

# CUMULATIVE DISASTER EXPOSURE AND YOUTH MENTAL HEALTH: A MULTILEVEL STRUCTURAL EQUATION MODELING APPROACH

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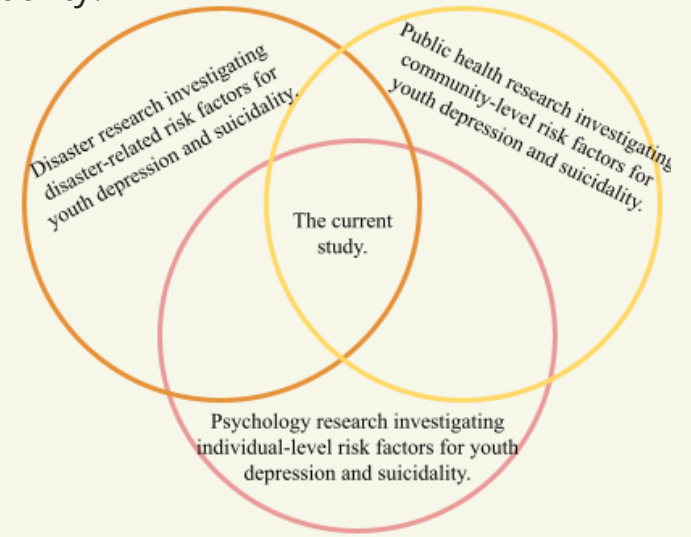


## PROBLEM STATEMENT

Today's youth have been burdened with the rising frequency and intensity of weather-related disasters due to climate change.<sup>1</sup> Although decades of literature indicate that youth are particularly vulnerable to mental health problems following disaster exposure,<sup>2</sup> limitations of existing studies include: a focus on single disaster events,<sup>3</sup> evaluating post-traumatic stress symptoms as the primary outcome,<sup>4</sup> a focus on individual and psychological risk factors,<sup>5</sup> and a lack of sociodemographic diversity within study samples.<sup>6</sup> Furthermore, few research studies have assessed how community-level (rather than individual-level) exposure to multiple and diverse weather-related disaster events impacts individual youth depression and suicidality. This is a critical gap in the literature, given that communities are increasingly experiencing multiple types of weather-related disasters in close geographic and temporal proximity, and rates of depression<sup>7</sup> and suicidality<sup>8</sup> in youth continue to rise.

## THE CURRENT STUDY

The current study aims to build a large and sociodemographically diverse integrative dataset to investigate the relationship between district-level cumulative disaster exposure, individual-level youth demographics and adverse experiences, district-level factors, and youth depression and suicidality. The study fills an important gap in the literature and contributes to the advancement of our understanding of the complex relationship between weather-related disaster exposure and youth depression and suicidality.



## THEORETICAL BASIS

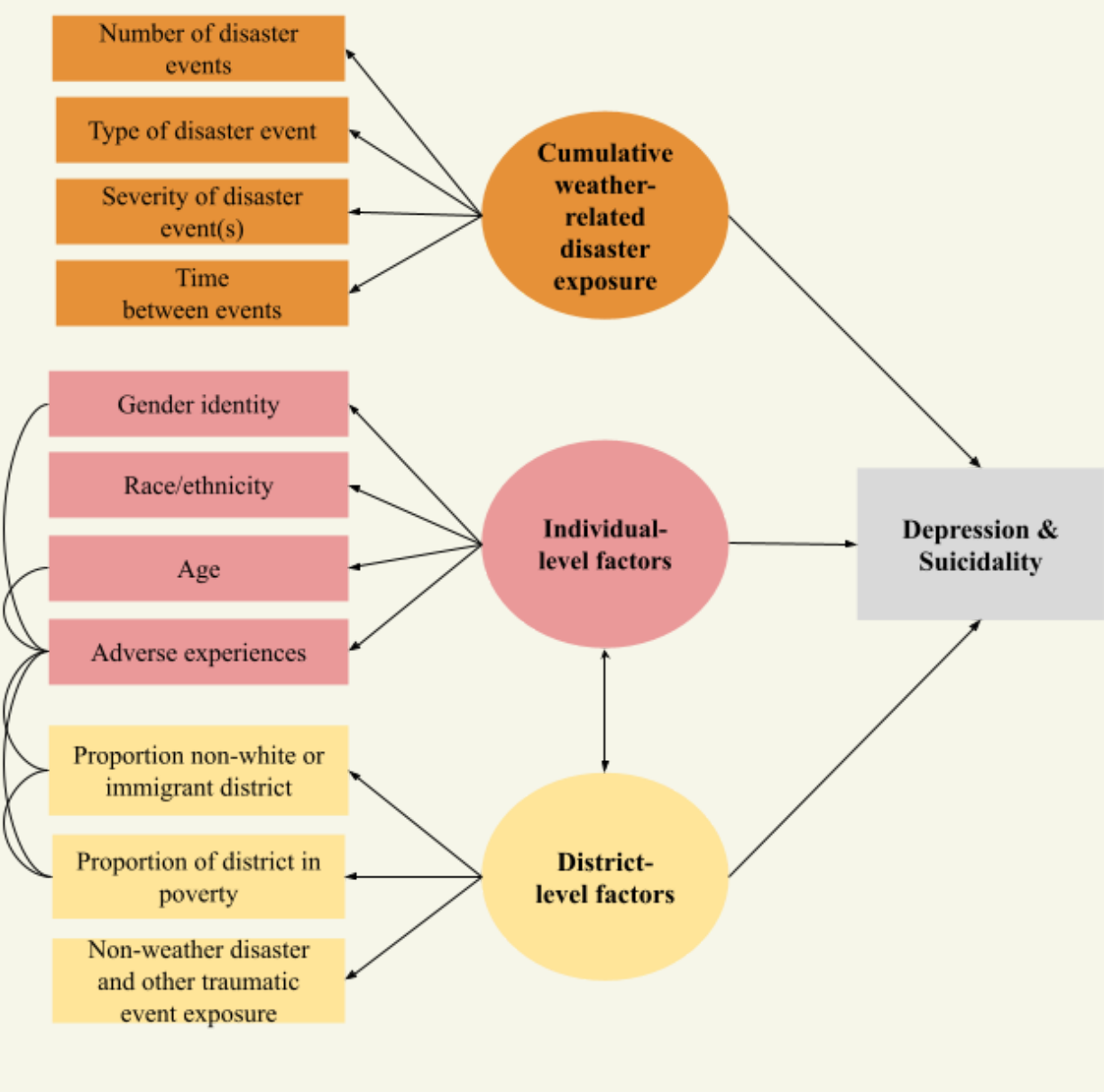
The current study draws upon two theoretical frameworks: 1) Cumulative stress models and 2) The disaster conceptual model. Cumulative stress models posit that exposure to multiple stressors can impact individuals according to an interactive, dose-response model, in which stressors both accumulate and interact to increase or decrease mental health risk.<sup>9</sup> The disaster conceptual model posits that the effects of disasters on youth are influenced by factors across ecological systems, including individual (e.g., age, gender), social (e.g., social support), and environmental factors (e.g., community poverty).<sup>10</sup> Based on these frameworks, the current study hypothesizes that exposure to multiple disasters may lead to a disaster cascade that exacerbates the negative impact of each subsequent disaster on youth mental health outcomes. Therefore, youth living in communities with higher levels of disaster exposure would have higher risk of depression and suicidality compared to youth living in areas with less disaster exposure. However, disaster characteristics, individual-level factors, and community characteristics will interact to either increase or decrease risk for depression and suicidality for youth.

## BUILDING THE DATASET

Table 1. Overview of integrative dataset

Dataset	Variables
Federal Emergency Management Agency (FEMA) Disaster Declarations 2017-2019	Frequency of <b>disaster exposure</b> (weather-related and non-weather-related), <b>location</b> , <b>disaster type</b> (e.g., severe storm, hurricane), <b>declaration type</b> (e.g., major disaster, fire), and <b>severity</b> (impact on district)
2019 Youth Behavior Risk Surveillance System (YRBS) Middle (N=25,308) & High School (N=56,770)	<b>Demographics</b> (assigned sex, race/ethnicity, age, district location); <b>Adverse events</b> (safety concerns, bullying, housing instability, food insecurity, sexual and intimate partner violence), <b>Mental health</b> (depressive symptoms, suicidal ideation, suicide plan, suicide attempt)
Census Bureau's Small Area Income and Poverty Estimates (SAIPE) 2017-2018	County-level <b>poverty rates</b> , <b>racial/ethnic and immigrant status breakdown</b> of district
Every Town Research Center School Shooting Database	<b>School shootings</b> within the school district on K-12 campuses, not including unintentional discharges
Global Terrorism Database	<b>Terrorism events</b> which have occurred within the school district

## METHODS: MULTILEVEL STRUCTURAL EQUATION MODELING



**Multilevel Modeling (MLM):** In the YRBS, each respondent is embedded within a school district nest. MLM can be used to analyze data with a nested structure. The goal is to estimate the effects of predictors at different levels while accounting for dependencies within the data. The current model has two levels: district and individual-level. MLM evaluates *fixed effects* at the district level and *random effects* at the individual level. Fixed effects are predictors that apply consistently across all districts, while random effects capture the variability specific to each individual.

**Structural Equation Modeling (SEM):** In order to estimate the complex relationship between *observed* and *latent* (unobserved) variables, SEM can be used to assess the fit of a model to the data and estimate the strength and significance of relationships between variables. The *measurement model* specifies the relationships between the latent variables and their observed indicators. The *structural model* represents the hypothesized relationships among the latent variables, including both direct and indirect effects. The structural model is often specified in terms of regression coefficients, representing the relationships between the latent variables.

**Multilevel Structural Equation Modeling (MSEM):** Allows for the examination of complex relationships among latent and observed variables while accounting for the hierarchical structure of the data. Structural model coefficients can be estimated at each level of the data hierarchy, capturing the *within-group* and *between-group variability*.

Figure 1. Proposed MLSEM model. Ovals present the latent variables and rectangles present the observed variables. Curved lines on the left-hand side represent proposed relationships between variables within and across factors.

## PRELIMINARY FINDINGS

- The preliminary sample includes 72,544 youth across 27 school districts in 14 states (CA, FL, MI, NM, NJ, NY, NC, OH, OR, PA, SC, TN, TX, and WA).
- Approximately 75% of the youth in the sample identify as Native American, Asian, Black/African American, Hispanic/Latino, Hawaiian or Pacific Islander, or Multiracial.
- Approximately 10% of youth across the middle and high school YRBS datasets endorsed past-year suicide attempts.
- Nearly 40% of youth in the high school YRBS dataset endorsed depressive symptoms.
- Intra-class correlations, which evaluate between-group variation in the outcome, are low (<3%), which may be due to: 1) homogeneity in suicidality and depression prevalence across districts and 2) the fact that individual-level differences within groups account for a significant portion of the total variance in outcomes compared to differences across the districts within the sample.
- There is theoretical justification for using MSEM to evaluate the impact of relationships between factors across ecological systems on youth mental health. However, MSEM analyses will be conducted taking into consideration characteristics of the data and underlying statistical assumptions of the method.

## ONGOING CONSIDERATIONS

- What is the best way to evaluate the severity of disaster impact on the district?
- Would it be helpful to include an additional socioeconomic status indicator related to proportion of free and reduced-price lunch in the district?
- What are some sources of data related to disaster-related displacement?
- What is the best way to address issues of collinearity within the integrative dataset?

## CITATIONS

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