopathology (Kira et al., 2022; Kira et al., in press). A paradigm shift is needed that focuses more on trauma global linear and nonlinear dynamics that emphasizes past, present, and future traumatic time perspectives and the ongoing social inequalities and not the past alone to advance the field. Previous, concurrent, and subsequent life events, in most cases, impact the individual jointly without separation or dissociation.

We emphasize that in evaluating the impact of life events on mental health, we cannot separate the impact of chronic stressors, major life stressors, and different trauma types in real life and real time (Kira et al., 2019). Traumatic events constitute one type of stressors that are acute and are an intricate part of the general theory of stressors (Kira, 2021a, Kira 20021b). In this context, stressors mean all kinds of acute (traumatic), chronic, and non-chronic stressors. Focusing on the single event only and separating it from the previous, concurrent, and subsequent events can be misleading in assessing its impact. We emphasize that separating criterion A (PTSD Criterion A trauma types (which is the gold standard of trauma definition) from non-Criterion A traumas and general life and chronic and continuous stressors is artificial and misleading. Adding the non-criterion A traumas of attachment and collective identity trauma types (intersected discrimination) (a non-criterion "A" stressors) resulted in the increased incremental predictive validity of criterion "A" over six-fold, and it fully mediated the effects of Criterion A on PTSD (Kira et al., 2019).

Further, the dynamics of trauma and stress accumulation (e.g., Kira, et al., 2008; Kira, Fawzi &Fawzi, 2013; Suliman et al., 2009; Yehuda et al., 1995) and proliferation (Kira et al., 2018; Kira et al., in press; Lowe et al., 2020) contribute significantly to the impact of the single trauma on psychopathology. That may mean that the indirect effects of cumulative and continuous stressors and traumas on psychopathology may be more significant than the triggering event (Kira et al., 2019). A recent empirical study (Hyland et al., 2020), even using the limited scope of trauma definition, concluded that particular non-Criterion "A" events involving extreme fear should be considered traumatic, and the ICD-11 approach of providing clinical guidance rather than a formal definition of trauma offers a viable solution with the current and previous attempts to define traumatic exposure in Criterion "A".

Another current dominant assumption in trauma research is the linearity and dose-response hypothesis. However, nonlinear systems are found within stressors and traumas phenomena. In nonlinear systems," there exists no proportionality and no simple causality between the magnitude of responses and the strength of their stimuli: small changes (or stressors) can have striking and unanticipated effects, whereas significant stimuli will not always lead to drastic changes in a system's behavior" (e.g., Willy et al., 2003). Both linear and nonlinear mechanisms exist within the dynamics dominating the field (Van Geert, 1998).

While cumulative, proliferation, linear and nonlinear dynamics represent the exposure side, the personal meaning of an event is the other side of the coin. The concept of the centrality of an event (COE) to the person's identity is another term in the equation of the event impact. COE may contribute to mediating the exposure effect. How central an event is to a person's identity will contribute to determining its outcome (Berntsen, & Rubin, 2006). From this perspective, stressful or traumatic events that become central to the way the subject understands the self and the world and that interfere with the interpretations that they make about new events are influential in determining its impact.

Further, the concept of identity is multifaceted, and the person possesses several interconnected salient identities: physical, personal/ or psychic, and social identities (e.g., Stets, & Burke, 2000). Identity is one of the poorly understood variables in psychopathology, traumatology, and clinical psychology. Identity, a nonlinear dynamic system, is the center of personal agency, self-executive control, and functions and a lens through which individuals appraise and construct the events' meaning that directs her/ his response (Elmore & Oyserman, 2012; Kira, 2020; Kira, 2019; Kira et al., 2019a; Kira et al.,2019b). Related to the concept of COE are existential annihilation anxieties (EAA). Existential anxiety is triggered primarily if the event threatened the existence of such an identity. The centrality of an event to an identity mediates its impact on such identity. The centrality of an event to one or more of the person's salient identities and its potential threat to these identities' mere existence will contribute to the event's impact strength. While general anxiety is well researched in clinical literature, specific anxieties that focus on the potential demise of one or more of the person's identities are mostly ignored in the clinical literature. The threats to existence and existential anxieties erupted due to these threats are the most specific severe threats that the person may encounter. The identity-based existential annihilation anxiety (EAA) framework integrated the existential annihilation anxieties (EAA) models and identified four

EAA types: psychic, collective, status, and physical (Kira et al., 2019; Kira et al., 2018; Kira et al., 2012; Kira et al., 2020). psychoanalytic literature identified psychic annihilation anxiety (Hurvich, 2003). The theory of mortality salience partially identified physical annihilation anxiety (e.g., Greenberg, Simon, Pyszczynski, Solomon, & Chatel, 1992).), while collective and status existential annihilation anxiety was recently introduced in the literature as part of the identity-based EAA model. We propose that COE and EAA totally or partially mediate the effect of cumulative previous, concurrent, and subsequent stressors and traumas (CST) on Psychopathology. These assumptions are the basis for identifying different identities' traumas in the development-based trauma framework (Kira, 2021a).

While the dynamics of exposure and the centrality of exposure to an identity and the existential anxieties that stem from the meaning of the event to the salient identity/ies represent one level of exposure microdynamics, the macrodynamics of cumulative exposure are mostly ignored in mainstream PTSD research. The system linear and nonlinear dynamics of accumulation and proliferation are key processes to understand the impact of exposure to stressors. The nonlinear dynamics are found to account for threefold of the variance that is accounted for by the linear dynamics in the impact of cumulative stressors (Kira et al., 2019). Studies of cumulative risk found it follows a nonlinear path in causing difficulties and distress (Oldfield, Humphrey, & Hebron, 2015). Relatively small and inconsequential changes in predictive factors may lead to abrupt quantum changes in behavior. These nonlinear cusp shifts from one state to another can happen upon exposure to cumulative and proliferated external and internal pressures/stressors (Zeeman, 1976). Within this dynamic system model, including linear and nonlinear causal chains and loops, the relatively recent single chain of events can be the stressor that finally triggers a pathological response and not the actual cause of the symptom presentation.

Further, cumulative stressors and traumas (CST) impact is not limited to PTSD (the dominant focus of current literature) but goes to the different disorders and psychopathology in general and can create dense comorbidities. Replicated findings identified three basic psychopathology components in adults and adolescents: Internalizing, externalizing, and thought disorder (psychoticism) (e.g., Caspi et al., 2014; Laceulle, Volleberge, & Ormel, 2015). PTSD is one part of the concept of Psychopathology. It is crucial to study the linear and nonlinear impact of CST exposure on psychopathology and its three main components. A recent study on the effects of cumulative stress and traumas (Kira, Barger, Shuwiekh, Kucharska, & Al-Huwailah, 2020) found that the nonlinear cusp (threshold) model accounted for a much higher variance than the linear model, indicating the presence of threshold effects of CST on internalizing, externalizing and thought disorders. The results of polynomial regression cusp catastrophe models showed that CST was a significant bifurcation factor for internalizing, externalizing, and thought disorder emergence. For example, the Cusp catastrophe model accounted for high variance ($R^2 = .770$), bettering the corresponding linear model ($R^2 = .028$) in predicting externalizing disorders. Similar results were found for the internalizing and thought disorder. Similar results were found for the CST prediction of Suicide (Kira, Barger, Shuwiekh, Kucharska, & Al-Huwailah, 2019).

The goal of the current study is to further empirically validate the proposed framework, that proposes that existential anxieties related to different identities and the centrality of event/s to these different identities will mediate the effects of cumulative stressors and trauma (non-linearly) on psychopathology three main components: internalizing, externalizing and thought disorders.

Hypothesis 1

Psychopathology is significantly correlated with EAA, the centrality of the event, CTS, and poor health.

Hypothesis 2

CST has direct and indirect effects on psychopathology. The indirect effects will be greater than the direct effects.

Hypothesis 3

Centrality of the event and existential annihilation anxieties types mediate the indirect effects of CST on psychopathology.

Hypothesis 4

The non-linear models (quadratic and cubic) will explain more variance than the linear models in estimating the association between CST and internalizing, externalizing, and thought disorders (the three factors of psychopathology).

Method

Procedures

We used five datasets collected on a broader research project that included EAA, will-to-exist, live, and survive (WTELS) measures, and other measures. The data sets included Egypt, Turkey, Kuwait, Syria (and Palestinians who lived in Syria), and the UK. The combined data set (N=1566) represented different cultures, different levels of exposure to cumulative adversities, different age groups (adolescents and adults), different religious affiliations, and Western and non-Western cultures. All data were previously collected upon IRB approval of the sponsoring universities in Egypt and Turkey as a cross-cultural research project (*The same data sets and some of the measures were used in previous studies, see, for example, Kira et al., 2020a; Kira et al., 2020b*).

Participants

Participants (N = 1566) included five subsamples from different five countries: Egypt (N = 490), Turkey (N = 420), Kuwait (N = 300), the UK (N = 177), and Syrians/ Palestinians (N = 179). The five samples represent different levels of traumatization and existential identity threats, which made them ideal for testing the model's assumptions. Syrians and Palestinians in Syria went and were still ongoing through the complicated Syrian civil war and the Palestinian's Israeli conflict (e.g., Giacaman et al., 2011; Kira et al., 2017; Papp  , 2006). Turkish people were recovering from an attempted military coup that threatened their democracy and followed extreme measures to prevent additional attempts. Egyptian participants went through the Arab Spring turmoil rising against dictators. The UK participants have been exposed recently to terrorism and interpersonal traumas and the turmoil of Brexit. Kuwaiti citizens represent the other side of those relatively less exposed to existential identity threats. The different samples' recruitment strategies were similar, using a mix of networking and electronic platforms and university students associations and their families and faculties. While the subsamples in Egypt, Kuwait, and Turkey included adolescents (about 20%), the Syrian and the UK subsamples included only adults. There were different religious backgrounds in the subsamples. The subsamples represent rich variations of social, religious, and economic, cultural affiliations, and different levels of exposure to stressors and existential challenges.

Participants included 51.4% of males. Age ranged from 14–75 (M = 25.63, SD = 9.02), with 14.6% adolescents (under 18 years of age). It included 59.5% students, 17.6% employees, 8.5% workers, 2.9% professionals, 1.2% merchants, 2% retired, and 9.6% other occupations. For marital status, 24.4% were married, 71.8% were single, 1% were widows, 1.3% were divorced, and 1.5% had other marital statuses. For the level of education, the sample included 5.8% with minimum reading and writing skills, 8.6% had an elementary level, 4.8% were middle school, 16.7% high school, 57.8% college, and 6.3% graduate level. For income, 3.6% reported to be very poor, 8.6% poor, 71.5% reported to have enough income, while 13.1% reported having a high income, and 3.25% reported to be of very high income. For religion, 70.5% were Muslims, 18.9% were Christians, and 10.6% were either atheists, agonists, or do not believe in any religion. Table 1 summarizes the main demographics of the five sub-samples (Kira et al., 2020).

Table 1
The detailed demographics of each of the five sub-samples

variable	Egypt (N = 490)	Turkey (N = 420)	Kuwait (N = 300)	Syrians(N = 179)	UK (N = 177)
Age	Age ranged from 14 to 75, Mean = 26.03, SD = 10.90, 20.4% adolescents.	Age ranged between 15 and 64 (M = 23.20, SD = 8.68) from which 18.9% were adolescents	age ranged from 15–50 (M = 26.37, SD = 8.50), from which 18.7% were adolescents	Age ranges between 19 and 54 (M = 28.7, SD = 6.16).	Age ranged between 18 and 40, M = 25.89, and SD = 5.66.
Gender	41.4 males	72.4% males.	39% males	62.6% males	60.7% females
Religion	49.6% of Muslims and 50.4%	94.3% were Muslims and the balance was from other religious affiliations.	99.7% Muslims, .3% Christians	90.5% were Muslims, .6% Ismaili Muslim, 2.2% Christians, 2.2% atheists, .6% agnostics, 2.2% identified with no religion, and .6% identified themselves as humanists	24.2% Christians, .6% Jewish, 4.5% other religions, while 70.8% with no religious affiliation.
Education	7.9% elementary level, 1.8% middle school level, 27.3% high school level, 51.8% college level, and 11% graduate studies level	5.9% elementary, 2.9% middle school, 17.5% high school, 71.7% college, and 1.9% graduate levels	4.7% elementary school, 20.6% high school, 72.7% college and 2% graduate students	.6% was elementary school, .6% middle school, 8.4% high school, 74.9% undergraduate degree, and 15.6% have graduate degree.	21.3% had a high school, 57.3% had an undergraduate degree, and 21.3% had a postgraduate degree
Marital Status	28.6% married, 68.8% single, 1.6% widowed, .4% divorced, .06% other	15.5% were married, 82.6% were single and 1.9% other marital statuses	35% married, 60.3% singles, 3% divorced, and 1.7% other.	25.7% were married, 70.9% single, 2.8% divorced and .6% widowed?	14.6% were married, 74.2% were single, 1.7% were divorced, and 9.6% had other marital statuses.
Employment	64.5% Students, 12.9% Employees, 3.4% professionals, 3.1% workers, 2.4% merchants, 1.4% retired, and 12.2% others	75.1% students, 9.2% workers, 2% employees, .4% professionals, 2.9% retire, and 9.9% other	55.3% students, 35.7% employees, 1.3% professionals, 4% retired, and 3.7% others.	27.4% students, 18.4% are unemployed, 43% are employees, 3.4% merchants, 2.2% professionals, 1.7% workers, .6% retired, and 3.4% others	48.9% were college students, 39.3% were employees, 6.2% were professionals, and 5.6% were others.
Socio-Economic-Status	1% very low, 2% low, 75.1% in the middle, 18.2% high, 3.7% very high	.5% very low, 6.5% low, 84.8% in the middle, 6.5% high, 1.7% very high	0.0% very low, .7% low, 77% in the middle, 18.3% high, 4% very high	25.7% very low, 33% low, 22.9% in the middle, 11.2% high, 7.3% very high	1.7% very low, 20.3% low, 70.6% in the middle, 7.3% high, 0.0% very high

Measures (Note the same samples and measures were used in previous studies with different focuses, e.g., Kira et al, 2020; Kanaan et al., 2019).

Independent variables:

Cumulative Stress and Trauma Scale (CST-S) short version (Kira et al., 2008). It includes 32 items. CST-S is grounded on the development-based trauma platform (DBTF) (e.g., Kira, 2001; Kira, 2019; Kira et al., 2008; Kira et al., 2018; Kira et al., 2019; Kira, 2021a, Kira, 2021b). The CST-S evaluates cumulative stressors and traumas concerning its mere occurrence, frequency, type, and negative and positive appraisals. The scale is designed to classify a sample of 29 stressors into six stressors/trauma types, in addition to gender discrimination. Additionally, it includes 3 items that measure chronic and major life stressors. The six types of stressors/traumas include collective identity traumas (e.g., discrimination and oppression). They include personal identity trauma (e.g., early childhood traumas such as child neglect and abuse). They include status identity/achievement trauma (e.g., failed business, fired, and drop out of school) (non-criterion A traumas). They also include survival trauma (e.g., getting involved in combat, car accidents, and natural disasters). They include attachment trauma, secondary trauma (i.e., indirect trauma impact on others), and gender discrimination. Participants were asked to specify their experience with an event on a 5-point Likert-type scale (0 = never; 4 = many times). Those who reported that they experienced the event were asked how much the event had affected them. They asked to use a 7-point Likert-type scale (1 = extremely positive; 7 = extremely negative) to rate its effect. In the analysis, the appraisal scale was split into two subscales: the positive (1 - 4) and negative (5 - 7) appraisal subscales. The CST-S includes two overall measures for cumulative stressors and traumas' dose: occurrence and frequency, and two appraisals: negative and positive appraisal and general appraisal.

Investigators can compute these subscales for each of the stressor/trauma types. The CST-S has shown adequate internal consistency ($\alpha = .85$) (Kira et al., 2008, Kira, Fawzi, & Fawzi, 2013), test-retest stability (.95 in 4 weeks), and predictive, convergent, and divergent validity. The measure has been translated into languages appropriate for each sample, including Arabic, Polish, Spanish, Turkish, Korean, Burmese, and Yoruba. In the present analysis, we used the cumulative stressors and traumas occurrence sub-scale. The current alpha of cumulative stressors and traumatic occurrence is .88.

Mediating Variables

The Centrality of Event Scale – 7 items short form (Berntsen and Rubin, 2006) assesses the degree to which a stressful occurrence is a point of reference for the individual's identity and the designation of its significance to the person's life and identity. The scale instructs the participant to consider the most stressful or traumatic event in his/her life and respond to the questions sincerely and honestly." The scale's short form consists of 7 items about the event, followed by a five-point Likert type scale, with "1" – strongly disagree" and "5" – totally agree." An example of the items is. " I feel that this event has become part of my identity." The authors reported that the scale had an excellent internal consistency (Cronbach's alpha = .94) and good convergent validity. In current data, the scale has an Alpha of .93.

Existential Annihilation Anxieties measure (EAA) (Kira et al., 2012; Kira et al., 2018; Kira et al., 2019; Kira et al., 2020) is a 15-item scale that assesses anxieties associated with four types of existential threats. Existential threats include threats to personal identity(3 items), threats to one's collective identity (4 items), threats to one's social status identity(5 items), and threats to his/her physical identity(3 items). An example of the items in the scale that represents collective identity threats is: "Sometimes I feel the threat of extermination/annihilation/ subjugation (that is, the threat of destruction or "getting rid "of my group) because of discrimination or stereotyping or acts committed against me, my race, religion, culture, or ethnic or cultural group." Another example representing the threats to personal identity is "Because of what has happened to me personally or is happening to me now, being fragmented unable to cope, and

losing control, and I fear the disintegration of myself or identity". Each item is scored on a scale from 0=disagree to 3=strongly agree. The scale was examined in samples in five countries: Egypt (N=490), Kuwait (N=300), Turkey (N=420), the UK (N=177), Syrian refugees in Turkey (N=179). Factor analysis on a combined sample (N=1566) identified 4 factors (subscales): Psychic EAA related to personal identity trauma (psychic), EAA related to collective identity trauma, EAA related to Social status traumas, and EAA related to fear of physical death (Kira et al., 2020). EAA scale was highly correlated with PTSD (.50), cumulative stressors and traumas, depression, thought disorder, internalizing, externalizing, and suicidality. It was associated with poor reported physical health, gender, other discriminations, and sexual abuse. It was negatively correlated with "will to exist-live and survive," spirituality, religiosity, self-esteem, and emotion regulation. EAA was strictly invariant across genders and age groups and strongly invariant across the five national groups. A critical cut-off point of 21 or more is proposed to discriminate between those critically high in EAA (Kira, Shuwiekh, Kucharska & Al-Huwailah, 2019; Kira et al., 2020). In current data, the measure had an alpha of .90. The alpha's of its four subscales ranged between .80 and .85.

Outcome Variables

Psychopathology Measure (Kira et al., 2017) is a 20-item screener that identifies adults and adolescents who are likely to have mental health disorders. The measure has three subscales: Internalizing, Externalizing, and thought disorder (psychoticism). Exploratory and Confirmatory Factor Analysis of different data in Egypt and Poland yielded three factors: Internalizing, Externalizing, and Psychoticism validating the current structure of psychopathology (e.g., Caspi et al., 2014; Laceulle, Volleberge, & Ormel, 2015). In the items of the measure, the participant is asked to indicate if the behavior (or feeling) happened in the past month (scored 4), or happened in the last 2-3 months (scored 3), or in the last 3-12 months (scored 2), or the last year or more (scored 1), or never happened (scored 0). High scores indicate potentially higher symptoms in these areas. Test-retest using an independent sample of 35 males with four weeks interval yielded excellent stability coefficients (0.970 for internalizing, 0.908 for externalizing, 0.915 for the combined externalizing and addiction subscale. In the current study, alpha reliability for internalizing was 0.84, 0.88 for externalizing and addiction, and 0.93 for psychoticism. The full scale of the psychopathology has an alpha of 0.90 in current data.

Poor Physical Health Scale (15 items, modified; Kira, Clifford, Wiencek, & Al-Haidar, 2001) was previously developed on refugees. The high score was positively correlated with higher PTSD, CTD (complex PTSD) scores, and older age (Kira et al., 2006). The reliability of the scale in several studies ranged between .70 and .85. The scale consists of questions about self-rated health on a 5-point Likert-type scale, and other questions on how does health conditions affected his/her work, her/ his social relationships, and his/her memory (cognitive functioning). The scale also consists of physical health problems, based on ICD-9-CM codes for selected general medical conditions that include neurological, blood pressure and digestive system, musculoskeletal, and endocrine disorders. The higher the score, the worse is the reported health. The scale's alpha in current data is .75.

Demographic variables: Demographic information was collected and included gender, age, marital status, religion, education, and socio-economic status (SES). SES was self-rated was (1) indicated very low SES, (2) indicated: low SES, (3) in the middle SES, (4) indicated high SES, and (5) indicated very high SES.

Statistical Analysis

We analyzed the data using IBM-SPSS 22, Amos 22. We computed frequencies, descriptions, and correlations between the variables. We computed path analysis to examine a model that identifies the effects of cumulative stressors and traumas (CTS) on psychopathology as mediated via centrality of the event (COE) and the four types of existential annihilation anxiety (EAA).

We examined the associations between CST and psychopathology mediated by COE and the four existential anxieties types (psychic, collective, physical, and status) using path analysis. Following Byrne's (2012), the path model was assessed to confirm an adequate fit to the data. The criteria for adequate model fit were a non-significant chi-square (χ^2), chi-square/degrees of freedom ($\chi^2/d.f. >5$), comparative fit index (CFI) values > 0.90 , and root-mean-square error of approximation (RMSEA) values < 0.06 (Weston & Gore, 2006). We used a bootstrapping method with 10,000 bootstrap samples to test the significance of direct, indirect, and total effects and 95% bias-corrected confidence intervals (95% CI) for each variable. To streamline the results, we modified the model by deleting the non-significant paths.

Additionally, we utilized PROCESS macro (Hayes, 2017) (model 4) to examine the CST direct and indirect effects via the mediators and the effect size and confidence intervals. Covariates introduced were age, gender, marital status, and religion. Further, we used bootstrapping sampling ($n=10000$) distributions to compute the direct and indirect effects and confidence intervals (95%) of the estimated effects. When the confidence interval does not contain zero, this point estimate is considered significant.

Further, to check the potential nonlinear associations between the variables and if the nonlinear models provide a better fit for the data, we utilized curve-estimation regression to examine the nonlinear (quadratic and cubic) and linear associations among the predictor variable: CST and the outcome variables: Psychopathology and its three components: thought disorder, externalizing, and internalizing as well as poor physical health.

Results

Descriptives

The highest trauma load was in the Syrian sample ($M = 7.39$, $SD = 5.09$). Their highest trauma load does not reflect on the severity of psychopathology but was reflected in the highest existential annihilation anxiety ($M = 31.50$, $SD = 8.88$). The UK sample participants have a high trauma load ($M = 7.32$, $SD = 8.00$) reflected in high psychopathology. However, their EAA was moderate. Kuwaitis and Egyptian participants have relatively lower trauma load, but Egyptian and Turkish participants have much higher EAA. Table (2) details these results.

Table (2) Means and standard deviations of the main variables in the sample and the five subsamples

	Total sample	Egypt	Kuwait	UK	Turkey	Syrians
	Mean (SD)					
CST Occurrence	4.29(4.50)	2.71(2.85)	2.91(2.51)	7.32(8.00)	4.52(3.37)	7.39(5.09)
Psychopathology	24.71(17.96)	24.20(15.09)	18.51(12.54)	51.93(18.59)	20.99(15.52)	16.83(10.56)
Internalizing	12.85(8.09)	11.60(6.33)	10.41(6.71)	23.44(8.34)	12.56(8.05)	10.55(6.07)
Externalizing	3.78(6.11)	3.96(5.77)	1.75(3.56)	13.77(6.56)	2.02(4.16)	.50(1.84)
Thought Disorders	8.03(7.29)	8.66(6.97)	6.35(6.13)	14.72(7.91)	6.68(7.21)	5.37(4.95)
EAA	14.99(10.99)	15.22(9.77)	9.93(8.45)	9.91(8.88)	13.39(8.55)	31.50(8.88)
Status Identity EAA	5.06(4.38)	4.10(3.80)	2.66(3.24)	8.83(3.62)	4.26(3.80)	9.81(3.71)
Collective Identity EAA	4.83(3.73)	4.59(3.64)	2.44(2.83)	5.81(2.49)	4.38(3.06)	9.51(3.30)
Personal identity EAA	4.03(2.87)	3.91(2.69)	2.81(2.56)	5.50(2.49)	3.19(2.47)	6.96(2.47)
Physical Identity EAA	2.76(2.70)	2.62(2.58)	2.03(2.54)	4.79(2.26)	1.53(2.03)	5.22(2.37)

Note: EAA=Existential Annihilation Anxiety, CST= Cumulative stressors, and traumas, SD=Standard deviation

Correlations

The event's centrality was associated with cumulative stressors and traumas (CST), and existential annihilation anxieties (EAA), including all its four components (personal identity, physical identity, collective identity, and status identity EAA). It was associated with psychopathology and poor health. Existential annihilation anxieties were associated with CST, poor health, and psychopathology. Cumulative stressors and traumatic occurrences were associated with identity status EAA, personal identity EAA, collective identity EAA, poor health, and psychopathology. Identity status EAA was highly associated with psychopathology (.43, $p < .001$) and poor health (.34, $p < .001$). Collective identity EAA was moderately associated with psychopathology (.27, $p < .001$) and poor health (.25, $p < .001$). Personal identity (psychic) EAA was highly associated with psychopathology (.39, $p < .001$) and moderately associated with poor health (.29, $p < .001$). Physical identity EAA (fear of death) was highly associated with Psychopathology (.40, $p < .001$) and moderately associated with poor health. Identity status EAA seems to be the most consequential to psychopathology. Table 3 provides the zero-order correlations between these variables.

Table 3
Zero-order correlations between the main variables

	M(SD)	1	2	3	4	5	6	7	8	9
1. Centrality of the event	20.58 (8.01)	1								
2. EAA	14.99(10.99)	.27***	1							
3. CST	4.29(4.498)	.30***	.25***	1						
4. Identity Status EAA	5.06(4.38)	.23***	.76***	.31***	1					
5. Collective Identity EAA	4.83(3.73)	.25***	.79***	.28***	.58***	1				
6. Personal identity EAA	4.03(2.87)	.29***	.74***	.29***	.58***	.57***	1			
7. Physical Identity EAA	2.76(2.70)	.27***	.67***	.24***	.59***	.47***	.55***	1		
8. Poor health	6.72(3.47)	.25***	.26***	.31***	.34***	.25***	.29***	.26***	1	
9. Psychopathology	24.71(17.54)	.24***	.22***	.24***	.43***	.27***	.39***	.40***	.22***	1

Note: * p < .05, ** p < .01, *** p < .001

Path analysis results

The path model had a good fit with the data (Chi-square = 6.665, d.f. = 2, p = .036, CFI = .999, RMSEA = .039). Status EAA accounted for the highest variance in the model ($R^2 = .501$). Cumulative stressors and traumas (CTS) had direct medium size effects on the centrality of event/s (COE). It had direct and indirect effects on psychopathology, status EAA, collective EAA, and Psychic EAA. It had mostly indirect effects on physical EAA. All its total effects on them were in the low medium range. CTS's direct effects on psychic EAA accounted for 76% of its total effects. Its direct effects on collective EAA accounted for 39% of its total effects. Its direct effects on status EAA accounted for 29% of its total effects. Its direct effects on psychopathology accounted for 33.3% of its total effects. The size of CTS' indirect (mediated) effects on psychopathology and status EAA was over twice the size of its direct effects. Its total effects on Status EAA were the highest (.31, $p < .01$).

The centrality of event/s(COE) had direct effects on Psychic EAA. It had direct and indirect effects on Psychopathology, physical and collective EAA, and indirect effects on Status EAA. Its total effects on all variables ranged from small to medium. Its direct effects on psychopathology accounted for 47% of its total effects. Its direct effects on physical EAA accounted for 38% of its total effects. Its total effects on collective EAA accounted for 33.3% of its total effects. The COE effects on psychic EAA were the highest (.23, $p < .01$).

Psychic EAA had direct large size effects on collective EAA. It had direct and indirect effects on psychopathology, status EAA, and physical EAA. Its total effect sizes on them are in the large to medium range. Its direct effects on psychopathology accounted for 42% of its total effects. Its direct effects on physical EAA accounted for 78% of its total effects. Its total effects on status EAA accounted for 43% of its total effects. Its total effects on status EAA was the highest (> .53, $p < .01$).

Collective EAA had direct effects on physical EAA, direct and indirect effects on status EAA, and indirect effects on psychopathology. Its total effects on all variables were small to medium. Its direct effects on status EAA accounted for 79% of its total effects. Its total effects on status EAA were the highest (.34, $p < .01$).

Physical EAA had direct effects on status EAA. It had direct and indirect effects on psychopathology. Its direct effects on psychopathology accounted for 76% of its total effects. Its total effects on the variables were medium to low. Status EAA had medium to low direct effects on psychopathology. Table 4 describes the direct, indirect, and total effects and the .95 confidence intervals for each variable.

Table 4

The direct, indirect, and total effects and their 95% confidence intervals for the effects of cumulative stressors and traumas, as mediated by the centrality of the event and the different types of existential annihilation anxieties on psychopathology.

Causal Variables	Endogenous Variables					
	COE	Psychic EAA	Collective EAA	Physical EAA	Status EAA	Psychopath.
CST						
Direct Effects	.29** (.25/.34)	.22** (.18/.37)	.11** (.07/.15)	.05 (-.00/.09)	.09** (.06/.13)	.08** (.02/.13)
Indirect Effects		.07** (.05/.09)	.17** (.14/.20)	.19* (.16/.22)	.22* (.18/.24)	.16* (.14/.19)
Total Effects	.29** (.25/.34)	.29** (.24/.33)	.28** (.23/.33)	.24** (.20/.29)	.31** (.25/.35)	.24** (.18/.29)
COE						
Direct Effects		.23** (.18/.28)	.06** (.01/.11)	.08** (.04/.13)		.09** (.05/.14)
Indirect Effects			.12** (.09/.15)	.13** (.10/.16)	.17** (.14/.20)	.10** (.08/.12)
Total Effects		.23** (.18/.28)	.18** (.13/.24)	.21** (.16/.25)	.17** (.14/.20)	.19** (.14/.24)
Psychic EAA						
Direct Effects			.52** (.48/.56)	.39** (.33/.44)	.23** (.19/.24)	.14** (.09/.20)
Indirect Effects				.11** (.09/.15)	.30** (.26/.33)	.17** (.15/.23)
Total Effects			.52** (.48/.56)	.50** (.45/.54)	.53** (.49/.57)	.33** (.29/.37)
Collective EAA						
Direct Effects				.22** (.16/.28)	.27** (.23/.32)	
Indirect Effects					.07** (.05/.10)	.11** (.08/.13)

Note: * $p < .05$, ** $p < .01$, *** $p < .001$ Note: CST = Cumulative Stressors and Traumas, COE = Centrality of the event, EAA = Existential Annihilation Anxieties

Causal Variables	Endogenous Variables					
	COE	Psychic EAA	Collective EAA	Physical EAA	Status EAA	Psychopath.
Total Effects				.22** (.16/.28)	.34** (.29/.39)	.11** (.08/.13)
Physical EAA						
Direct Effects					.31** (.26/.35)	.16** (.10/.22)
Indirect Effects						.05* (.04/.8)
Total Effects					.31** (.26/.35)	.21** (.14/.27)
Status EAA						
Direct Effects						.21** (.14/.26)
Indirect Effects						
Total Effects						.21** (.14/.26)
Squared R	.086	.128	.340	.344	.501	.245
Note: * p < .05, ** p < .01, *** p < .001 Note: CST = Cumulative Stressors and Traumas, COE = Centrality of the event, EAA = Existential Annihilation Anxieties						

PROCESS results

The model accounted for .431 of the effects of CST on psychopathology. That means that .569 of the variance is not accounted for by the model variables contributing to psychopathologies. Other potential variables may include genetics and epigenetics. CST's indirect effects on psychopathology were relatively higher than its direct effects. COE, Status EAA, psychic EAA, and physical EAA were significant mediators, with status EAA and psychic EAA having the highest effect size. Gender, age, and religion were significant covariates. Table 5 details these results.

Table 5

Direct, Indirect, and Total Effects of CST on Psychopathology as mediated by Status EAA, Psychic EAA, Collective EAA, physical EAA, COE, and poor health.

Variable	<i>b</i>	<i>SE</i>	<i>t/z</i>	<i>P</i>	<i>LL 95% CI</i>	<i>UL 95% CI</i>	<i>R²(p)</i>
Total effects	.79	.11	7.12	.000	.57	1.01	0.431 (< .000)
Direct effects	.31	.10	3.03	.003	.11	.50	
Total indirect effects	.49	.06			.38	.60	
Mediators' effects							
COE	.08	.03	3.25	.001	.04	.14	
Poor health	.03	.02	1.04	.298	-.02	.07	
Status EAA	.16	.04	4.50	.000	.10	.23	
Collective EAA	.00	.02	.05	.964	-.05	.05	
Psychic EAA	.14	.03	4.42	.000	.09	.21	
Physical EAA	.08	.02	3.61	.000	.04	.13	
Covariates Effects							
Gender	3.58	.70	5.12	.000	2.21	4.94	
Age	-.37	.04	-9.85	.000	-.45	-.30	
Marital status	.66	.64	1.02	.307	-.60	1.92	
Religion	6.47	.42	15.48	.000	5.65	7.29	
Note: LL 95% CI = lower level 95% confidence interval; UL 95% CI = upper level 95% confidence intervals							

Curve Estimation results

CST was associated with Psychopathology both linearly ($F = 7.79, p < .009, R^2 = .043$), and non-linearly (the cubic model) ($F = 9.73, p < .000, R^2 = .144$), with the non-linear model accounting for over three times the percentage of the variance accounted for by the linear model (see Fig. 2). CST was associated with internalizing disorders only non-linearly ($F = 11.17, p < .000, R^2 = .114$ (the quadratic model) (Fig. 3). CST was associated with externalizing disorders both linearly ($F = 5.34, p < .022, R^2 = .03$), and non-linearly (the cubic model) ($F = 4.19, p < .008, R^2 = .067$), with the non-linear model accounting for over twice the percentage of variance accounted for by the linear model (Fig. 4). CST was associated with thought disorders both linearly ($F = 8.90, p < .003, R^2 = .048$), and non-linearly (the cubic model) ($F = 8.26, p < .000, R^2 = .125$), with the non-linear model accounting for over twice the percentage of variance accounted for by the linear model (Fig. 5). CST was associated with Poor physical health both linearly ($F = 7.20, p < .008, R^2 = .04$), and non-linearly (the cubic model) ($F = 10.68, p < .000, R^2 = .115$), with the non-linear model accounting for almost three times the percentage of the variance accounted for by the linear model (see Fig. 6).

Discussion

We addressed several theoretical challenges to stress and trauma research and laid out several important questions that stress and trauma researchers need to address to propel the field further forward. The current study departs from the dominant clinical literature in different ways, making it significant and providing unique contributions. The study highlights the importance of a paradigm shift from the currently dominant only focus on single stressor/ trauma to a

more focused on stress and traumatization dynamics that are mostly nonlinear. CST had significant direct effects on psychopathology and significant indirect effects via centrality of the event (COE) and existential annihilation anxieties. Its impacts are significant on psychic, collective, and physical EAA, and especially status EAA. Higher status EAA seems a central and strong mediator in predicting psychopathology. The same trajectory was found for the impact of COE on psychopathology.

The study addressed crucial dynamics of the impact of cumulative stressors (acute/ traumatic and non-acute and chronic) and the pathways and trajectories to different psychopathology types (internalizing, externalizing, and thought disorders).

The focus on macro-dynamics started in the literature with the emerging concepts of polyvictimization (e.g., Finkelhor et al., 2007), intersectionality (Crenshaw, 2017), trauma proliferation (Kira et al., 2018), and type III continuous traumatic stress (Kira et al., 2013; Kira, 2021a, Kira, 2021b). Most of the previous studies did not present the macro dynamic approach that the current study pursued in understanding the combined effects of all stressors and criterion "A" and non-criterion "A" traumas on psychopathology. All such stressors work together to impact one or more of the person's identity. Identity traumas, personal and collective (social) is an emerging framework (Kira, 2001).

While the literature traditionally focuses on the role of general anxiety, which is an important part of producing symptomatic behavior, the current study focused more on other specific anxieties that emanate from the threat of such combined stressors to the mere existence of one or more of a person's identities (e.g., personal, social). There is empirical evidence that existential specific threat is different and separate from general anxieties (Kira et al., 2012). Such specific existential anxieties are influential in producing dysfunctional behavior. The current study validated this approach, as existential anxieties and the event's centrality to an identity mediated the most impact of CST on psychopathology.

One of the significant findings is that identity status EAA (the concerns about a person's status or socio-economic status, such as in extreme poverty or loss of job) accounted for the highest variance ($R^2=.518$) in the path model. Further, identity status had a high impact on psychopathology in the model. Socio-economic equalities have long been recognized and found to be associated with different types of psychopathology (e.g., Lorant, V., Kunst, Huisman, Costa, & Mackenbach, 2005; McLaughlin et al., 2011; Skapinakis, Weich, Lewis, Singleton, & Araya, 2006; Williams, Yu, Jackson, & Anderson, 1997). Intersected discrimination was found to significantly contribute to COVID-19 infection and stressors and is behind the disproportionate impact of COVID-19 on minorities. (Kira, Ibrahim et al., 2021, Kira et al., in press), and accounted for the highest variance in complex PTSD (Kira et al., 2022).

The concept of psychic EAA developed initially in the psychoanalytic literature (e.g., Allen, Hurvich, & Mcguire, 2017; Hurvich, 2003), was found to strongly directly impact and contribute to mediating CST impact on psychopathology. Actually, it had the largest total effect size on psychopathology. Another variable that mediated CST's impact was physical EAA (fear of and terror-related to death). Fear of physical death and mortality salience have a long consideration in terror management and other death theories (e.g., aan de Stegge, Tak, Rosmalen., & Oude Voshaar, 2018). Additionally, collective EAA, a novel concept that was developed previously in the studies of minority stress and political and cross-cultural psychology (Kashima, Halloran, Yuki, & Kashima, 2004; Kira, 2002; Kira, 2006; Yair, 2014), is another variable that was found to mediate the effects of CST on psychopathology. The constellations of different EAA interact and ultimately reinforce the status's EAA.

Another important variable that mediates CST's impact on psychopathology was the centrality of the event (COE) to an identity. Previous studies found that COE is an important variable due to its association with psychopathology (e.g., Berntsen & Rubin, 2006; Gehrt, Berntsen, Hoyle, & Rubin, 2018). While we tried to further develop the concept to be

specific to one type of identity or the other, we did not empirically test this specificity hypothesis. Future studies are recommended to test what different events are central to what identity (personal, collective, physical, status) and the differential impact of each in different trauma profiles.

Another significant contribution of the current study is replicating previous evidence of CTS's nonlinear dynamics impact on Internalizing, externalizing, and thought disorder (Kira et al., 2020). Using a Cusp catastrophe analysis to replicate the evidence of the nonlinear dynamics threshold model can be followed in future studies. The cumulative impact of CST dynamics is related to various processes, including distress tolerance (Leyro, Zvolensky, & Bernstein, 2010), stress sensitization, the kindling process (Post, Weiss, & Smith, 1995), and the diathesis-stress model (Stein, Jang, Taylor, Vernon, & Livesley, 2002). All assume a stress tolerance and buffer that breaks upon reaching a threshold that may be different from person to person.

One point that needed further explanation is the contrast between the Syrian and UK samples results as both have high cumulative stressors and traumas; while the UK participants have higher psychopathology (externalizing, internalizing, and thought disorders), compared to the Syrian participants. However, in the Syrians' same sample, in a previous study (Kanaan, Kira, Shuwiekh, Kucharska, & Al-Huwailah, 2019). using the PTSD adapted University of California Los Angeles post-traumatic stress disorder-5 reaction index (which was not used in the current study), %52 of Syrian participants scored at the intensity cutpoint of 38 or above for PTSD that accurately reflects the effect of their level of traumatization. The traumas/ stressors profile of Syrians are different from the UK trauma profile which may have different mental health consequences.

One of the strengths of the study was combining different samples that have different trauma loads and profiles which increased trauma variability. That allowed us to test the non-linearity hypotheses. For example, in samples with low trauma load., the linearity /non-linearity hypothesis cannot be verified. Verification of non-linearity requires the presence of different levels of traumatization (high, low, and medium). The results may be different in groups with homogenous low (or high) trauma loads.

The current study has compelling implications for research and practice. The impact of environmental and internal stressors on the individual is mediated by the focused lens of his/ her salient relevant identity/s and does not necessarily follow a linear trajectory. The indirect and cumulative impact of previous and proliferated and continuous stressors and traumas can be more significant than the direct impact of the triggering stressor. The stressors that threaten one or more of the person's identities' existence, maintenance, or development may be the most severe and consequential. One of the most of these threats that mediate the impact of cumulative stressors on mental health is the threats to the person's social status, for example, his/her minority status, poverty, and threats to work status and failure in school, among other identity threats to social and personal identities that mediate a significant part of the impact of cumulative stressor and traumas on psychopathology. The centrality of identity spans from psychopathology to posttraumatic growth and effective treatment. Identity traumas may facilitate normal development and PTG. Strong salient identity with strong wills and motivation is a key for healing of identity traumas and a significant path to higher PTG, lower PTSD, and comorbidities (Kira et al., 2019, Kira et al., 2021; Kira & Shuwiekh, 2021; Mossakowski, 2003; for meta-analysis, see Smith & Silva, 2011). Different identity traumas may have different trajectories to PTG and wellbeing (e.g., Wamser-Nanney et al., 2018).

This model emphasizes stressors and traumas, macro-linear and nonlinear dynamics and the role of identity hierarchy that the individual possesses, and the different types of pre-identity, identity and interdependence stressors, and traumas. Various interventions that are cumulative trauma-focused are emerging (e.g., Brave Heart, 1998; Franklin, 1999; Kira, Ashby, Omidy, & Lewandowski, 2015; Kira, & Tummala-Narra, 2015; Kira, Wroble, 2016; Schauer, & Schauer, 2010). Such models focus more on personal and collective (social) identity and the cumulative dynamics and

not only on the single trauma-focused past events. Such models need to be further developed and tested in controlled studies. Such interventions may hold promise for the future, especially for the multiply traumatized populations (e.g., veterans, refugees, torture survivors, asylum seekers, black Americans, Native Americans, minorities, and foster care children).

How the nonlinear model that explained more variance than the linear model informs clinical practice? Some Psychoanalytic scholars led the call for nonlinear psychoanalysis (Galatzer-Levy, 2017; Halfon et al., 2016). Earlier, Brabender (2000) proposed a group therapy model based on the nonlinear model. A significant theme in non-linearity is that a small alteration in the patient's initial conditions may have a significant effect on the end result. In the context of non-linearity, it is argued that 'evidence-based psychotherapy as it exists today can only ever be relevant to a small fraction of the domain of psychopathology. It is concluded that good psychotherapy should be individualized to an individual patient whose functions are governed by nonlinear processes. There is a

need to expand the spectrum of scientific psychology to include nonlinear dynamics in this context. Some clinicians have proposed a move away from the approach of treating mental illness as disorder categories towards a focus on processes and patient-specific mechanisms in psychotherapy and thinking about mental illness in terms of systems (Petros, 2003). Current psychotherapy movements strongly align with technical advances in dynamic modeling tools, yet their clinical practice implementation is relatively scarce. The barriers to adopting these new paradigms can be addressed by grounding dynamical systems in practitioners' theories and training (Burger et al., 2020).

We focused, in the current study, on the impact of global dynamics and we did not examine the unique contribution of events that do not meet Criterion A definition of trauma versus those events that do. While some initial studies addressed this issue (e.g., Kira, Fawzi, et al., 2019), future studies can elaborate on disentangling the relationships between these stressor types in different trauma profiles.

The current study has several limitations. One of the limitations is that the study was conducted in a convenient sample that is relatively skewed towards younger ages and may have limited and biased representation. We recommend more studies that use more representative samples.

Another limitation is that the measures we used are based on participants' self-reports, which could be subject to under- or over-reporting of events due to current symptoms, embarrassment, shame, or social desirability. Further, the samples that represent Western cultures were limited to the UK. Including more Western samples should make the argument of invariance across cultures stronger.

Another limitation is that the study utilized a cross-sectional design in testing our mediated model. Mediated models contain causal paths that inherently involve time passage, and testing these paths with cross-sectional data can produce biased estimates (Maxwell & Cole, 2007). Accordingly, we should caution that the use of terms like direct, indirect, and total effects should be understood as they are meant and intended by its use in PROCESS and path analyses.

Declarations

Ethical Approval

All Procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

Conflict of Interest

All authors did not receive any grants for this work or honorariums related to this work and declare no conflict of interest.

The statement of the individual author's contributions: Dr. Ibrahim Kira, and the contributing authors designed the study. Dr. Kira conducted the statistical analysis and wrote the first draft. Professor Hanaa Shuwiekh conceived the procedures and obtained the IRB approval of the study, in addition to editing the final draft of the submission. Justyna Kucharska, and Amthal, H. Al-Huwailah, Neslihan Arıcı Özcan, and Amer Kanaan, participated in designing the study and in editing the final draft.

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Figures

N = 1566
 Chi Square = 6.665, d.f.= 2, p=.036
 CFI = .999
 RMSEA=.039

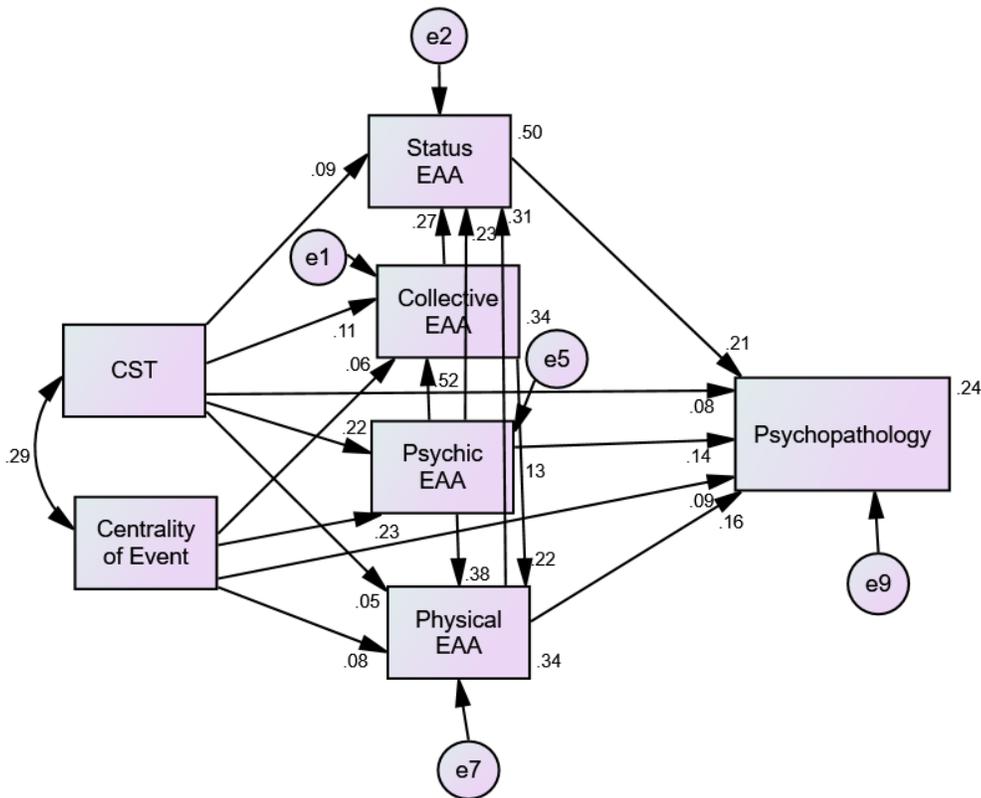


Figure 1

Path model for the effects of CST on psychopathology mediated by the centrality of event and EAA four types

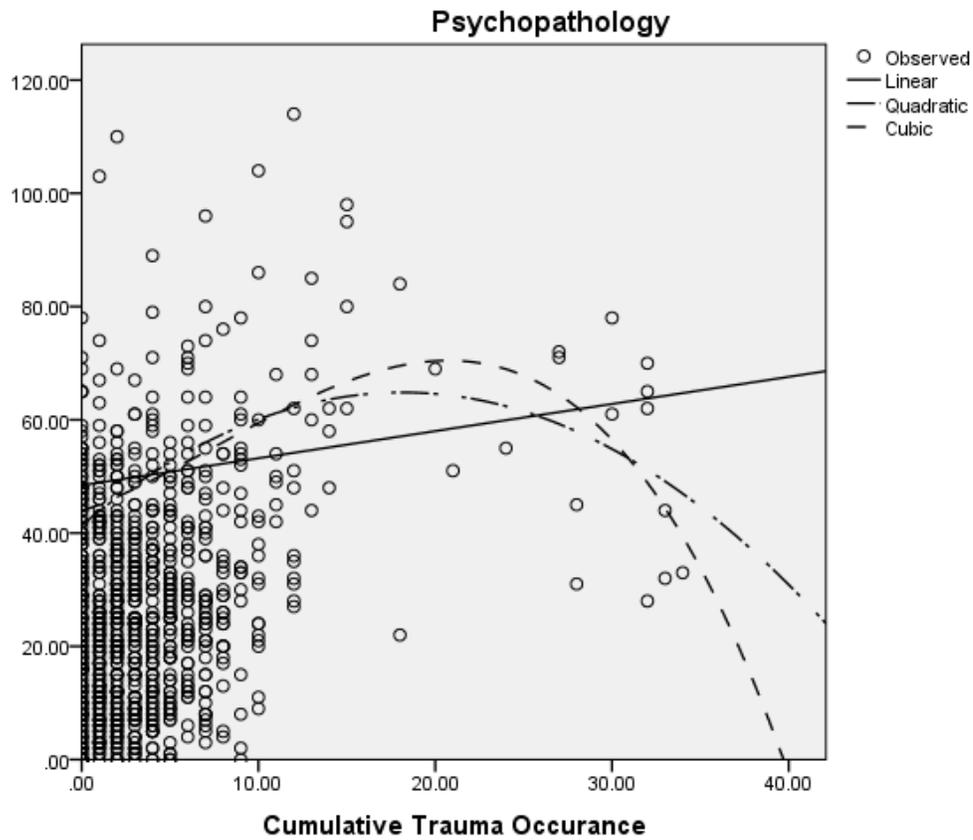


Figure 2

Curve estimation regression for linear, quadratic, and cubic models for the effects of cumulative stressors and traumas on Psychopathology

Internalizing

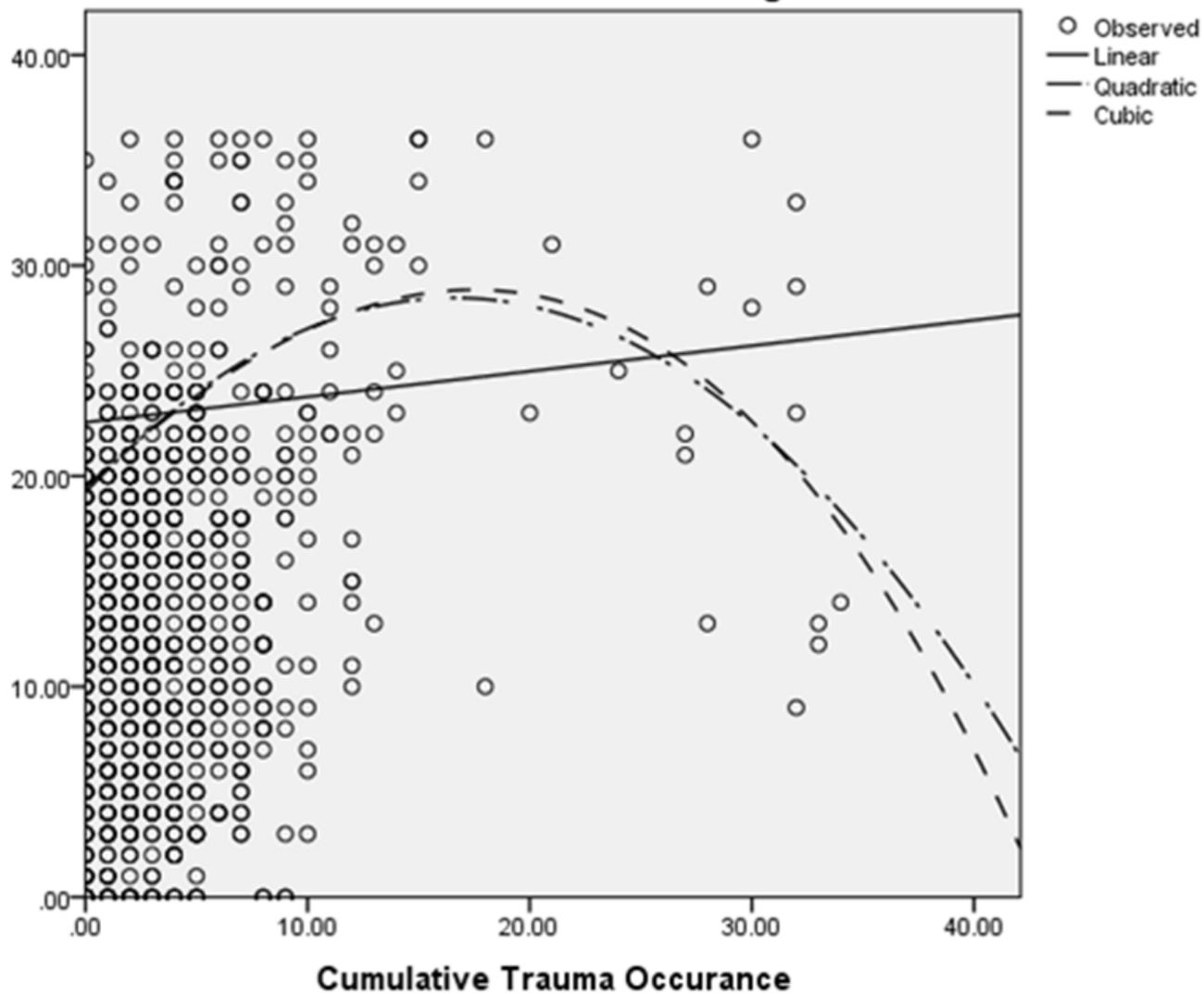


Figure 3

Curve estimation regression for linear, quadratic, and cubic models for the effects of cumulative stressors and traumas on Internalizing disorders.

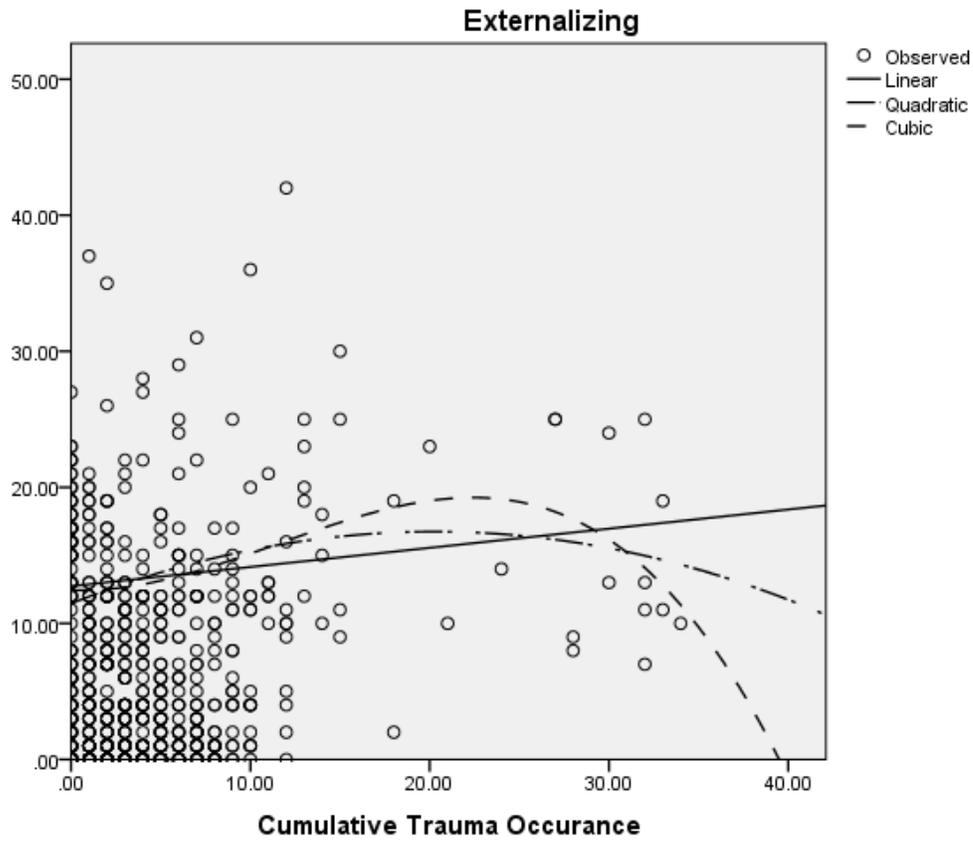


Figure 4

Curve estimation regression for linear, quadratic, and cubic models for the effects of cumulative stressors and traumas on externalizing disorders

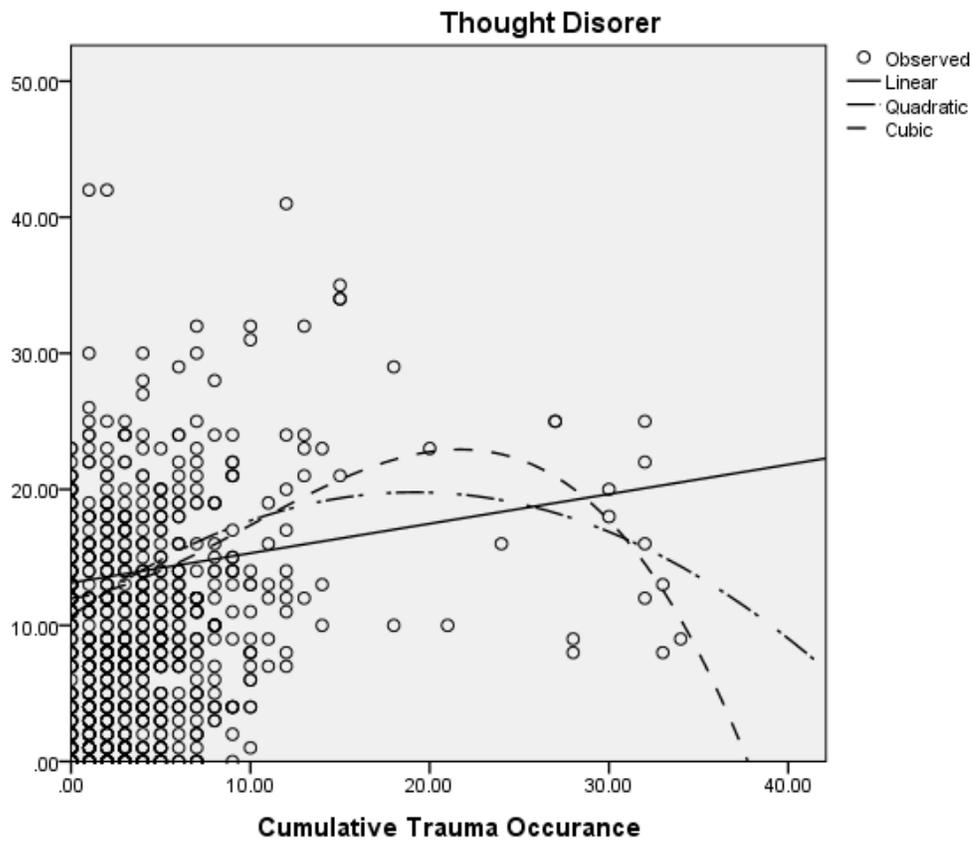


Figure 5

Curve estimation regression for linear, quadratic, and cubic models for the effects of cumulative stressors and traumas on thought disorders

Total Health



Figure 6

Curve estimation regression for linear, quadratic, and cubic models for the effects of cumulative stressors and traumas on poor physical health.