Original Research Article

Socioeconomic Status and Gastrointestinal Symptoms Among College Students: Examining the Roles of Urban and Perceived Stress

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ABSTRACT

Chronic stress is a well-established driver of gastrointestinal (GI) dysfunction, yet how socioeconomic status (SES) shapes stress-related GI outcomes during emerging adulthood remains poorly understood. The current study examined associations between perceived stress, urban life stress, and GI symptoms among undergraduate students, and explored whether these associations differed across socioeconomic status (SES) groups. In a cross-sectional online survey, undergraduate students (N = 45) completed measures of perceived stress, urban life stress, GI symptoms, and a multidimensional socioeconomic status index (SEI). SES was dichotomized at the SEI median into low- and high-SES groups. Independent-samples t-tests compared stress exposure between SES groups, Pearson correlations examined stress-GI associations, and linear regressions conducted separately within each SES group examined whether stress predicted GI symptom severity. Lower-SES students reported significantly higher urban life stress than higher-SES students, while perceived stress did not differ by SES. Greater urban life stress was associated with poorer GI symptoms, and this association was statistically significant among low-SES students, but not among high-SES students. These findings suggest that urban life stress is associated with greater GI symptom burden among lower-SES students, highlighting urban stressors as a potential focus for understanding socioeconomic health disparities during emerging adulthood. Given the cross-sectional design and absence of a formal SES-stress interaction test, these results should be interpreted as descriptive group differences rather than evidence of statistical moderation or causal pathways.

Keywords: Socioeconomic status; urban stress; perceived stress; GI health; college students

INTRODUCTION

Stress is a well-established driver of gastrointestinal (GI) dysfunction. Chronic stress dysregulates gut-brain signaling pathways, or the bidirectional communication network linking the central nervous system to GI function, disrupting gut motility, visceral pain sensitivity, and intestinal permeability (1, 2). These pathways are particularly sensitive during periods of major developmental transition, when prolonged activation of the stress response can alter gut microbiome composition and contribute to lasting changes in GI symptom patterns (1-3). Disorders such as irritable bowel syndrome (IBS) exemplify this intersection: psychological stress is both a precipitant and a perpetuating factor, increasing healthcare utilization, reducing productivity, and diminishing quality of life (4-6).

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The experience of stress during college is not uniform, but rather deeply shaped by socioeconomic context. Socioeconomic status (SES) is a key determinant of health across the life course, as lower-SES individuals face structural barriers to care and chronic accumulating stressors including financial strain, housing instability, and limited access to healthy resources (3, 7-10). These stressors compound over time, contributing to heightened physiological vulnerability that manifests in somatic symptoms (1, 2, 11, 12). For college students from lower-SES backgrounds, these pre-existing burdens are layered onto the already demanding college transition, creating an amplified stress environment that their higher-SES peers are less likely to face (12-14).

A particularly salient form of stress for lower-SES college students is urban life stress, a multidimensional construct capturing chronic stressors tied to the community and neighborhood environment, including economic instability, poor-quality built environments, neighborhood violence, exposure to pollution, and experiences of discrimination (15-17). Urban life stress is conceptually distinct from general perceived stress; while perceived stress reflects an individual's subjective appraisal of overall life demands, urban life stress captures objective, externally imposed stressor exposures rooted in class and socioeconomic position.[15] Urban stress is strongly associated with higher levels of anxiety and depression (19-20). Concurrently, longitudinal research indicates that poverty-related stress and neighborhood instability predict increased GI symptom complaints, suggesting that socioeconomic-related stressors exert effects on GI health beyond individual-level factors alone (20-22).

Despite growing recognition of these associations, limited research has examined how SES specifically shapes the relationship between urban stress and GI symptom severity during the critical period of emerging adulthood. Given the heightened vulnerability of the undergraduate population, the present study examined associations between perceived and urban life stress and GI symptom severity, and explored whether these associations differed descriptively across SES groups. By integrating contextual urban stress measures, this research aims to clarify the role of socioeconomic disparities in GI health and identify more accurate indicators of disadvantage than general stress perceptions. Specifically, the current study examines: Does the relationship between urban stress and GI symptom severity in undergraduate students differ by SES?

METHODS AND MATERIALS

Study Design & Procedures

This study employed a quantitative, cross-sectional observational design to examine the role of SES in the association between stress and GI symptom severity. Data were collected via an online survey hosted on the Qualtrics platform between August 2024 and April 2025. Participation was voluntary, and no monetary compensation was provided. All procedures received ethical oversight and were approved by the Loyola Marymount University Institutional Review Board (#FA05-R). All participants provided informed consent prior to survey initiation and were debriefed upon completion.

Participants

A total of 46 undergraduate students were recruited from a private university setting through three primary channels: (1) the institution's Psychology Participant Pool, (2) Health & Society Department course instruction, and (3) social media advertisements. Eligible participants were current undergraduate students aged 18 or older with sufficient English proficiency. Participants were excluded if they had incomplete survey responses or failed to provide informed consent prior to participation. Of the 46 participants who provided informed consent, one was missing data on the SES index and age and was excluded from analysis, yielding an analytic sample of N = 45. The selection of a private university population was intentional to examine socioeconomic stratification within a specific academic context, though it is noted that such institutions may have less socioeconomic diversity than public universities.

Measures

The questionnaire assessed GI symptom frequency, perceived stress, urban stressors, and SES. Specifically, participants completed the following measures: (1) Gastrointestinal Quality of Life Index (GIQLI), (2) Perceived Stress Scale (PSS), (3) Urban Life Stress Scale, and (4) MacArthur Scale of Subjective Social Status. The survey began with standard demographic, SES, and lifestyle questions, which served to minimize potential discomfort prior to the introduction of more sensitive items.

To capture a robust profile of socioeconomic well-being, a multidimensional Socioeconomic Status Index (SEI) was constructed. This index combined the MacArthur Scale of Subjective Social Status, a 10-rung

ladder of relative standing, with objective indicators including employment status, housing status, receipt of federal student aid or CalFresh benefits, and parental education levels. The MacArthur Scale consisted of participants selecting the level that best represented their perceived socioeconomic standing. Scores ranged from 1 to 10, with higher scores indicating higher perceived social status. This measure has demonstrated strong validity in relation to objective indicators of SES. Each objective indicator (employment status, housing status, federal aid receipt, and parental education for both mother and father) was recoded into an ordinal or binary value reflecting relatively lower versus higher socioeconomic standing, then summed without additional weighting with the MacArthur ladder score to yield a single composite SEI score (observed range: 16-25). Because the SEI was constructed as an unweighted sum of differently scaled indicators rather than a standardized or validated composite, it should be considered an exploratory index; future work could examine SEI construction using standardized (z-scored) component weighting or established composite SES measures to facilitate comparison across studies (23, 24).

GI health was assessed using the GIQLI**,** a 36-item measure designed to assess health-related quality of life in individuals with GI disorders (25). In the present study, 19 core items were specifically selected to focus on physical symptoms and physiological functioning; the social and emotional functioning subscales were excluded to maintain the study's specific focus on the biological manifestations of stress. Items were rated on a 5-point scale ranging from 0 ("all of the time") to 4 ("never"), with higher scores indicating better GI-related quality of life. The GIQLI has demonstrated strong reliability and validity and effectively differentiates across levels of clinical severity (26).

Perceived stress was measured using the 10-item Perceived Stress Scale (PSS-10), which assesses the extent to which situations in one's life are appraised as stressful over the past month (27). Items were rated on a 5-point Likert scale ranging from 0 ("never") to 4 ("very often"), with higher scores reflecting greater perceived stress. The PSS has demonstrated good reliability and concurrent validity (27).

Community-level stressors were assessed using a 15-item adapted version of the Urban Life Stress Scale, which in its original form is a 21-item measure evaluating economic stability, social context, and neighborhood environment. Six items not considered relevant to a traditional undergraduate student population were omitted; the retained 15 items continued to span all three original domains (16, 17). The scale captures stress across three domains: economic stability, social and community context, and neighborhood and physical environment. Items were rated on a 5-point scale ranging from 1 ("no stress at all") to 5 ("extremely stressful, more than I can handle"). The measure has demonstrated strong reliability and validity in prior research (16, 17).

Data Analysis

Statistical analyses were performed using IBM SPSS Statistics (Version 31.0.0.0). Participants were classified into high versus low SES groups, under the SEI. The SEI, originally a continuous variable, was dichotomized using a median split at the sample median SEI score of 21. Because 8 participants (17.8% of the analytic sample) scored exactly at the median, all median-tied cases were assigned to the low-SES group (SEI ≤ 21 = low SES; SEI > 21 = high SES); this tie-handling rule, rather than an error in computation, produced the resulting 26/19 (low/high) split rather than a more even division. This approach was utilized specifically to facilitate stratified linear regression analyses, allowing for a direct comparison of the strength and direction of associations between stress and GI symptoms across different socioeconomic strata.

Initially, associations between variables were assessed using independent samples t-tests and Pearson correlations. To investigate disparities in stress levels across SES, independent samples t-tests were conducted, comparing participants categorized as high versus low SES. These analyses were conducted separately for perceived stress and urban life stress. A formal interaction term between SES and stress was not included in the current analysis; these analyses were intended to provide descriptive comparisons across SES groups rather than a formal statistical test of moderation. Additionally, Pearson correlation analyses were conducted to ascertain correlations between stress and GI symptom frequency, evaluating the extent to which perceived stress and urban life stress were associated with GI symptom severity.

RESULTS

A total of 45 undergraduate students were included in the final analysis, with participants classified into low SES (N = 26) and high SES (N = 19) groups based on a median split of the comprehensive SEI. The overall sample had a mean age of 19.16 years (SD = 1.30) and was predominantly female (71.1%); age did not differ significantly between low-SES (M = 19.23, SD = 1.45)

and high-SES (M = 19.05, SD = 1.08) groups, t(43) = 0.45, p = .65. The cohort was racially and ethnically diverse, though composition varied by group; the high SES group had a greater representation of White/Caucasian participants (63.2%) compared to the low SES group (23.1%), which had higher representation of Hispanic/Latino(a) (38.5%) and Asian (23.1%) participants; given multiple ethnicity categories with small expected cell counts, group differences in ethnic composition were evaluated using Fisher's exact test, p = .002 (Table 1).

Table 1. *Baseline Characteristics of Undergraduate Participants in a Cross-Sectional Survey. United States, 2025. Percentages may not total 100 because of rounding or missing data.*

Characteristic	Total (N=45)	Low SES (N=26)	High SES (N=19)
Age (years), mean (SD)	19.16 (1.30)	19.23 (1.45)	19.05 (1.08)
Average sleep hours, n (%)			
6 hours or less	11 (24.4)	7 (26.9)	4 (21.1)
Between 7 and 9 hours	34 (75.6)	19 (73.1)	15 (78.9)
Year in school, n (%)			
First year	24 (53.3)	15 (57.7)	9 (47.4)
Second year	10 (22.2)	4 (15.4)	6 (31.6)
Third year	5 (11.1)	3 (11.5)	2 (10.5)
Fourth year +	6 (13.3)	4 (15.4)	2 (10.5)
Employment Status, n (%)			
Part-time (including work-study	20 (44.4)	17 (65.4)	3 (15.8)
Unemployed	23 (51.1)	9 (34.6)	14 (73.7)
Other	2 (4.4)	---	2 (10.5)
Receives federal student aid, n (%)	21 (46.7)	17 (65.4)	4 (21.1)
Mother's education, n (%)			
High school or less	4 (8.9)	1 (3.8)	---
Bachelor's degree	24 (53.3)	14 (53.8)	11 (57.9)
Graduate degree	13 (28.9)	8 (20.8)	8 (42.1)
Other	4 (8.9)	3 (11.5)	---
Father's education, n (%)			
High school or less	1 (2.2)	4 (15.4)	---
Bachelor's degree	25 (55.6)	15 (57.7)	9 (47.4)
Graduate degree	16 (35.6)	4 (15.4)	9 (47.4)
Other	3 (6.7)	3 (11.5)	1 (5.3)
Living situation, n (%)			
With parents/family	5 (11.1)	5 (19.2)	---
On-campus housing	30 (66.7)	18 (69.2)	12 (63.2)
Off-campus	10 (22.2)	3 (11.5)	7 (36.8)
Ethnicity, n (%)			
White/Caucasian	18 (40.0)	6 (23.1)	12 (63.2)
MENA	3 (6.5)	1 (3.8)	2 (10.5)
Native Hawaiian/Pacific Islander	1 (2.2)	1 (3.8)	---
Asian	10 (22.2)	6 (23.1)	4 (21.1)
Black/African American	2 (4.4)	2 (7.7)	---
Hispanic Latino(a)	10 (21.7)	10 (38.5)	---
Other	1 (2.2)	---	1 (5.3)

Continued Table 1. *Baseline Characteristics of Undergraduate Participants in a Cross-Sectional Survey. United States, 2025. Percentages may not total 100 because of rounding or missing data.*

Characteristic	Total (N=45)	Low SES (N=26)	High SES (N=19)
Gender, n (%)			
Female	32 (71.1)	19 (73.1)	13 (68.4)
Male	13 (28.9)	7 (26.9)	6 (31.6)
Non-binary/Other	---	---	---

Note. Group differences (low- vs. high-SES) were evaluated using Fisher's exact test for categorical variables with low expected cell counts. Low-SES students were significantly more likely to be employed part-time or unemployed in a different distribution than high-SES students (p = .001) and significantly more likely to receive federal student aid (p = .011). Mother's education did not differ significantly between groups (p = .363), and father's education showed only a marginal, non-significant difference (p = .067).

Socioeconomic markers further distinguished the groups: low SES students were significantly more likely to be employed part-time (65.4%) and to receive federal student aid (65.4%) compared to high SES students (15.8% and 21.1%, respectively). Additionally, parental education levels were higher in the high SES group, where most parents held bachelor's or graduate degrees, whereas low SES participants more frequently reported parents with a high school education or less. While sleep duration was generally similar across the sample, a higher percentage of low SES students reported sleeping six hours or less (26.9%) compared to their high SES peers (21.1%) (Table 1).

Independent samples t-tests revealed significant disparities in urban stress exposure between the two groups. Students in the low SES group reported significantly higher levels of urban life stress (M = 34.88, SD = 11.02) than those in the high SES group (M = 27.47, SD = 7.31, t(43) = 2.55, p = .014), representing a moderate-to-large effect (d = 0.77; mean difference = 7.41 points, 95% CI [1.54, 13.28]). In contrast, no significant group differences were observed for perceived stress (p > .05), suggesting that while general stress appraisals were comparable, those from lower SES backgrounds faced a disproportionately higher burden of community-level stressors (Figure 1).

To further examine whether the association between urban stress and GI symptoms differed descriptively by SES group, linear regression analyses were conducted separately within each group. Among participants in the low SES group, higher levels of urban stress significantly predicted greater GI symptom severity (β = 0.44, 95% CI [0.06, 0.82], t(24) = 2.38, p < .05), with urban stress accounting for approximately 19% of the variance in GI symptom severity (R^2 = .19) in this group. Conversely, the association between urban stress and GI symptoms in the high SES group was not statistically significant (β = 0.09, 95% CI [-0.42, 0.60], t(17) = 0.37, p = .72; R^2 = .01). The regression slope was steeper for the low SES group than the high SES group, consistent with a stronger linear association between urban stress and GI symptom severity among low-SES students in this sample; because no formal SES-stress interaction term was tested and the design is cross-sectional, this pattern should be interpreted as a descriptive between-group difference rather than statistically confirmed moderation or a causal effect of stress on GI symptoms (Figure 2).

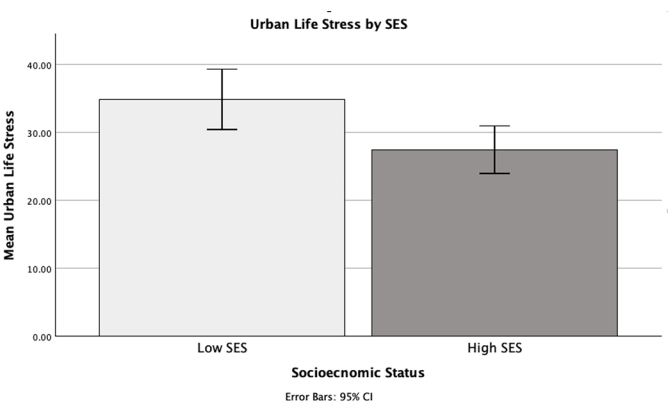

Figure 1. *Urban Life Stress by Socioeconomic Status.Mean urban life stress scores among undergraduate students by socioeconomic status (SES) in a cross-sectional survey of university students, United States, 2025. Error bars represent 95% confidence intervals.*

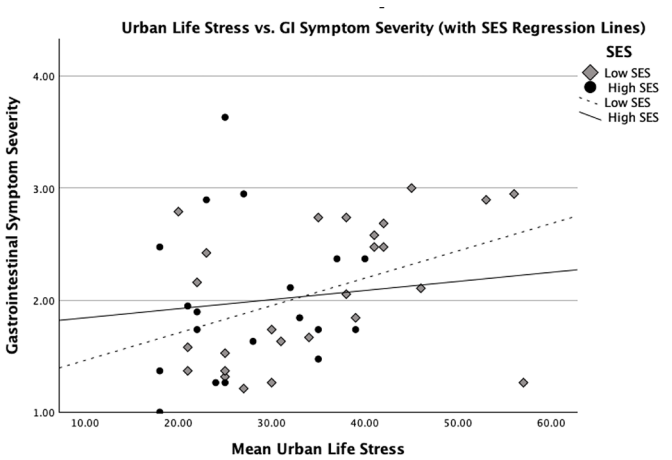

Figure 2. *Association Between Urban Life Stress and Gastrointestinal Symptoms by Socioeconomic Status. Scatterplots illustrating the relationship between urban life stress and gastrointestinal symptom severity among undergraduate students stratified by SES in a cross-sectional survey of university students, United States, 2025. Lines represent linear regression fits.*

DISCUSSION

The results of this study indicate that while there were no significant differences in general perceived stress across SES groups, a meaningful distinction emerged regarding urban life stress**,** with lower SES students reporting scores approximately 27% greater than their higher SES peers. These findings suggest that stressors specific to the urban environment, such as neighborhood instability, economic strain, and environmental challenges, may operate independently of general stress appraisals for undergraduate students.[15] Furthermore, urban life stress proved to be a more sensitive indicator of socioeconomic disadvantage than standard perceived stress measures, highlighting the importance of evaluating contextual environmental exposure to understand health disparities in emerging adulthood.

A notable pattern in this research is that the association between urban stress and GI symptom severity differed descriptively by SES group: urban stress significantly predicted GI symptom severity among low-SES students, whereas no significant association was found among high-SES students. Because no formal interaction term between SES and stress was tested, this pattern should not be interpreted as statistically confirmed moderation; rather, it suggests that socioeconomically disadvantaged students may show heightened physiological sensitivity to community-level stressors, with chronic exposure to such stressors potentially contributing to increased GI symptom burden. Chronic exposure to community-level stressors has been associated with adverse mental and physical health outcomes in later adulthood, including depressive symptoms and physiological dysregulation (18, 20, 28). Individuals residing in highly unstable environments experience more severe health outcomes overall (3, 18). These results align with established theories on the gut-brain connection, which emphasize that chronic stress rooted in environmental contexts can dysregulate nervous system pathways, disrupting gut motility and pain sensitivity (2).

The broader literature on neighborhood disadvantage and cumulative stress suggests that residents of lower-SES neighborhoods often face cumulative stress burdens with fewer buffering supports or social cohesion compared to those in higher-SES areas (8, 9). Research on poverty-related stress and neighborhood instability has documented downstream effects on both mental and physical health, including heightened physiological stress reactivity and reduced access to coping resources, patterns that map directly onto the GI vulnerabilities observed in the present study (18, 20). For college students, college enrollment itself may serve as a partial buffer against the health consequences of lower SES, providing access to healthcare, mental health services, and social networks that are less available outside of academic settings (29, 30). Specifically, educational attainment has been linked to reduced risk for psychiatric disorders and improved long-term health trajectories, suggesting that university environment can partially mitigate the effects of socioeconomic strain for those who have access to adequate institutional support (31, 32). However, this protective effect is not guaranteed; students who carry the greatest urban stress burdens into college, including those from lower-SES backgrounds, may be least equipped to benefit from these resources without proactive institutional outreach. Thus, identifying and addressing patterns of urban stress through community- and institution-level interventions is essential for supporting the health and well-being of students disproportionately impacted by urban life stress.

CONCLUSIONS

A notable strength of the present study is its integration of contextual, urban-life stress measures with GI health outcomes, offering a comprehensive understanding of

how environment influences both psychological and physiological well-being. Nonetheless, several limitations must be considered, including the small sample size (N = 45), which reduces statistical power. Furthermore, the use of a private university setting may limit the generalizability of results due to higher average SES and less diversity than public institutions. Future research should prioritize larger, more socioeconomically diverse samples across multiple institutional settings. Several additional limitations should be noted. First, although group differences between low- and high-SES students were tested, no formal statistical interaction term between SES and stress was included in the analytic model; consequently, the present findings describe between-group differences in the stress-GI association rather than statistically confirmed moderation and should be interpreted accordingly. Second, SES was dichotomized using a median split (with median-tied cases assigned to the low-SES group), which simplifies a continuous construct, can obscure within-group variability, and may reduce statistical power relative to treating SES continuously; future work should consider continuous or multi-level SES modeling, including a formal SES-stress interaction term, where sample size permits. Third, all measures relied on self-report, which is subject to recall and social desirability biases and shared-method variance that could inflate associations between stress and GI symptom measures. Fourth, the SEI was constructed as an unweighted sum of differently scaled subjective and objective indicators rather than a validated composite, limiting comparability with standardized SES measures used elsewhere. Fifth, residual confounding by unmeasured variables (e.g., diet, physical activity, baseline GI diagnoses, or prior mental health history) cannot be ruled out and may account for some of the observed associations.

Because the present study employed a cross-sectional design, the temporal relationship between urban stress exposure and GI symptom severity cannot be established, and the observed associations cannot be interpreted as causal. Although the results are consistent with the possibility that urban stress is associated with SES-related differences in GI health, longitudinal research is needed to determine whether exposure to environmental stressors precedes, and is causally related to, the physiological disparities observed during emerging adulthood. Moreover, the current findings highlight important implications for examining institutional and policy-level factors that may help mitigate the adverse effects of urban stressors on student well-being. A more comprehensive understanding of the mechanisms connecting environmental stress exposure to GI symptom severity across the lifespan may help inform strategies to better support students during this critical developmental period.

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CONFLICT OF INTEREST

The author declares no conflicts of interest related to this work.

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