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Rising tide of stress: Global trends and structural predictors over 18 years

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ABSTRACT

Background: Mounting evidence points to stress being a transdiagnostic contributing factor to health conditions. Given the health significance of stress, characterizing macro-level spatiotemporal trends and disparities of stress is necessary to understanding stress and its potential health burden across populations. The need to investigate structural factors contributing to stress is further underscored by the escalating instability worldwide over the past decade, which can trigger a stress response and lead to adverse health outcomes if left unaddressed.
Methods: This study used nationally representative surveys ($N = 2461{,}226$; 146 countries) in 2006–2023 and the Fragile State Index ($N = 137$ countries) to i) describe global stress trends varied by world regions and demographic groups, and ii) examine whether nation-level state fragility, a summative measure that aggregates 12 economic, social, and political indicators to assess a state's risk of collapse or conflict, predicts steeper increases in stress over time.
Results: A state's level of fragility may contribute to individuals' perceived stress and in turn have profound consequences for population physical and mental health. The current study reveals an alarming increase in stress globally and calls for prioritizing structural approaches to reverse this trend. By doing so, we not only reduce stress but also its related disease burden.

1. Introduction

Mounting evidence over the last few decades has outlined how stress acts as a transdiagnostic factor conferring risk for mental and physical health conditions. At the same time, the wider social, political, and environmental context can influence the psychological and health outcomes of individuals within a society (World Health Organization, 2018). Considering the increase of chronic conditions globally, this study adopted a global lens by examining worldwide spatiotemporal patterns of stress and the novel structural factor of state fragility—a summative measure of a nation's risk of conflict or collapse potentiated by its deficiencies in meeting citizens' essential needs. We first provide an overview of stress and its disease burden, then argue for the need of adopting a structural lens in understanding global stress and finally introduce state fragility and our current study in the context of other macro-level research.

1.1. Stress as a transdiagnostic factor of health

Stress was first conceptualized as underpinning the nonspecific signs and symptoms of illness (Selye, 1955, 1973). It was then comprehensively defined as "a negative emotional experience accompanied by predictable biochemical, physiological, cognitive, and behavioral changes that are directed either toward altering the stressful event or accommodating to its effects" (Baum, 1990). Acute stress responses in healthy individuals may be adaptive and typically do not impose a health burden, whereas decades of research have documented the long-term health consequences of stress in the face of unremitting threats (Russell and Lightman, 2019). Stress is a transdiagnostic risk factor that contributes to a wide spectrum of mental and physical health

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conditions across the lifespan. Stressful life events reported by patients often precede the onset of depression and anxiety (Schneiderman et al., 2005). Chronic stress, namely perceived stress that is prolonged or repeated episodes of acute stressors, can also get under the skin and be a contributing factor in diseases such as obesity (Tomiyama, 2019), cardiovascular diseases, human immunodeficiency virus/acquired immunodeficiency syndrome, and cancer (Cohen et al., 2007; Schneiderman et al., 2005). The mechanisms underlying how stress contributes to the development and maintenance of each disease may vary, but the literature highlights the role of stress in facilitating disease progression or exacerbating the course of disease (Cohen et al., 2007). Perceived stress research has largely been limited to specific countries or regions, apart from some cross-cultural studies investigating stress during the COVID-19 pandemic. International studies of perceived stress that examine differences across countries tend to be cross-sectional in nature (e.g. Cristóbal-Narváez et al., 2020). However, most if not all these studies within countries do report increasing levels of perceived stress prior to the COVID-19 pandemic (American Psychological Association, 2023; Klaas et al., 2023; Patel et al., 2022), but it is unclear how perceived stress levels have changed across the world, including lower and middle income countries (LMICs). Given the health significance of stress, characterizing the macro-level spatiotemporal trends and disparities of stress is a necessary first step to systematically understand stress and its potential health burden across different populations. Accordingly, the first goal of the current paper is to examine how stress has changed over time in the past 18 years across 146 countries for different demographic groups and world regions.

1.2. Social determinants of stress and health

Decades of health psychology research has offered comprehensive insights about psychosocial determinants of and biological vulnerability to stress, and how these might contribute to poor psychological outcomes (Bamert et al., 2025; Schneiderman et al., 2005). However, if perceived stress is commonly reported in the population, a useful approach would be to expand from studying individual stressors to a population-based factors contributing to stress (Rose, 2001). Rooted in ecological and other multilevel models outlining downstream patterns of social determinants of health (Chen and Miller, 2013; Kindig et al., 2008; Lehman et al., 2017; Myers, 2009), previous literature has unmasked the meso-level factors in communities and neighborhoods that shape stress and health disparities. For example, when measured at the community level, socioeconomic status (Baum et al., 1999), neighborhood violence (Ewart and Suchday, 2002), residential density (Gong et al., 2016), and residential pollution (Sass et al., 2017) are linked to increased reports of stress. Conversely, social support and cohesion, neighborhood safety and security, and education have been suggested to buffer against stress and the development of mental disorders (Lund et al., 2018). With the wealth of research on these meso-level factors affecting stress and health, there is growing recognition that the study of social determinants of health should be complemented by a wider structural or systems lens to better inform public policy (Carey and Crammond, 2015; Chater and Loewenstein, 2023; Pearlin et al., 2005). This ecological perspective is especially relevant in stress and health research, given that the link between psychological factors, such as positive and negative emotions, and health can be observed in countries across the world (Pressman et al., 2013), warranting an investigation of how these associations persist and vary across the globe (Bell et al., 2010).

1.3. Global instability, fragile states, and stress

The need to investigate structural level factors contributing to stress is further underscored by the escalating instability worldwide over the past decade (World Economic Forum, 2024). This instability has manifested in many forms, including increased military spending and armed conflict, political polarization, widening wealth disparities, climate-related disasters, forced displacement, and disruptions in essential services. Importantly, the growing instability is not confined to traditionally fragile states such as Sudan, Afghanistan, and Democratic Republic of the Congo (Institute for Economics & Peace, 2024). Protests and riots have erupted in countries across the economic spectrum (e.g., Venezuela, Turkey, and the United States) (Human Rights Watch, 2025; Al Jazeera, 2024; American Psychological Association, 2023), reverberating a sense of uncertainty among global populations and signaling the growing fragility of countries and states (Cange et al., 2019; El Khoury-Malhame et al., 2024; Massazza et al., 2023).

State fragility, a concept that emerged in the post-Cold War era, refers to governments' inability to provide essential public goods and services to their citizens. These services encompass security, the rule of law, political rights, economic opportunities, education, healthcare, and more (Helman and Ratner, 1992; Rotberg, 2004). In other words, it reflects the ability of governments to function effectively, maintain peace, and foster economic and social development within their respective countries or states (World Bank, 2024a). A fragile state can trigger stress and poor health outcomes. Food insecurity is associated with heightened mental health problems in adults and developmental issues in children (Ae-Ngibise et al., 2021; Cain et al., 2022). Economic inequality is a strong correlate with shortened life expectancy, poor self-rated physical health, and higher risk for common mental disorders (Burns, 2015). Exposure to conflict and political violence places significant mental health burdens on affected populations (Charlson et al., 2019; Mesa-Vieira et al., 2022). Taken together, these findings show how the structural deficits may directly translate into psychophysiological stressors. Despite the well-documented connections between individual components of fragility and mental health, no studies have investigated the relationship between overall fragility and psychological stress. The Fragile States Index (FSI) integrates these diverse sub-dimensions into a unified measure of state vulnerability across twelve indicators—including security, public services, and demographic pressures (The Fund for Peace, 2024), and has been widely used in health-related research studies (Duan et al., 2021; Graves et al., 2015; Guarino et al., 2017; Sweileh, 2020). The second goal of the current paper is to examine the linkages between a state's fragility and the stress levels their constituents' experience.

1.4. Study overview and hypotheses

Adopting a global perspective, this study examines stress trends by linking stress reports from the Gallup World Poll (GWP) with the Fragile States Index (FSI). The FSI is compiled by The Fund for Peace and is a composite score generated across 179 countries that measures the level of state fragility within a country (The Fund for Peace, 2023). Considered one of the most comprehensive tools for assessing state fragility alongside the Country Policy and Institutional Assessment established by the World Bank (McKay and Thorbecke, 2019), the FSI indicates when states face pressures that exceed their ability to cope and function, thereby serving as an early indicator for political risk and conflict (The Fund for Peace, 2024). It has been used to investigate the roles of state fragility in various global health topics such as food insecurity, youth mental health, and psychological and physical health outcomes during a global pandemic (Duan et al., 2021; Elgar et al., 2021; Kim and Jung, 2021).

Drawing representative data across 146 countries from the 2006–2023 GWP (N = 2461,226), the current study investigates (1) whether perceived stress is increasing globally and (2) how perceived stress trends vary across different world regions and demographic groups (e.g., gender, age, and income quintiles). We hypothesize that the overall stress trend will increase significantly over the study period, with widening stress disparities in demographic groups and world regions. The examination of specific subpopulation stress trends were exploratory. We then contextualize these stress trends by examining (3)

whether nation-level state fragility—a summative measure that aggregates 12 economic, social, and political indicators to assess a state's risk of collapse or conflict (The Fund for Peace, 2023)—predicts steeper increases in stress over time. Here we hypothesize that an increase in fragility of a country will be positively associated with perceived stress in a population. Our research design enables a global investigation of perceived stress trends, identification of at-risk populations, and understanding of social, economic, and political drivers of stress worldwide. Together, systematically examining stress through a global, structural, population-wide lens will be crucial to reducing stress and its associated disease burden at scale.

2. Methodologies

The present study was pre-registered in the Open Science Framework (DOI: 10.17605/osf.io/m6j5g & 10.17605/osf.io/9av4f). Deviations from the pre-registration were documented in Table A1.

2.1. Data sources

This current study was a secondary data analysis of deidentified data from the GWP collected between 2006 and 2023 and national-level data from the FSI (2009–2023).

2.1.1. GWP

The GWP used a serial cross-sectional design to survey nationally representative samples across the world between 2006 and 2023 (Gallup Inc, 2022). The inclusion criteria are non-institutionalized civilians aged 15 or above. The GWP used telephone surveys in Northern America, Western Europe, developed countries in Asia, and Gulf Cooperation Council countries. In-person interviews were used in the rest of Asia, Central and Eastern Europe, a majority of Latin American countries, former Soviet states, the Middle East, and Africa. Gallup surveyed 1000 individuals in most countries or settings (*Mean* = 1103, *SD* = 699, *range* = 438–13,388). The main analytic samples between 2006 and 2023 comprised over 2.4 million adults across 146 countries ($N = 2461{,}226$, Tables A2–3). Analyses involving world regions were restricted to samples collected from 146 countries ($N = 2312{,}793$) between 2008 and 2023 due to the lack of representation of regions and countries in Europe & Central Asia, North America, and Sub-Saharan Africa in 2007. The sample size for the moderation analysis involving income quantiles was restricted to 2.1 million adults in 139 countries ($N = 2104{,}524$) collected between 2009 and 2023 during which the income measures were administered. All analytic samples were limited to countries where at least 7 waves of data were collected to minimize model convergence issues. The GWP conducted data validation during field surveys and before public data releases. Data weighting was implemented to ensure national representativeness and minimize bias in survey-based estimates for each country on an annual basis. Non-response adjustments were made to the sampling base weight to match the weighted sample totals to known target population totals obtained from country level census data of gender and age, as well as education or socioeconomic status when such data was available.

2.1.2. FSI

The FSI is compiled by The Fund for Peace and is a composite score generated across 179 countries that measures the level of state fragility within a country (The Fund for Peace, 2023). Developed as a political risk assessment tool and for early warning of conflict, the FSI assesses when states face pressures that exceed their ability to manage, thereby serving as an early indicator for political risk and conflict (The Fund for Peace, 2024). The Index consists of 12 indicators in 4 categories: cohesion; economics; political environment; and social and cross-cutting, which in turn are made up of 100 sub-indicators. The final FSI scores for each country are synthesized from three components: content analyses, quantitative data analyses, and qualitative reviews by experts. The content analyses involve Boolean searches in global media data from over 45 million articles annually to determine the salience of each sub-indicator. The results are then combined with quantitative data from international agencies (e.g., the United Nations and the World Health Organization) that present key aspects of the indicators. Concurrently, a social science research team would conduct qualitative analyses and reviews of key events in each country annually, to supplement any lagging quantitative data and noisy content analysis data. The final FSI score for each country generated from this process is reviewed by the research team to ensure the scores are harmonized across countries. We retrieved data from the 2009–2023 FSI as a country-level measure of state fragility and matched the country-level data available to countries surveyed in the GWP during the same period, resulting in over 2.0 million adults in 137 countries ($N = 2019{,}983$).

2.2. Variables

2.2.1. Variables from GWP

2.2.1.1. Stress. Perceived stress was assessed by asking participants whether they experienced stress during a lot of the previous day in a binary format ("yes", "no"). Responses of "don't know" or refusal to answer were classified as missing in the analyses.

2.2.1.2. Gender. Gender was coded based on the interviewer's assessment of a respondent's gender. The options were *male* or *female*. Respondents were not asked about their biological sex and gender identity directly. Male was chosen as the reference category in regression analyses.

2.2.1.3. Age. Respondents were categorized into 4 age groups: 15–29, 30–44, 45–59, and 60 years old and above, with the youngest age group serving as the reference category in regression analyses.

2.2.1.4. Per capita income quintiles. Respondents were divided into income quintiles by ranking per capita annual income in international dollars in each country and year and dividing the ranked income into five equal groups. The income quintile would provide a measure of respondent wealth that is relative to other respondents in their country. The lowest income quintile was chosen as the reference category in regression analyses.

2.2.1.5. World regions. Countries were classified into 10 regions (i.e., Western Europe; Central and Eastern Europe; Commonwealth of Independent States; Southeast Asia; South Asia; East Asia; Latin America & The Caribbean; North America, Australia & New Zealand; Middle East and North Africa; and Sub-Saharan Africa) based on the categories used in the World Happiness Reports (Helliwell et al., 2024). A list of countries under each regional category can be found in Table A4. South Asia was selected as the reference category in regression analyses due to it being the most populous region.

2.2.2. FSI score

The FSI assesses 12 indicators across 4 categories: cohesion economic (i.e., economic decline, uneven economic development, and human flight and brain drain), political (i.e., state legitimacy, public services, and human rights and rule of law), and social and cross-cutting (i.e., demographic pressures, refugees and internally displaced persons, and external intervention). Each of the 12 indicators in the FSI has a maximum score of 10, resulting in a total possible score of 120. A higher FSI score denotes more fragility or instability within the country.

2.2.3. Gross domestic product (GDP) per capita

Extracted from the World Bank, the Gross Domestic Product (GDP) is

the sum of gross value added by all resident producers in a country as well as product taxes (World Bank, 2024b). Any subsidies not included in the value of the products were subtracted. GDP expressed in current international dollars (United States Dollars) was converted by the *purchasing power parity* conversion factor. Log2 transformation was applied to GDP to follow the log-normal distribution and to minimize heteroskedasticity in statistical models.

2.3. Statistical analyses

To examine the global stress trends in 2006–2023, we reported the weighted proportion of stress reports in the global populations and estimated a multilevel logistic regression (level 1: participant; level 2: country) to predict stress from a linear time trend, with random intercepts and slopes by country. To investigate how stress trends vary across demographic groups (i.e., gender, age, and income quintile) and world geographic regions, we estimated additional models, one for each moderator, that added the fixed effects terms for the main effect of the moderator and interaction term of year and the moderator. Similar to the year-only model, these moderation models included random intercepts and slopes by country.

Next, we investigated the association between stress and state fragility using a hybrid effect model (Allison, 2009). We derived two variables to decompose the between-country and within-country effects of the State Fragility Index (FSI). The between-country FSI variable, the country-mean-centered FSI score, estimates the overall fragility of a country compared to others. The within-country FSI variable was calculated by subtracting the FSI score from country-specific means. Therefore, the within-country FSI allowed us to isolate the "within-country" association which gets at whether countries that became more fragile over time also experienced greater increase in stress. In the Results section, we focus on the within-country association between FSI and stress for two reasons. First, the within-country effect is typically considered to be more reliable as all observed and unobserved time-invariant confounders are accounted for (Allison, 2009). Second, the Fund for Peace recommends state fragility be assessed longitudinally, emphasizing trends and rate-of-change in fragility within countries (The Fund for Peace, 2021). This recommendation also facilitates our examination of how stress trends evolved with changes in instability. For this set of analyses, we first used a multilevel logistic regression model to estimate the hybrid within-country and between-country effects of FSI scores on stress, with random intercepts and slopes for years by each country. A linear time trend was included to capture the over-time changes in stress by including year as a control variable, alongside income quintile, GDP per capita, age, and gender. A second multilevel logistic regression effect model was used to estimate the interaction effect of 1) within-country FSI scores and year; and 2) between-country FSI scores and year by adding these two interaction terms to the first model.

In all models, the year variable has been min-max normalized and scaled to the range of [0,1] so that 1 unit change in year would refer to the entire study period of available data (i.e., 2006–2023 for models involving demographic groups, 2008–2023 for the model involving world regions, and 2009–2023 for models involving income quintile and for models of FSI). All continuous variables were scaled and centered to ensure model stability. For the mathematical equations and descriptions of all the multilevel logistical regression models, please refer to the supplementary text. Complete-case analyses were conducted where entries with missing stress variables and data were excluded from the analyses (i.e., case-wise deletion). Only 4.2 % of the stress data was missing across all years (2006–2023) when the stress item was administered. All analyses were performed using R Statistical Software (versions 4.4.1 and 4.5.0) (R Core Team, 2021). The following R packages were used for data processing, analyses, and visualization: countrycode (Arel-Bundock et al., 2025), ggbreak (Yu and Xu, 2025), ggeffects (Lüdecke, Aust, et al., 2025), ggpubr (Kassambara, 2025), Hmisc (Harrell & Dupont, 2025), kableExtra (Zhu et al., 2024), knitr (Xie et al., 2025), lme4 (Bates et al., 2025), numDeriv (Gilbert & Varadhan, 2019), readxl (Wickham et al., 2025), rio (Becker et al., 2024), sf (Pebesma et al., 2025), sjPlot (Lüdecke et al., 2025), stargazer (Hlavac, 2022), survey (Lumley et al., 2025), tableone (Yoshida et al., 2022), and tidyverse (Wickham & RStudio, 2023).

3. Results

3.1. Global stress trends

The global stress trend in 2006–2023 showed that the weighted proportion of stress reports was the lowest (26.51 %, 95 % CI [25.92–27.11 %]) in 2007, rose to the highest (38.13 %, [37.77–38.49 %]) in 2020 and remained stable thereafter (Fig. 1A). Among the 146 surveyed countries, 122 (83.56 %) reported an increase in stress and 40 countries (27.40 %) increased stress reports by 70 % (Fig. 1B, Table A5). Chief among them were Comoros (489.48 %), Niger (381.81 %), Tanzania (312.61 %), Burkina Faso (311.94 %), Mauritania (255.69 %), Chad (222.90 %), and Guinea (217.23 %) in East, Central, and West Africa, which all experienced over two folds of stress report increase from their respective baselines. Conversely, 24 countries reported a decrease in the proportion of stress reporting between 2006 and 2023 (range = 0.32–47.55 %). Taken together, the descriptive stress trend indicates heterogeneity across countries. Still, the year-only multilevel logistic regression model estimated that the odds of stress reports increased by 97.4 % during the study period (OR = 1.97, 95 % CI [1.77–2.20]), after accounting for variability in stress among countries over the years (Table 1). This time effect held even in the multilevel logistic regression models of moderators (Fig. 2, Tables A6–A9). Next, we turned to specific moderating effects of age, gender, income, and geographic regions on stress reports.

3.2. Gender

At the outset in 2006, women had slightly higher odds of reporting stress than men (OR = 1.08, 95 % CI [1.06–1.09]). The gender divide continued to grow wider from 2006 to 2023 as women were at higher odds of reporting increases in stress than men by 10.08 % (OR = 1.10, 95 % CI [1.08–1.12]) (Fig. 2A, Table A6).

3.3. Age

In 2006, the two middle-aged groups, comprising individuals between 30 and 44 years, and 45 to 59 years, were the most stressed among all age groups (Fig. 2B, Table A7). Individuals aged 30 to 44 years olds had a significantly higher odds of reporting stress compared to their youngest peers aged 15 to 24 years, with an odds ratio of 1.30 (95 % CI [1.28–1.31]). Similarly, individuals aged 45 to 59 years also experienced a 19.5 % higher odds (OR = 1.20, 95 % CI [1.17–1.22]) of reporting stress. On the contrary, the oldest individuals (aged 60 and above) were the least stressed group, having 21.56 % lower odds (OR = 0.78, 95 % CI [0.77–0.80]) of reporting stress than the youngest age group. Over the entire study period, all three older age groups were estimated to have slightly higher odds of reporting increased stress compared to the youngest age group. This suggests that stress trends are increasing most for adults later in life. Among these age groups, individuals aged between 45 and 59 years experienced the sharpest increase in stress reporting, with a 13.4 % increase (OR = 1.13, 95 % CI [1.102–1.166]).

3.4. Income

A clear social patterning effect of income emerged from the outset in 2009: Compared to the most stressed group whose earnings were at the bottom 20 %, those in the second and third quintiles had 13.0 % (OR =

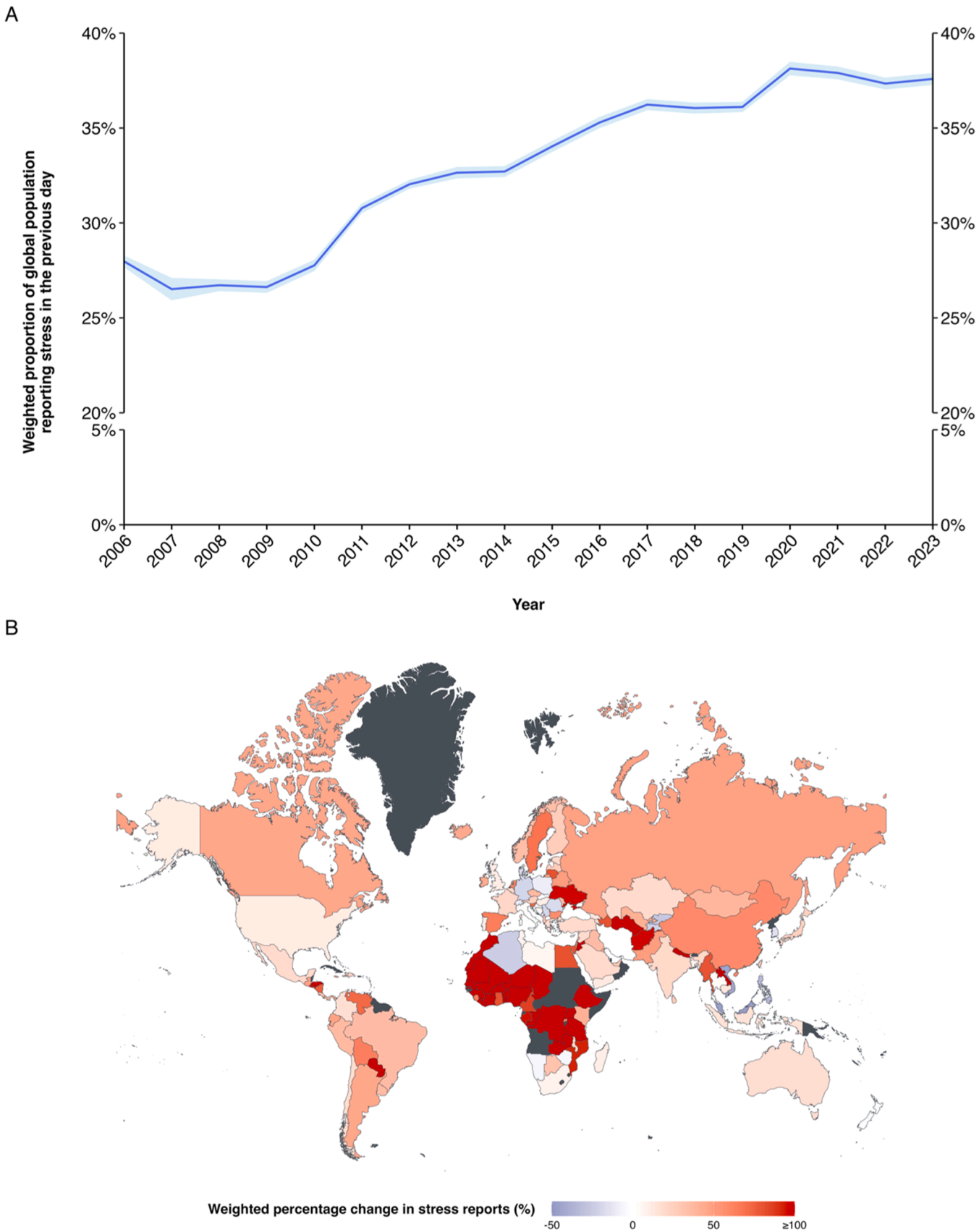

Fig. 1. (A) Global trend of stress reports and (B) percentage changes in stress reports in 146 countries from 2006 to 2023. Note: The shade represents the 95 % confidence interval. Data source: Gallup World Poll.

Table 1
Multilevel logistic regression model of the association between self-reported stress and normalized year.

	Self-reported Stress	
Predictors	*Odds Ratios*	*95 % CI*
(Intercept)	0.34 ***	0.30–0.37
Normalized Year	1.97 ***	1.77–2.20
Random Effects		
σ^2	3.29	
$\tau_{00\ Country\ (Intercept)}$	0.42	
$\tau_{11\ Country\ (Normalized\ Year)}$	0.44	
$\rho_{01\ Country}$	−0.63	
ICC	0.08	
$N_{Country}$	146	
Observations	2461,226	
Marginal R^2 / Conditional R^2	0.010 / 0.092	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

0.87, 95 % CI [0.85–0.89]) and 19.4 % (OR = 0.81, 95 % CI [0.79–0.82]) lower odds of reporting stress (Fig. 2C, Table A8). The fourth and the fifth quintiles were estimated to have incrementally lower odds of reporting stress, by 24.6 % (OR = 0.75, 95 % CI [0.74–0.77]) and 28.7 % (OR = 0.71, 95 % CI [0.70–0.73]) respectively. By 2023, while all income groups had increased odds of reported increase, the fourth and the richest quintiles were less so by 6.42 % (OR = 0.94, 95 % CI [0.91–0.97]) and 5.53 % (OR = 0.95, 95 % CI [0.91–0.98]), compared to the financially worst-off quintile.

3.5. World region

Compared to South Asia, individuals in the Commonwealth Independent States were 54 % less likely to report stress at baseline (OR = 0.54, 95 % CI [0.42 – 0.68]) (Fig. 2D, Table A9). Residents in the Middle East and North Africa (OR = 2.22, 95 % CI [1.70–2.89]) and North America, Australia & New Zealand (OR = 2.17, 95 % CI [1.44–3.26])

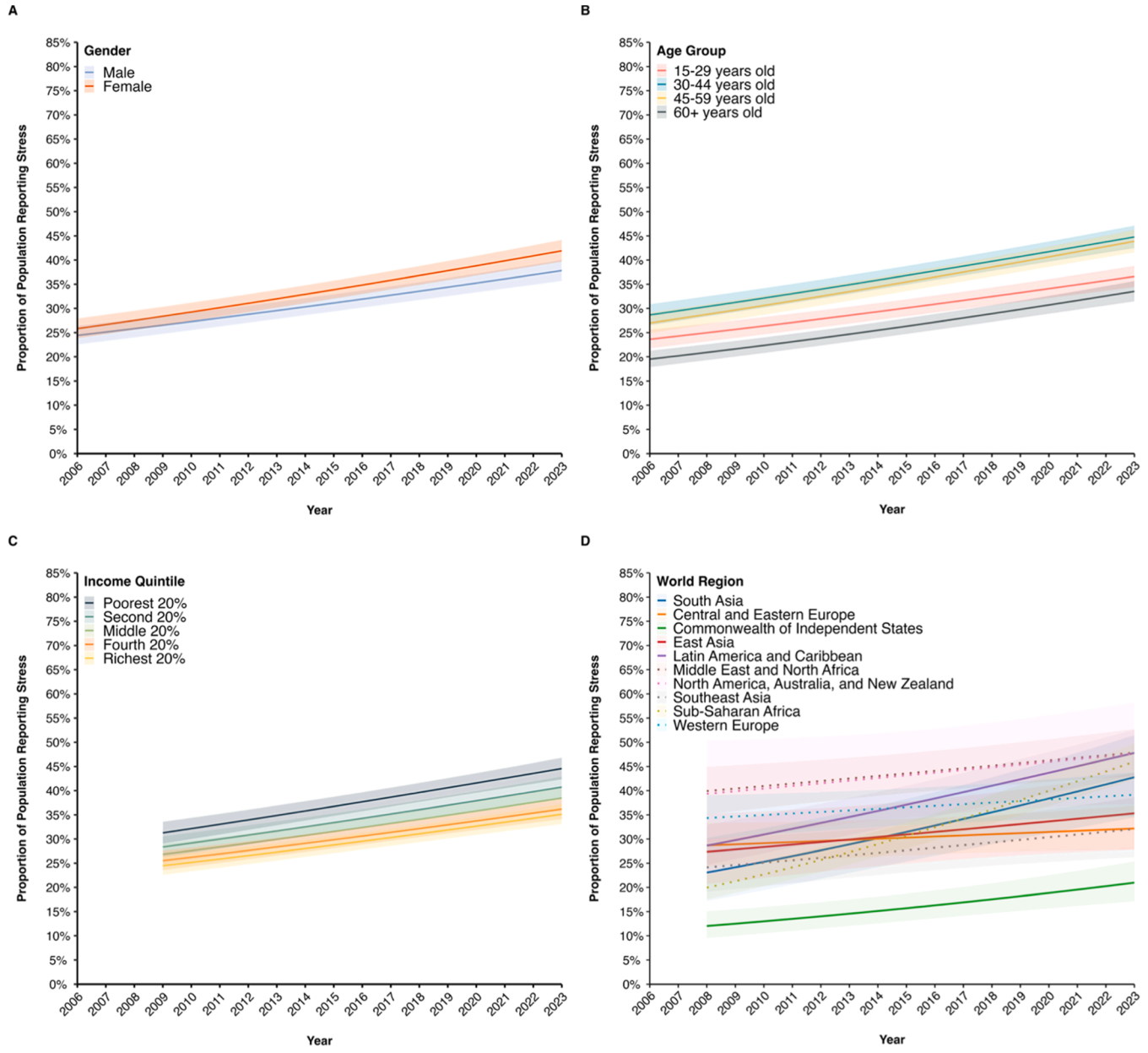

Fig. 2. The predicted proportion of stress report by (A) gender, (B) age group, (C) income quintile, and (D) world region over time. Note: The fitted values displayed here are the predicted values from the regression model, with the 95 % confidence interval. Data source: Gallup World Poll.

had more than double the odds of reporting stress than those in South Asia, followed by Western Europeans (OR = 1.75, 95 % CI [1.31–2.32]). East Asia, Southeast Asia, Sub-Saharan Africa, Latin America & the Caribbean, and Central/Eastern Europe were estimated to have comparable stress reporting to South Asia. By the end of the study period in 2023, Sub-Saharan Africa had the strongest positive time trend effect in which they had 37.1 % higher odds of reporting stress than South Asia (OR = 1.37, 95 % CI [1.04–1.81]). Conversely, Central and Eastern Europe (OR = 0.47, 95 % CI [0.35–0.63]), Western Europe (OR = 0.47, 95 % CI [0.37–0.65]), North America, Australia, & New Zealand (OR = 0.56, 95 % CI [0.34–0.92]), and East Asia (OR = 0.58, 95 % CI [0.37–0.91]) had a slower increase in stress report over time than the reference region.

3.6. How state fragility is linked with stress over time

The average instability as measured by FSI scores between 2009 and 2023 among the 141 countries (range = 60.21–75.07 out of 120) remained relatively stable (Fig. A1). Results from the multilevel logistic regression revealed that within-country changes in state fragility moderated how quickly stress increased over time (OR = 1.14, 95 % CI [1.12–1.15]) (Table A10). This interaction indicates that stress trends varied depending on whether a country was experiencing higher or lower fragility than its average level over the study period. Fig. 3 illustrates this evolving relationship over the study period. In 2009, countries experiencing lower fragility than their long-term average had higher rates of stress reporting. However, this pattern reversed by 2023: countries with higher-than-average fragility scores showed greater stress reporting. Most importantly, during periods when countries experienced elevated state fragility, their populations showed particularly rapid increases in stress over time.

As a sensitivity analysis, we conducted an additional set of analyses which replaced the within-country and between-country changes in FSI with one categorical FSI variable: sustainable (0–30), stable (31–60), warning (61–90), and alert (91–120). The proportion of countries in each FSI category remained stable over time (Fig. A2), which corroborates with the trend of FSI when it was analyzed as a continuous variable. Furthermore, the adjusted multilevel logistic regression model with the FSI categories and time showed a similar trend as our preregistered analyses (Fig. 3; Table A11). Initially, the most fragile countries (categorized as warning and alert) were less likely to report stress (OR_{range} = 0.50–0.52) compared to the countries in the sustainable category. However, this trend was reversed in 2023, as people in the more fragile countries were three times more likely to report stress than those in the sustainable FSI category (Fig. A3 and Table A11).

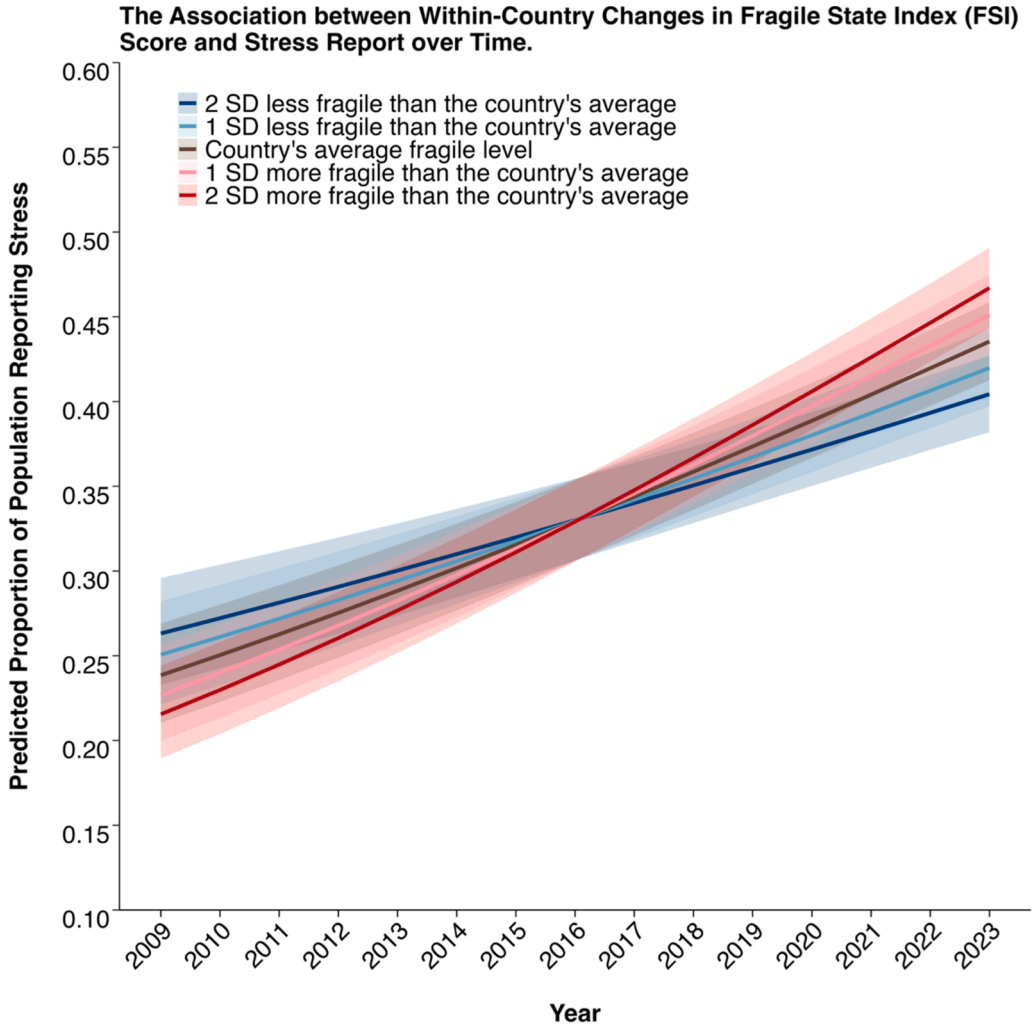

Fig. 3. Association between within-country changes in Fragile States Index (FSI) score and stress report over time. Abbreviation: SD = Standard Deviation. Note: The fitted values displayed here are the predicted values from the regression model, with the 95 % confidence interval. Meaningful reference points (i.e. ± 2 standard deviations from average with-in country FSI score) were used to illustrate the association. Data sources: Funds for Peace, Gallup World Poll, and World Bank.

4. Discussion

Stress is a well-documented transdiagnostic risk factor implicated in mental and physical chronic conditions, and these chronic conditions have been increasing globally. This study makes three contributions: it establishes the global rise in perceived stress since the mid-2000s, documents widening disparities across social groups, and introduces a novel structural determinant—state fragility—into the study of population stress. Extending beyond meso-level models that examine social determinants of stress and health at the community and neighborhood level, this study utilized global data from over 2.4 million participants across 146 countries in 2006–2023 and adopted a broader structural lens by introducing a novel governance predictor. Three key findings emerged: 1) on average, the odds of reporting feeling a lot of stress increased by twofold in 18 years (Fig. 1A; Table 1), 2) existing disparities across demographic groups escalated over the survey years (Fig. 2; Tables A7–10), and 3) the rising tide of perceived stress is particularly evident in countries that are becoming more fragile (Fig. 3).

4.1. Global stress trends and demographic moderators

While the increase in perceived stress has been documented in certain populations, especially after the COVID-19 pandemic (Breslau et al., 2021; Daly and Macchia, 2023; Patel et al., 2022), this is the first study to document this trend with comprehensive global coverage and period. Consistent with our first hypothesis, we showed that there has been a global trend of rising stress since the mid and late 2000s, with over 80 % of the surveyed 146 countries experiencing a net increase in stress reports (Fig. 1). Looking beyond this universal trend, this study probed for disparities in perceived stress across demographic groups to understand the disparate consequences amongst the disadvantaged (Baum et al., 1999; Chen and Miller, 2013; Myers, 2009). Consistent with previous literature (Baum et al., 1999; Folkman et al., 1987; Matud, 2004) and our second hypothesis, we identified disparities in perceived stress. Specifically, middle-aged adults (aged 30-44 and 45-59), women, and individuals in the lowest income groups had significantly greater odds of experiencing stress, and these disparities grew over time. For instance, those from less economically privileged backgrounds have faced a more pronounced rise in stress compared to individuals in the upper 40 % income quintiles (Fig. 2C). Nevertheless, these between-group differences are overshadowed by a broader trend of stress—the odds of perceived stress reports have approximately doubled over the study period after accounting for each moderating factor (Tables A6–A9). A striking example of the overall stress trend is that the richest 20 % in 2023 reported a comparable level of stress as those of the poorest 20 % in 2009 (Fig. 2C). This sweeping rise in stress has dire consequences, especially given the dose-response association between stressful life events and certain health outcomes (Dong et al., 2004). As a transdiagnostic risk factor, a global increase in stress may help explain rising mental health conditions and non-communicable diseases. Importantly, these disparities are not only socially patterned but also embedded within broader structural contexts, setting the stage for our investigation of state fragility as a macro-level determinant (Dong et al., 2004).

4.2. Association of state fragility and stress over time

The increase in perceived stress across geography and time also necessitated an investigation of possible structural determinants contributing to this phenomenon and we were motivated to investigate determinants relevant to different world regions vastly different in their national characteristics. Here, we used data from 137 countries to examine the relationship between a country's incapacity to maintain peace, function, and development and the stress reported by its population. In partial contrast with our hypothesis, we noted having a lower-than-average fragility within a country was associated with higher rate of stress report at the outset (Fig. 3). This unexpected finding emerged amid the global financial crises in 2007 – 2009. While the financial crisis had a pervasive impact across the world, advanced economies from traditionally more stable countries faced some of the most substantial repercussions (Koh and Yu, 2020). Additionally, individuals in these countries often have higher expectations for stability and security, making disruptions in their generally stable environment seem more stressful compared to their usual experiences. On the other hand, people in traditionally more fragile countries might not have reported experiencing more stress during the financial crisis when exposure and adaptation of stressors were commonplace (Grissom and Bhatnagar, 2009; Stein et al., 2018). These combined factors could help explain the higher stress reports in less fragile countries early on. More broadly, they illustrate how macro-level disruptions, such as the collapse of global financial systems, can interact with national fragility to shape patterns of population stress.

Zooming away to examine the moderating effect of state fragility on stress over 15 years, we did find that countries that were increasingly fragile experienced a steeper increase in perceived stress by 2023 as hypothesized (Fig. 3). Corroborating the growing call for understanding population mental health through a structural lens (Lehman et al., 2017; Lund et al., 2018), our findings suggest that state fragility could be a major factor influencing the perceived stress of individuals through different ecological levels. Fragile countries may lack the capacity to provide economic security, democratic governance, basic healthcare, and human rights protection, all of which have been linked to worsening health and well-being in their citizens (Diener and Seligman, 2004; Jain et al., 2022; Johnson et al., 2010; Melianova et al., 2024; Prior et al., 2018).

The world has seen a widespread decline in peacefulness in the past decades (Gleditsch, 2019). In particular, the most extreme form of instability—armed conflict—has sprung in all continents except for Antarctica and Australia & Oceania over the course of our study period in 2006–2023 (Uppsala Conflict Data Program & Peace Research Institute Oslo, 2024). The number of armed conflicts also increased substantially over this time. A notable example would be countries in the Middle East and North Africa, which saw the highest odds of reported stress (OR = 2.22, Fig. 2D) compared to the reference region of South Asia from the outset. This is expected as many countries as possible in the region (e.g., Iran, Syria, Lebanon, Iraq) embroiled in both inter-state and civil conflicts in the past decades (Council on Foreign Relations, 2024). A state's failure to reconcile internal and external conflicts effectively contributes to individuals' perceived stress and in turn has profound consequences for population physical and mental health. However, the magnitude of state fragility, which goes beyond war and conflict, did not fully explain the rising tide of stress. In Sub-Saharan Africa, the odds of stress report increased the most over our study period (OR = 1.37, Fig. 2D; Table A9). The region might experience the steepest increase in stress due to the combined impacts of deteriorating population health, economic instability, and severe climate change effects, including extreme weather events and prolonged droughts (Deaton and Tortora, 2015; World Meteorological Organization, 2024). In particular, the region accounted for largest population living with HIV and highest rate of infant and maternal mortality rate globally, straining the already under-resourced healthcare systems (World Health Organization African Region, 2022). These findings underscore that structural forces—from conflict and economic instability to climate change—are central to shaping stress at the population level. Future research should extend beyond individual and community factors to identify the structural drivers most amenable to intervention (Diener and Seligman, 2004; Helliwell, 2006; Shiroka-Pula et al., 2023; Sibley et al., 2020; Veenhoven, 2000).

4.3. Limitations

The findings of our study should be considered in light of the

following limitations. We acknowledge that the brief binary measure of stress is a limitation in the current study. Only the single item that asked participants to respond "Yes" or "No" to the question, "Did you experience stress a lot of the day yesterday?" was available in our data sources. The brief nature of the measure precludes a more granular assessment of stress. However, the wording of the measure intentionally captures high levels of stress, which may be particularly important to assess since high levels of stress are especially predictive of detrimental outcomes (Dong et al., 2004). Moreover, the binary response option is a deliberate choice made by Gallup to accommodate the wide range of literacy levels across the world (Gallup Inc, 2022). Consequently, the brief stress measure with its low participant burden enabled us to examine the spatiotemporal patterns of perceived stress as a proxy for chronic stress across over 140 countries spanning 18 years. Future global studies on stress will benefit from using established instruments such as Perceived Stress Scale (PSS-14), Perceived Stress Questionnaire (PSQ), and Depression Anxiety Stress Scale (DASS-21/42) to examine perceived stress in finer details (e.g., chronic or acute stress, different stressors) (Cohen et al., 2007; Levenstein et al., 1993; Lovibond and Lovibond, 1995). Still, our findings of a twofold increase of global perceived stress *on any given day* should serve as a warning sign. In the broader stress literature, many complementary measures of both objective and perceived stress have been developed. Future research is needed to use more reliable and valid measures of stress to dissect the patterns of chronic perceived stress in greater resolution. Similarly, caution is needed when interpreting results related to the Fragile States Index. The concept of fragile states has faced criticism for being used by international powers to stigmatize weaker countries and advance their foreign policy agenda (Grimm et al., 2014; McKay and Thorbecke, 2019). This criticism raises doubt about the validity of instruments that are designed to measure state fragility. It is also important to note that states with lower capacity often have less reliable data, meaning that greater fragility may correlate with less certainty about the actual conditions within those states. Assuming representative samples are harder to obtain in more fragile regions or countries (e.g., a selection bias due to differential nonresponse and coverage), our current estimates of stress levels and its association with FSI could be underestimated. Future research should take into account how different political systems and each subtype of state fragility (e.g., uneven economic development, state legitimacy, and fragmentation of state institutions) affect population stress.

5. Conclusion

We live in an increasingly stressful world, paralleled by a growing burden of chronic disease. This study provides the first global evidence that perceived stress has nearly doubled since the mid-2000s, that disparities by age, gender, and income have widened, and that structural conditions—particularly state fragility—contribute to these trends. Acute shocks, such as the 2007–2009 global financial crisis, also amplified stress in less fragile countries, highlighting the dynamic interplay between chronic fragility and episodic crises.

Taken together, these findings underscore that rising stress is not only socially patterned but also shaped by broader structural and political-economic contexts. Addressing this dual challenge will require interventions at both individual and structural levels: policies and programs that support psychological wellbeing, reduce social inequalities, and strengthen governance and institutional stability. By tackling stress on multiple fronts, we can alleviate psychological burden and mitigate the associated chronic disease load, offering a concrete pathway toward improving population health globally.

Data statement

The FSI data is publicly available (The Fund for Peace, 2023). The GWP survey data of this study is available from Gallup under license for the current study, so it is not publicly available. However, the analytic datasets can be made available from the corresponding authors upon reasonable request and with the permission of Gallup. Analysis scripts: All analysis scripts are publicly available at the Open Science Framework project page (https://osf.io/r4exu/).

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used large language models (i.e., ChatGPT-4, Claude-3.5 Sonnet, and Cursor Small) in order to write project analytic code and copy-edit. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Ethical statement

The current study involved secondary data analyses of de-identified data collected by Gallup Inc and The Fund for Peace, and did not require informed consent from participants and ethical approval at the University where the analyses were conducted.

CRediT authorship contribution statement

Elisabetta Febe Canaletti: Writing – review & editing, Writing – original draft, Visualization, Project administration, Investigation, Formal analysis, Data curation, Conceptualization. **Phyllis Lun:** Writing – review & editing, Visualization, Project administration, Methodology, Formal analysis, Data curation. **Levi D. Stutzman:** Writing – original draft, Investigation, Conceptualization. **Meanne Chan:** Writing – review & editing, Supervision, Investigation. **Felix Cheung:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.wss.2025.100319.

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