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Psychological Distress Across Socioeconomic Strata, Generations, and Gender: SOSEC's Longitudinal Evidence from Germany and the United States

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Abstract

Background

Psychological distress represents a central indicator of population mental health and follows pronounced socioeconomic gradients that vary across nations, generations, and gender. This study leverages longitudinal data to examine SES-distress trajectories, comparing the relevance of objective and subjective SES associations between Germany and the United States.

Methods

Biweekly PHQ-4 distress scores from the SOSEC study (January 2025–December 2025, overall Germany n≈1,500, USA n≈3,000, demographically weighted) were stratified by objective (income-based) and subjective (ladder) SES across generations (Baby Boomers, Generation X/Y/Z) and gender. Linear mixed-effects models were used to examine additive and interactive effects (SES×country, SES×gender, SES×age), leveraging large sample power for moderation analyses.

Results

Lower-SES and income classes showed elevated, volatile distress, whereas the upper-class showed stable lower levels. Older generational cohorts exhibited increased stability while younger generations greater volatility. Females reported higher levels of distress. The association between subjective SES and distress was stronger among females ($p < .001$), whereas no gender differences emerged for objective income classes. Distress declined with age ($p < .001$), while the protective effect of objective SES increased with age ($p < .001$). No age moderation was observed for subjective SES.

Conclusions

Cross-national differences were modest, with some evidence that the SES–distress association varies by country. Both objective and subjective SES were linked to lower distress, without consistent differences between Germany and the USA. Patterns across age and gender suggest younger individuals and females with lower SES may be more vulnerable. Future research could use age–period–cohort approaches to better disentangle life-course and cohort-specific dynamics.

1. Background

Psychological distress, encompassing symptoms of anxiety and depression, constitutes a critical population-level indicator of mental health burden, with particular relevance in times of sustained societal strain. Its prominence has markedly increased amid the compounding global crises of recent years, as economic instability, geopolitical tensions, and social disruption have elevated affective strain across diverse population groups. From January to December 2025, geopolitical tensions, economic instability, and climate-related disruptions created a landscape of elevated uncertainty, elevating affective strain across social groups as both a public health priority and research focus. Although

distress and life satisfaction are interrelated, they remain conceptually distinct: life satisfaction reflects a cognitive, evaluative judgment of overall life quality, whereas distress captures immediate anxiety and depressive symptoms, proving more responsive to transient stressors. Thus, examining distress enables a more precise assessment of how socioeconomic stressors dynamically manifest as psychological burden in diverse population subgroups.

Distress follows pronounced socioeconomic and income gradients, with people with lower socioeconomic status (SES) and in lower income classes consistently exhibiting elevated levels under economic and societal stressors [18]. Evidence from longitudinal surveys also highlights distinct intergenerational differentials in reported well-being [24]. Among younger cohorts – most notably Generation Z – a marked decline in life satisfaction has been observed, between 2019 and 2023. This downturn surpasses that of older populations (≥60 years). It appears closely associated with heightened anxiety prevalence (16.4% among individuals aged 18–29) and stress responses triggered by major geopolitical events such as the war in Ukraine [4, 25]. Furthermore, gender represents a key axis of inequality in subjective well-being, with women typically reporting poorer mental health and higher levels of psychological distress than men, particularly under conditions of socioeconomic disadvantage [5, 12]. Cross-national evidence further indicates that the magnitude and patterning of these gender disparities, as well as their interactions with SES, differ across welfare regimes as well as sociocultural contexts [11, 20].

Psychometric indicators from a prospective, biweekly survey among a population-based sample in Germany and the US (SOSEC study), including PHQ-4 distress scores and self-efficacy measures, highlight generational vulnerabilities – such as Gen Z's pronounced fears of war and nuclear threats – that could intersect with sociocultural norms and coping capacities [16]. Studies like the World Happiness Report show a stronger decline in life satisfaction among younger cohorts (e.g. Gen Z by >20% since 2010 globally), while older groups remain more stable [7]. These findings from prior research, as well as other studies documenting steeper declines in life satisfaction among younger cohorts compared to older ones, higher burnout rates, and cross-national youth well-being gaps linked to socioeconomic stressors, underscore persistent generational differences in regard to distress and life satisfaction [6, 10, 21]. Additional evidence supports the claim of persisting mental health inequalities, with in adolescents and young adults facing elevated anxiety and distress amid crises, exceeding the stability observed in older cohorts [8].

Despite these insights, a critical research gap remains: the absence of multivariate, cross-national analyses to unpack generational differences in subjective well-being amid shifting socio-political contexts.

The present article examines SOSEC (Social Sentiment in Times of Crises) time-series distress data, stratified by socioeconomic status, generation and gender to illuminate differential resilience mechanisms between Germany and the United States.

This study is the first population-based real-time investigation to capture how life satisfaction and psychological distress evolve amid the unprecedented global crises of the past year. Drawing on up-to-date U.S. and German longitudinal data from January 2025 to December 2025, it offers compelling evidence on how shifting socioeconomic realities shape mental well-being across the population.

2. Methods

Data were drawn from the SOSEC Study, a biweekly longitudinal survey conducted via an online platform since November 2022. The study was approved by the ethics committee of the German Association for Experimental Economic Research e.V. (Institutional Review Board Certificate No. MSEIsPRB) and conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study. Representative samples included approximately 1,500 participants in Germany and 3,000 in the United States per survey wave, weighted for age, gender, and socioeconomic status. Analyses utilized biweekly distress time series from January 2025 to December 2025. Descriptive analyses examined temporal trends stratified by categorical measures of subjective and objective financial status (lower/middle/upper income class), gender, and generational cohorts (Traditionalists and Baby Boomers, e.g. “TB” (1925-1964), Generation X (1965–1979), Generation Y (1980–1994), and Generation Z (1995–2007)).

Psychological distress was assessed using an adapted version of the validated ultra-brief Patient Health Questionnaire (PHQ-4). This instrument comprises four items covering generalized anxiety symptoms and depressive symptoms. Responses were provided on a 7-point Likert scale ranging from 1 ("strongly agree") to 7 ("strongly disagree"). All items were reverse-coded so that higher values indicate greater psychological distress. A mean score across the four items was computed, resulting in a scale ranging from 1-7.

Objective SES was operationalized as quintiles of equivalised disposable household income, harmonized across Germany and the United States to ensure comparability. In the United States, quintile thresholds were derived from the U.S. Census Bureau's publication regarding income in the United States from 2022, representing gross household income distributions [14]. Gross incomes were adjusted to net income, assuming a 25% tax and transfer deduction, consistent with Census guidelines. Equivalisation followed the Supplemental Poverty Measure (SPM) equivalence scale (1.0 for head, 0.5 per additional adult, 0.3 per child under 14 years via OECD-standards). This yielded the following monthly per-person net equivalised income quintiles (USD): Q1 ≤1,562; Q2 1,563–3,020; Q3 3,021–4,895; Q4 4,896–7,968; Q5 ≥7,969. In Germany, quintile cut-points were calculated from Destatis' equivalised net disposable income distributions, yielding monthly per-person thresholds (EUR): Q1 ≤1,331; Q2 1,332–1,921; Q3 1,922–2,657; Q4 2,658–3,750; Q5 ≥3,751 [9, 27]. Equivalisation employed the OECD-modified scale as well (1.0 for head, 0.5 per additional adult, 0.3 per child under 14 years), ensuring each quintile represented 20% of the national population for balanced stratification [22].

For analysis, objective and subjective SES were treated as continuous (centered) variables. Linear mixed-effects models included objective and subjective SES, country, age (centered), gender, and survey wave as predictors. Interaction terms between SES indicators and country were included to assess cross-national differences. Additional interactions with age and gender were specified to examine potential moderation effects.

3. Results

3.1. Sample characteristics

The final sample included a total of 47,916 participants (21,170 from Germany, 26,746 from the USA) contributing a total of 76,524 observations (38,403 from Germany and 38,121 from the USA) across all 25 measurement waves.

German participants had a mean age of 40.8 years (SD = 17.1) and 54.8% were female. Their mean objective SES was 2.49 (SD = 1.26) and subjective SES was 2.83 (SD = 1.07). Average distress scores in Germany were 3.45 (SD = 1.52). Participants from the USA had a mean age of 41.6 (SD = 18.1), while 48.1% of them were female. Their mean objective SES was 2.44 (SD = 1.23) and subjective SES was 2.72 (SD = 1.16). Average distress scores in the US were 3.62 (SD = 1.62). For further details, including distributions by generation, see Table 1.

Tab. 1: Sample characteristics of participants in Germany and the USA, derived from SOSEC data from January 2025 to December 2025. Participants refers to unique individuals in the dataset. Observations refers to the total number of measurement occasions across all waves. Descriptive statistics for SES variables and distress are calculated across all available observations.

	Overall	Germany	USA
Participants (N)	47916	21170	26746
Observations (N)	76524	38403	38121
Age			
M (SD)	41.3 (17.7)	40.8 (17.1)	41.6 (18.1)
% Female	51.1	54.8	48.1
Generation (%)			
Generation Z	36.6	34.8	38.0
Generation Y	27.3	28.3	26.5
Generation X	18.6	20.5	17.0
Baby Boomers /Traditionalists	17.5	16.4	18.5
Objective SES			
M (SD)	2.47 (1.25)	2.49 (1.26)	2.44 (1.23)
Subjective SES			
M (SD)	2.78 (1.12)	2.83 (1.07)	2.72 (1.16)
Distress			
M (SD)	3.54 (1.57)	3.45 (1.52)	3.62 (1.62)

3.2. Descriptive generational differences over time

To further explore potential differences in psychological distress across age groups, we plotted mean distress scores over time by generation, stratified by socioeconomic status (SES, categorical). These analyses are descriptive, based on raw scores, and intended to provide an overview of temporal trends rather than to test formal hypotheses. The figures depict biweekly mean distress scores from January 2025 to December 2025. Analyses were conducted for German and US data separately as demonstrated (Fig. 1).

Across all four generations in Germany, a consistent pattern emerged for both objective and subjective SES. Participants in lower-SES groups generally exhibited higher mean distress scores than those in middle- or upper-SES groups. Across generations, the oldest cohort (Traditionalists and Baby Boomers, TB) tended to show slightly lower overall distress and less pronounced fluctuations over time, whereas younger generations exhibited somewhat more variability. In addition to various fluctuations, April 2025 was marked by a synchronous increase in measured distress parameters across all generational cohorts and income classes. Overall, the separation between SES groups was relatively clear, with lower SES consistently associated with higher distress.

In the United States, patterns were somewhat different. For objective SES, the distinction between SES groups was less pronounced, and upper SES trajectories displayed noticeable fluctuations, resulting in more variable mean distress scores across survey waves. Nevertheless, the general pattern was similar across generations. For subjective SES, the ranking of distress by SES was somewhat more orderly, with lower SES groups generally showing higher distress, though middle and upper SES curves overlapped slightly more than in Germany. As in Germany, the oldest generation tended to have slightly lower overall distress levels.

3.3. Descriptive Gender differences over time

To examine potential differences in psychological distress between men and women, we plotted biweekly mean distress scores over the study period, separately by gender and stratified by socioeconomic status (SES, categorical). Data are presented separately for Germany and the USA.

In Germany, both objective and subjective SES showed similar patterns for females and males. Lower SES groups generally exhibited higher mean distress scores than middle and upper SES groups. For objective SES, females reported slightly higher distress across all SES groups than males, with mean distress scores of M = 3.95 (SD = 1.52) in the lower class, M = 3.31 (SD = 1.47) in the middle class, and M = 3.29 (SD = 1.40) in the upper class. Among males, the corresponding values were M = 3.65 (SD = 1.50), M = 3.06 (SD = 1.42), and M = 2.72 (SD = 1.43), respectively, indicating a slightly clearer gradient across SES groups. For subjective SES, the same overall pattern held: females showed mean distress scores of M = 4.08 (SD = 1.53) in the lower class, M = 3.41 (SD = 1.45) in the middle class, and M = 3.31 (SD = 1.53) in the upper class, whereas males reported M = 3.69 (SD = 1.49), M = 3.08 (SD = 1.42), and M = 2.86 (SD = 1.46), respectively. Lower SES was associated with higher distress, and females again showed slightly higher distress than males across all SES groups, with greater overlap between middle and upper SES than among males.

In the United States, patterns were more variable over survey waves. For objective SES (e.g. income class), lower groups generally had higher distress, but upper SES trajectories showed pronounced fluctuations, overlapping with middle and lower SES at several time points. In this context, females reported mean distress scores of M = 4.20 (SD = 1.52) in the lower class, M = 3.70 (SD = 1.57) in the middle class, and M = 3.44 (SD = 1.65) in the upper class, while the corresponding male values were M = 3.97 (SD = 1.54), M = 3.64 (SD = 1.59), and M = 3.39 (SD = 1.57). This pattern was broadly similar for females and males. For subjective SES, the overall ordering of distress by SES was clearer, but middle and upper SES groups overlapped more than in Germany, and variability over time was greater. Females reported M = 3.99 (SD = 1.62) in the lower class, M = 3.44 (SD = 1.54) in the middle class, and M = 3.48 (SD = 1.64) in the upper class; among males, the corresponding values were M = 3.72 (SD = 1.63), M = 3.31 (SD = 1.58), and M = 3.49 (SD = 1.62). Across both SES measures, females and males exhibited generally more similar patterns, with less distinct separation between SES groups compared with Germany. Around April 2025, distress levels exhibited a marked average increase, characterized by

parallel elevations across socioeconomic classes, generational cohorts, and gender – surpassing the amplitude of contemporaneous German trajectories.

3.4 Linear mixed-effects models

To examine the association between socioeconomic and income status (SES) and psychological distress, linear mixed-effects models with random intercepts for individuals were estimated. Objective and subjective SES (both standardized) were included as predictors alongside country (Germany vs. USA), age, gender, and survey wave. In a first step, interactions between SES indicators and the country were modeled to assess cross-national differences. In a second step, moderation by age and gender was examined by including interaction terms between SES indicators and these variables.

Results indicated that both objective and subjective SES were significantly associated with psychological distress. Higher levels of objective SES (b = -0.13, p < .001) and subjective SES (b = -0.18, p < .001) were related to lower levels of distress. Participants in the USA reported higher distress levels compared to those in Germany (b = 0.15, p < .001). In addition, higher age was associated with lower distress (b = -0.03, p < .001), whereas women reported higher distress than men (b = 0.12, p < .001). The association between objective SES and distress differed significantly between countries (b = 0.05, p < .001), indicating a weaker negative association in the USA compared to Germany. In contrast, the interaction between subjective SES and country was not statistically significant (p = .12), suggesting comparable associations across countries. Overall, subjective SES showed slightly stronger associations with distress than objective SES (Tab. 2).

Tab. 2: *Parameter estimates of Model 1. Model 1 includes objective and subjective SES (centered), country (Germany vs. USA), age (centered), gender (Male vs. Female), and survey wave as predictors, with interactions between SES indicators and country to assess cross-national differences. Fixed effect estimates (b), standard errors (SE), t-values, and p-values are reported. Higher values of distress indicate greater psychological distress.*

	b	SE	t	p
(Intercept)	3.507	0.012	280.919	< .001
Wave	−0.001	0.001	−1.809	.070
SES objective	−0.134	0.007	−17.947	< .001
SES subjective	−0.182	0.009	−19.226	< .001
Country (USA)	0.145	0.014	10.724	< .001
Age	−0.025	0.000	−65.022	< .001
Gender (female)	0.119	0.014	8.664	< .001
SES objective*Country (USA)	0.051	0.011	4.588	< .001
SES subjective*Country (USA)	0.021	0.013	1.558	.119

The moderation analyses largely confirmed the main effects. Both objective (b = -0.14, p < .001) and subjective SES (b = -0.14, p < .001) remained negatively associated with distress. A significant interaction between subjective SES and gender (b = -0.08, p < .001) indicated that the negative association between subjective SES and distress was stronger for women than for men. In contrast, the interaction between objective SES and gender was not significant (p = .49). Age significantly moderated the association between objective SES and distress (b = -0.001, p < .001), suggesting a slightly stronger negative association at higher ages, although the effect size was small. No significant moderation by age was found for subjective SES (p = .997). The interaction between objective SES and country remained significant, whereas the interaction between subjective SES and country was again not significant (Tab. 3).

Tab. 3: *Parameter estimates of Model 2. Model 2 builds upon Model 1 by including interactions of objective and subjective SES (both centered) with age (centered) and gender (Male vs. Female) to examine moderation effects. Country (Germany vs. USA) and survey wave are also included as predictors. Fixed effect estimates (b), standard errors (SE), t-values, and p-values are reported. Higher values of distress indicate greater psychological distress.*

	b	SE	t	p
(Intercept)	3.506	0.013	280.388	< .001
Wave	−0.001	0.001	−1.965	.049
SES objective	−0.137	0.009	−14.637	< .001
SES subjective	−0.144	0.011	−12.583	< .001
Country (USA)	0.140	0.014	10.350	< .001
Age	−0.025	0.000	−64.972	< .001
Gender (female)	0.123	0.014	8.946	< .001
SES objective*Country (USA)	0.045	0.011	4.013	< .001
SES subjective*Country (USA)	0.018	0.013	1.349	.177
SES objective*Age	−0.001	0.000	−4.442	< .001
SES subjective*Age	0.000	0.000	0.004	.997
SES objective*Gender (Female)	−0.008	0.011	−0.687	.492
SES subjective*Gender (Female)	−0.076	0.013	−5.721	< .001

4. Discussion

4.1. General aspects

Psychological distress was the primary outcome of this investigation, and its socioeconomic patterning constitutes the central focus of interpretation. To our knowledge, this is the first high-frequency, cross-national longitudinal study to examine how objective and subjective SES jointly shape distress trajectories across an extended period of societal strain in Germany and the United States. Using the biweekly SOSEC panel data and multilevel models, we examined how objective and subjective SES jointly relate to distress, and how these associations vary by country, age, and gender. The observation period (January 2025 – December 2025) falls within an extended phase of societal strain shaped by the long-term aftermath of the COVID-19 pandemic, persistent inflationary pressures, and recurring geopolitical tensions. Against this background, the combination of high temporal resolution and cross-national scope allows us to examine how objective and subjective SES are associated with psychological distress during a period of sustained societal stress, and to identify subgroup-specific patterns that annual panels cannot resolve.

Our main findings substantiate these conceptual advances while revealing novel cross-national and demographic deviations. SOSEC multilevel models reveal pronounced socioeconomic gradients in psychological distress, with subjective social class exerting stronger effects than objective income-based measures, particularly among women who showed elevated baseline burden yet greater

“protection” with higher SES. U.S. distress trajectories exhibit heightened volatility and distinct peaks (e.g., Apr/Jul 2025) compared to Germany's more stable patterns amid shared crises, underscoring perceptual mechanisms in polycrisis amplification. These insights advocate targeted interventions to stabilize subjective status perceptions and mitigate class-specific vulnerabilities.

4.2. Notable peaks in distress

Analysing the German SOSEC panels pictured above reveals a synchronous increase in psychological distress across all socio- and economic strata (lower, middle, upper class), generations (TB, X, Y, Z), and gender around April 2025. This broad increase across demographic silos – underscores the unparalleled temporal resolution of SOSEC's high-frequency, polycrisis-embedded design, capturing real-time affective perturbations unavailable in conventional annual panels. Several contemporaneous contextual factors may merit further exploration: the Munich car-ramming attack (13 February 2025), the German federal election (“Bundestagswahl”, 23 February 2025), and early-year macroeconomic projections signaling stagnation. The current analysis does not formally evaluate their contributions; establishing causality would necessitate an interrupted time-series or event-study approach, which we defer to subsequent investigations. Whether these reflect acute event-induced hypervigilance, cumulative polycrisis sensitization, or media-amplified status threat across classes warrants prospective dissection as well – yet SOSEC's granularity uniquely positions it to disentangle such exogenous triggers from endogenous volatility in future waves.

In the U.S. panels, a pronounced distress peak emerges around April 2025, characterized by parallel elevations spanning socioeconomic classes, generations, and gender (see Fig. 2a, 2b, 4a, 4b), with greater amplitude than the contemporaneous German trajectories. Contemporaneous contextual factors in the United States encompassed announced tariff measures and fiscal policy debates (January - April 2025), alongside reported inflation peaks and labour market uncertainty. As noted previously, these elements are presented descriptively; a formal attribution of the observed peak to specific events would require additional time-series identification strategies.

A secondary, broad-spectrum distress upsurge materialized by July 2025 across U.S. generations and classes (TB/X/Y/Z convergence, see Fig. 2a, 2b, 4a, 4b), sustaining elevated variance relative to baseline. Geopolitical reverberations from the 12-Day War (Israel-Iran, June 2025) could have interacted with domestic inflection points such as the U.S.-Iran tariff frictions, Gaza policy realignments under Trump, and mid-year GDP slowdowns – potentially fueling existential threat appraisals and intergroup polarization. The universality of this crest across perceptual strata suggests collective affective contagion, in which media-saturated threat narratives could transcend SES buffers.

4.3. Generational differences

Generational differences in psychological distress emerged as one of the most consistent patterns in the SOSEC data, with younger cohorts exhibiting markedly higher and more volatile distress levels than older generations. These findings align with established longitudinal evidence from German cohorts and

extend them to a cross-national context. Notably, Otten et al. employed PHQ-4 distress measures in representative German longitudinal data (2006 – 2021, n = 27,033), revealing cohort- specific effects via hierarchical age-period-cohort (HAPC) models. Oldest cohorts exhibited peak distress, while younger ones (post-1980) remained stable, mirroring the patterns of stable Generations TB/X vs. volatile Y/Z described above. Period effects (peaks in 2017/2020) reflected cyclical fluctuations, with age proving non-significant after controlling for cohort, period, gender, and region. These parallels underscore the robustness of cohort-driven vulnerabilities across datasets [23].

Extending these cohort-specific insights from longitudinal German mental health data, aggregate well-being indicators further highlight generational disparities. The SKL Glücksatlas 2023 documents a pronounced decline in life satisfaction among Generation Z from 2019-2023, exceeding that observed among those over 60 years, alongside rising anxiety levels (16.4% among 18–29-year-olds), thereby contrasting with the stability in older SOSEC cohorts [25]. This generational divergence aligns with our findings of volatile distress patterns in younger groups (Y/Z), potentially amplified by acute societal stressors like economic pressures and global uncertainties, while older cohorts (TB/X) exhibit resilience akin to buffered historical exposures. These macro-trends underscore the imperative for targeted interventions prioritising youth mental health amid converging crises, as previously advocated by McGorry et al. in their seminal analysis of the youth mental health crisis [19].

4.4. Gender Differences

Gender represents a key axis of differential vulnerability in psychological distress: women consistently reported higher distress levels than men across all socioeconomic strata and both countries, with the SES–distress association showing meaningful gender-specific moderation. Key findings underscore elevated distress among women ($b = 0.177$, $p < 0.001$), with amplified SES dependence: high SES was associated with notably lower distress levels in women compared to low SES ($p < 0.01$), consistent with Lampert et al.'s study on mental health (“Deutsche Erwachsenen Gesundheitsstudie 1“, e.g. DEGS1) from 2013 which reported a marked gradient in mental health by SES (OR=4.9 low vs. high SES) in German adults [17]. Furthermore, Hajek and König’s analysis of PHQ-4-derived anxiety the GSOEP (German Socio-Economic Panel) data in 2020 reported elevated anxiety risk among women at lower socioeconomic status (SES) and education levels [15]. These findings resonate with our SOSEC results, which demonstrate higher distress among females with low SES. At the same time, our moderation analysis indicated that the association between subjective SES and distress was stronger among women ($b = −0.076$, $p < .001$), suggesting that perceived status may be a more salient stressor for males whereas women exhibit higher overall distress levels that are particularly sensitive to objective SES disadvantage. This multifaceted gender-SES interplay highlights women's amplified vulnerability to (socio-)economic adversity and underscores the value of tailored interventions to bolster resilience in population mental health frameworks.

The before-mentioned study from Otten et al. which analysed data from a hierarchical age-period-cohort analysis from 2006–2021, also showed certain differences in gender: German women exhibited 38,1%

higher distress levels compared to men with findings remaining significant when including socioeconomic control variables – directly comparable to gender-stratified panels in the DE/USA SOSEC data [23]. These patterns align with elevated female distress in both nations, potentially driven by intersecting social roles and stressors, while underscoring the need for cohort-tailored, gender-sensitive public health measures to address persistent disparities in mental strain.

4.5. Additional Aspects

Our results on SES-distress gradients and their moderators resonate strongly with prior psychosocial and epidemiological evidence, highlighting both convergent mechanisms and contextual divergences between Germany and the United States.

Using the MacArthur Scale of Subjective Social Status, Adler et al. demonstrated in the year 2000 that higher subjective SES independently predicted lower depression, anxiety, and cortisol levels beyond objective indicators like income and education [1]. This seminal validation of subjective SES superiority aligns with the current SOSEC findings from the USA, where high subjective SES was associated with significantly lower distress ($p < 0.05$), underscoring perceived rank as a proximal psychosocial driver of strain amid economic volatility.

This perceptual primacy transitions to age-moderated dynamics in later life: In a cross-sectional analysis of older adults (n = 296, aged ≥60), English et al. found subjective community standing – over objective SES – predicted more positive aging attitudes, younger subjective age, and reduced age-related losses, with no incremental objective effects after adjustment [13]. These results elucidate the current age-moderated patterns, where objective SES protection strengthened in older cohorts (Baby Boomers; interaction $p < 0.05$) while subjective effects attenuated, suggesting generational shifts in status perception influence resilience trajectories.

In the German context, objective SES retains primacy, as evidenced by national health surveys: Drawing from DEGS1, Lampert et al. established robust SES gradients in self-rated health and depression risk, amplified as mentioned before in women even after age/sex adjustment [17]. This corroborates the additive models and female-specific SES buffering here ($p < 0.01$ objective, $p = 0.09$ subjective), reinforcing Germany's pronounced protective role of objective SES against distress in lower strata, particularly among vulnerable subgroups.

4.6. Strength and Limitations

A key strength of this analysis lies in its utilisation of the SOSEC panel's robust representativeness for the German and US adult population, capturing life satisfaction dynamics across the full calendar year of 2025 amid contemporaneous economic and geopolitical stressors. Standardised operationalisation of socioeconomic status via OECD-modified equivalised net household income quintiles (Destatis-derived thresholds) affords precise lower-, middle-, and upper-class stratification with international comparability to US benchmarks. The exploratory multivariable framework further enriches interpretation by integrating

affective and crisis-related covariates (e.g., financial worries and distress), yielding ecologically valid insights into SES-life satisfaction gradients.

Limitations must be acknowledged, including inevitable panel attrition, which typically biases toward more stable, educated respondents and may underrepresent transient or severely crisis-impacted subgroups [3]. Reliance on a single-item outcome precludes multi-item scale advantages (e.g., SWLS internal consistency), potentially limiting sensitivity to subtle temporal or inter-individual variations. Covariates such as education, employment status, family status, and migration background – frequently implicated in mental health literature – represent promising extensions for future models to parse SES effects from compositional confounders [2, 26]. Finally, temporal alignments of dissatisfaction "peaks" with external events (energy crises, Russian-Ukraine war developments) denote correlation rather than causation, lacking individual-level exposure metrics. A planned follow-up employing causal methods (e.g. difference-in-differences keyed to event timing) would address this gap in future research.

5. Conclusion

Psychological distress followed robust socioeconomic gradients across Germany and the United States throughout 2025, with lower-SES strata exhibiting persistently elevated and volatile distress trajectories relative to the stable, low levels observed in upper strata. These patterns underscore distress as a sensitive and policy-relevant marker of socioeconomic inequality in mental health. Generational analyses reveal pronounced stability among older cohorts (Baby Boomers/Generation X) versus heightened volatility in younger groups (Generations Y/Z) – most marked in the USA – underscoring cohort-specific resilience amid cyclical stressors. Gender-stratified patterns confirm females' higher mean distress coupled with amplified SES-buffering effects, further moderated by age: Objective SES protection strengthens significantly, while subjective effects attenuate.

Cross-nationally, objective SES showed a markedly stronger association in Germany compared to subjective SES, whereas subjective SES predominated in the USA amid attenuated objective effects; SES×SES interactions remained negligible despite statistical significance conferred by large sample size. Overall, these patterns suggest distinct psychosocial mechanisms, with perceived relative rank prevailing in the USA over material resources in Germany.

These results highlight younger low-SES women as a priority subgroup for future investigations and targeted preventive interventions, aligning with evidence that perceived social standing correlates with psychological distress. Subsequent analyses should employ age-period-cohort models alongside interrupted time-series or event-study designs to more precisely parse life-course, cohort-specific, and period effects driving these patterns.

6. List of abbreviations

Abbreviation	Meaning
DEGS1	German Health Interview and Examination Survey for Adults 1
Dept.	Department
DZPG	German Center for Mental Health
EUR	Euro (currency of the euro area)
FZI	Research Center for Information Technology
GDP	Gross Domestic Product
GSOEP / SOEP	German Socio-Economic Panel
HAPC	Hierarchical Age-Period-Cohort
KIT	Karlsruhe Institute of Technology
M	Mean
N	Number (count of persons/observations)
OECD	Organisation for Economic Co-operation and Development
OR	Odds Ratio
PHQ-4	Patient Health Questionnaire-4
Q1–Q5	Quintile 1 to Quintile 5 (income quintiles from lowest to highest)
SD	Standard Deviation
SES	Socioeconomic Status
SKL	SKL Happiness Atlas (study/report on life satisfaction)
SOSEC	Social Sentiment in Times of Crises
SPM	Supplemental Poverty Measure
SWLS	Satisfaction with Life Scale
TB	Traditionalists and Baby Boomers
USA / US	United States of America / United States
USD	United States Dollar

Declarations

7. Acknowledgements

Not applicable.

8. Author’s contributions

JF conceptualized, organized and surveyed the SOSCE panel. JK conceptualized this study with VC, organized the preparation of the SOSEC data used in this analysis, and drafted the manuscript. JH conducted the statistical analyses and contributed to the methodology and visualizations. FKD contributed to the methodological design and formal analyses. IN curated the data, carried out the investigation, and contributed to the software implementation. JMF provided critical revisions of the manuscript and supported the interpretation of the findings. VC and JF conceptualized and supervised the project, provided resources and project administration, and contributed to writing in review and editing. Both contributed equally to this work and share senior (last) authorship. All authors read and approved the final manuscript.

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10. Data availability

The data that support the findings of this study are not publicly available due to licensing and privacy restrictions but can be obtained from the authors upon reasonable request and with permission from the FZI Research Center for Information Technology.

11.1. Ethics approval and consent to participate

Ethics approval for this study was obtained from the ethics committee of the German Association for Experimental Economic Research e.V. (Institutional Review Board Certificate No. MSEIsPRB; issued on 13 September 2023).

11.2. Consent for publication

Not applicable

11.3. Competing interests

The authors declare no competing interests.

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Figures

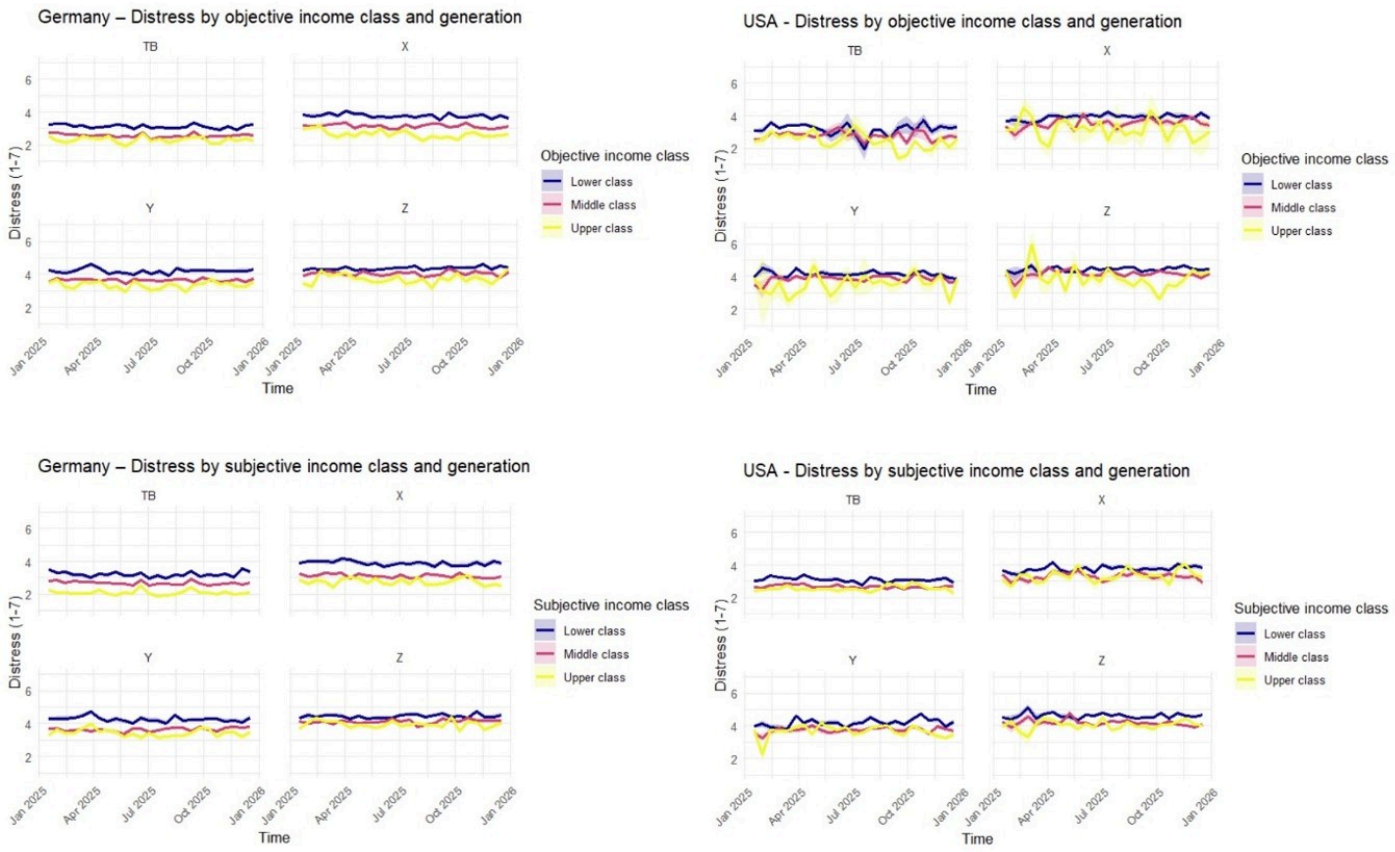


Figure 1

Subjective and objective SES trajectories by generation and country, SOSEC data from January 2025 to December 2025. Psychological distress in Germany and the USA, stratified by generation and SES from January 2025 to December 2025. Panels show objective and subjective SES.

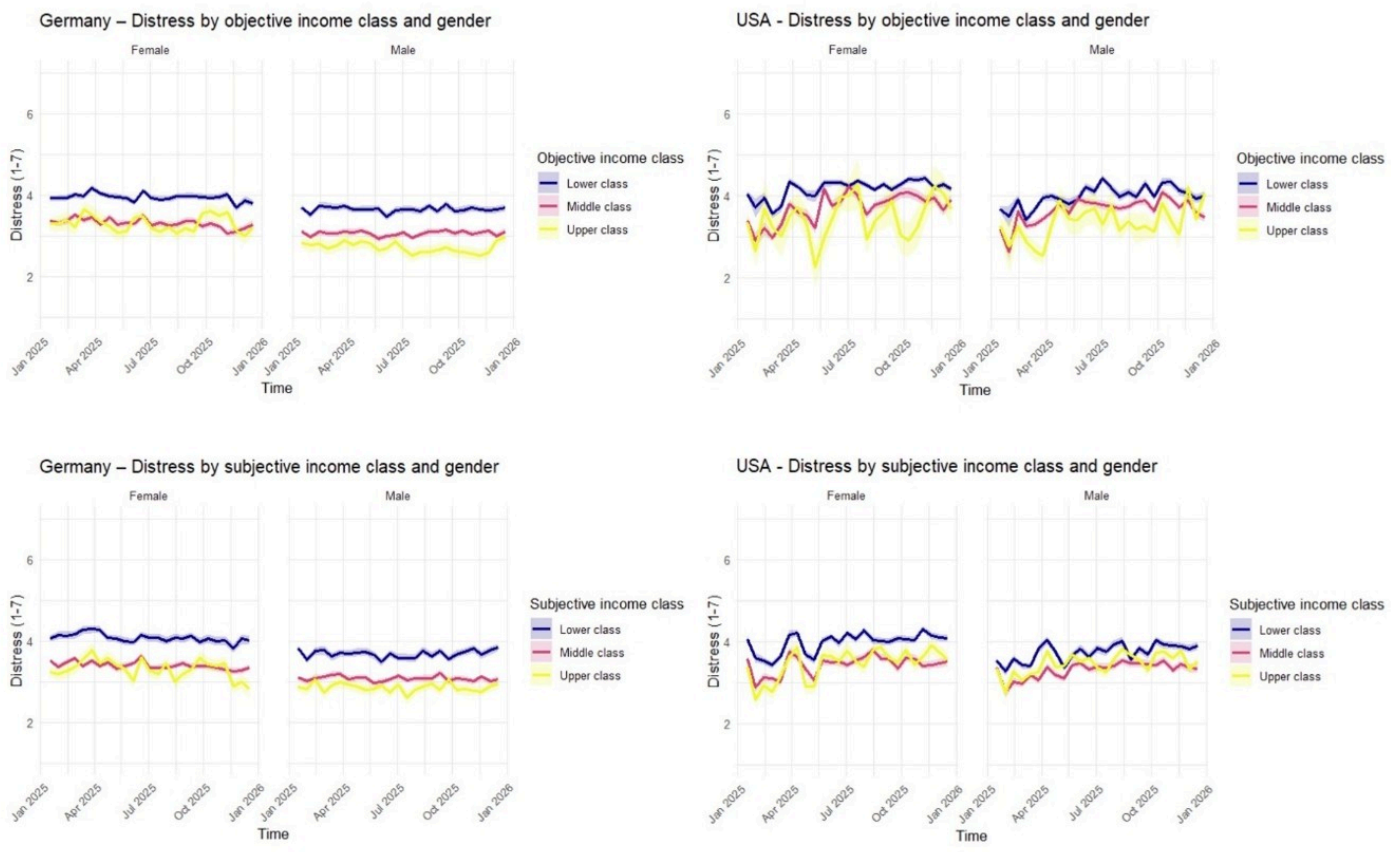


Figure 2

Subjective and objective SES trajectories by gender and country. Psychological distress in Germany and the USA, stratified by gender and SES from January 2025 to December 2025. Panels show objective and subjective SES.