

UC Irvine

UC Irvine Previously Published Works

Title

Socioeconomic Adversity, Social Resources, and Allostatic Load among Hispanic/Latino Youth

Permalink

<https://escholarship.org/uc/item/1z52j72g>

Journal

Biopsychosocial Science and Medicine, Publish Ahead of Print(&NA;)

ISSN

2998-8748

Authors

Gallo, Linda C
Roesch, Scott C
Bravin, Julia I
[et al.](#)

Publication Date

2019-04-01

DOI

10.1097/psy.0000000000000668

Peer reviewed



Published in final edited form as:

Psychosom Med. 2019 April ; 81(3): 305–312. doi:10.1097/PSY.0000000000000668.

Socioeconomic Adversity, Social Resources, and Allostatic Load among Hispanic/Latino Youth: The Study of Latino Youth

Linda C. Gallo, Ph.D.¹, Scott C. Roesch, Ph.D.¹, Julia I. Bravin, M.S.², Kimberly L. Savin, B.A.², Krista Ferreira, Ph.D.³, Mercedes R. Carnethon, Ph.D.⁴, Alan M. Delamater, Ph.D.⁵, Christian R. Salazar, Ph.D.⁶, Maria Lopez-Gurrola, M.P.H.⁷, and Carmen R. Isasi, M.D., Ph.D.⁸

¹Department of Psychology, San Diego State University

²San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology

³Department of Social Medicine, University of North Carolina at Chapel Hill

⁴Feinberg School of Medicine, Northwestern University, Chicago, IL

⁵University of Miami Miller School of Medicine, Miami, FL

⁶UC Irvine Institute for Memory Impairments and Neurological Disorders (UCI MIND), University of California, Irvine

⁷San Diego State University Research Foundation, San Diego, CA

⁸Albert Einstein College of Medicine, Bronx, NY

Abstract

Objective.—We examined associations among socioeconomic adversity, social resources, and allostatic load in Hispanic/Latino youth, who are at high risk for obesity and related cardiometabolic risks.

Methods.—Participants were N=1343 Hispanic/Latino youth (51% male; ages 8–16 years) offspring of Hispanic Community Health Study/Study of Latinos (HCHS/SOL) participants. Between 2012–2014, youth underwent a fasting blood draw and anthropometric assessment, and youth and their enrolled caregivers provided social and demographic information. A composite indicator of allostatic load represented dysregulation across general metabolism, cardiovascular, glucose metabolism, lipid, and inflammation/hemostatic systems. Socioeconomic adversity was a composite of caregiver education, employment status, economic hardship, family income relative to poverty, family structure, and receipt of food assistance. Social resources were a composite of family functioning, parental closeness, peer support, and parenting style variables.

Results.—Multivariable regression models that adjusted for sociodemographic factors, design effects (strata and clustering), and sample weights revealed a significant, positive, association

Address correspondence to: Linda C. Gallo, Ph.D., South Bay Latino Research Center, 780 Bay Blvd. Suite 200, Chula Vista, CA, 91910 Phone: 619-240-7807. lgallo@sdsu.edu.

Conflicts of Interest: The authors have no conflicts of interest to report.

between socioeconomic adversity and allostatic load ($\beta=.10$, $p = .035$) and a significant, inverse association between socioeconomic adversity and social resources ($\beta=-.10$, $p = .013$). Social resources did not relate to allostatic load, and did not moderate or help explain the association of adversity with allostatic load (all $ps > .05$).

Conclusions.—Statistically significant, but small associations of socioeconomic adversity with both allostatic load and social resources were identified. The small effects may partially reflect range restriction given overall high socioeconomic adversity *and* high social resources in the cohort.

Keywords

Allostatic load; Hispanic; Latino; Social Support; Socioeconomic Status; Youth

Hispanics/Latinos account for one-fourth of the US population and are expected to comprise 30% by 2050 (1). Hispanic/Latino children are more than twice as likely to live in poverty than non-Hispanic White children (2). Given the robust influence of childhood socioeconomic adversity on neurocognitive and social-emotional development and mental and physical health throughout the lifespan (3–7), this disparity is of critical public health importance. Furthermore, poverty is often associated with other adversities, such low parental education and single parent family structures, which negatively impact child health and development. Changing US demographics highlight the importance of understanding how socioeconomic adversity shapes health among Hispanic/Latino youth.

Resilience models posit that some individuals continue to thrive in the face of adversity, because they benefit from specific individual or contextual protective factors (6, 8, 9). Supportive social resources, including family cohesion, parental warmth, and authoritative parenting, may protect against outcomes such as mood and conduct disorders and physical health problems (10–13). Culturally, Hispanic/Latino families may benefit from strong communal values and support (14, 15) that help them avoid the deleterious effects of adversity (14). On the other hand, exposure to adversities could erode social resources in a manner that ultimately augments health risks (11). Thus, social resources could directly protect against negative health outcomes, or, they could “mediate” (indirect effect) or “moderate” (interaction effect) associations between socioeconomic adversity and health.

Allostatic load is a useful model for elucidating the health consequences of social conditions because it captures cumulative wear and tear across biological systems (16–18) and predicts lifecourse morbidity and mortality (19, 20). Research has shown associations of socioeconomic disadvantage in childhood with allostatic load in late childhood and early adolescence (21, 22). Other studies have demonstrated that supportive social resources can buffer associations of socioeconomic adversity with allostatic load, such that greater adversity related to worsened dysregulation only in the presence of low peer support (23) or maternal responsiveness (21).

The current study examined associations of social factors with allostatic load in Hispanic/Latino youth from the Hispanic Community Health Study/Study of Latino (HCHS/SOL) Youth (“SOL Youth”). We hypothesized that: 1) Greater socioeconomic adversity would

relate to higher allostatic load; 2) higher protective social resources would attenuate the association between socioeconomic adversity and allostatic load (i.e., moderation effect); 3) higher socioeconomic adversity would relate to lower protective social resources; 4) higher social resources would relate to lower allostatic load; and 5) the positive association between socioeconomic adversity and allostatic load would be attributable, in part, to lower protective social resources (indirect effect).

Methods

Sample and Procedures

HCHS/SOL is a population-based cohort study of chronic disease prevalence, incidence, and risk and protective factors in 16,415 adults, ages 18–74 years at recruitment between 2008 and 2011 from four US cities (Chicago, IL; Miami, FL; Bronx, NY and San Diego, CA). Participants were of Cuban, Dominican, Mexican, Puerto Rican, Central or South American, or more than one/other Hispanic/Latino heritage. Details regarding the sampling approach and methods have been presented previously (24, 25). As described elsewhere (26, 27), SOL Youth includes 1,466 offspring of HCHS/SOL participants, ages 8–16 years old. Between 2012 and 2014, youth underwent a fasting exam with blood draw and anthropometric assessment, and youth and caregivers completed social and demographic measures. Participants without data needed to characterize allostatic load ($n=83$), or socioeconomic adversity and/or social resources ($n=4$), and/or taking medications for diabetes, hypertension, or dyslipidemia ($n=36$) were excluded for an analytic sample of $N=1,343$. There were no significant differences in age, sex, family income, caregiver education, child and caregiver nativity or Hispanic/Latino background, or field center, between included and excluded youth ($p>.05$). Institutional Review Boards at all participating institutions approved the study and all participants provided informed consent or assent.

Allostatic Load Composite.

Although there is no gold standard approach to measuring allostatic load (18, 20), studies often use a count based composite of multi-system indicators above a cut score linked to the sample distribution. Following this approach, we computed a summative multi-system allostatic load composite reflecting dysregulation across these systems: general metabolism, measured by BMI and waist circumference; cardiovascular, assessed by systolic and diastolic blood pressure (SBP, DBP), and pulse rate; glucose metabolism, indicated by fasting glucose, glycosylated hemoglobin (HbA1c), and homeostatic model assessment of insulin resistance (HOMA-IR); lipid regulation, assessed by high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides; and inflammation/hemostatic function, assessed by high-sensitivity C-Reactive Protein (hs-CRP), e-Selectin and Plasminogen Activator Inhibitor type 1 (PAI-1). System risk scores were computed as the proportion of individual biomarkers for which a participant's values fell into the high-risk quartile, and therefore ranged from 0 to 1 (indicating 0–100% of biomarkers within that system in the high-risk range). This approach ensured that each system was weighted equally in the composite score, regardless of number of indicators (28). Cut points for individual biomarkers were determined at the 75th percentile value (below the 25th percentile for HDL-C) for the sample distribution. Allostatic load was

computed as the sum of the five physiological system risk scores (possible range: 0 to 5). Thus, a score of 0 would indicate that no indicator within any individual system was at an elevated range, whereas a score of 5 would indicate that 100% of all indicators within all individual systems were at the elevated range. Details regarding the assessment of variables that comprise the allostatic load composite can be found in the Supplemental Digital Content. Descriptive data for the individual indicators and allostatic load composite are shown in Table 1. A histogram of the allostatic load sample distribution is shown in Supplemental Figure 1.

Socioeconomic Adversity.

To capture the cumulative impact of adversity exposure, and consistent with prior research regarding the impact of health consequences of social risks in children and adolescents (29–31), we combined several parent/caregiver-reported indicators to create an aggregate socioeconomic adversity score. One point was scored for the presence of: Family income below the poverty line; primary caregiver non-completion of high school or equivalent; unemployment in sole caregiver, or—if caregiver spouse/partner was also present— in both caregivers; single parent family structure; family receipt of food assistance (e.g., Supplemental Nutritional Assistance Program); and economic hardship in the past year (e.g., unable to pay rent or mortgage; evicted). The socioeconomic adversity composite ranged from 0 to 6 with higher scores indicating greater adversity. Descriptive data for the individual indicators and composite are shown in Supplemental Table 1. The sample distribution of socioeconomic adversity scores is depicted in Supplemental Figure 2.

Social Resources.

To capture the cumulative effects of protective social resources, we created a summed social resources composite score, with one point scored for: Good family functioning; high parental closeness; high peer support; and authoritative parenting. As defined below, the cut scores for these indicators were based on recommendations from prior research or were linked to the upper or lower quartile of the distribution, mirroring the approach for allostatic load. The composite social resources score ranged from 0 to 4 with higher scores indicating greater social resources.

Scores on the 12-item General Family Functioning subscale of the McMaster Family Assessment Device (32) were used to indicate family functioning. This measure has been found to be reliable and its factor structure supported in both clinical and non-clinical populations (33). Items were averaged to form a summary score with 1 indicating best family functioning and 4, worst family functioning ($\alpha_{\text{English}} = .78$; $\alpha_{\text{Spanish}} = .76$ in the current sample). Following prior research (34), scores < 2 were categorized as good family functioning and > 2 as poor family functioning. Youth completed a 6-item study specific measure of Parental Closeness with the enrolled caregiver, with items averaged and scores ranging from 1 (lowest closeness) to 5 (highest closeness) ($\alpha_{\text{English}} = .71$; $\alpha_{\text{Spanish}} = .70$ in the current sample). Nearly half of the sample obtained the highest score possible. Thus, scores 4.67 to 5 (77%) were categorized as “high” parental closeness and ≤ 4.66 as “low” parental closeness. Youth completed the 4-item friendship subscale of the Multidimensional Scale of Perceived Social Support (35, 36). This measure has demonstrated reliability and validity

across diverse samples (36) including undocumented Hispanic/Latino immigrants (37) and Hispanic/Latino youth (38, 39). In accordance with prior studies of Hispanic/Latino families (40) and children (39), the scale was modified for ease of administration to use a 4-point, versus a 7-point, likert scale. A summary score was calculated as the average of the item scores (range 1 to 4), with higher scores indicating greater support from friends ($\alpha_{\text{English}} = .78$, $\alpha_{\text{Spanish}} = .70$ in the current sample). For analysis, youth who scored in the upper quartile were categorized as having “high” support. Finally, the enrolled parent/caregiver completed the 16-item Authoritative Parenting Index (41) for each child enrolled in the study. This measure was originally developed and validated for reports by children and adolescents (41) but has since been adapted for parent report [e.g., (42)]. The scale describes parenting styles on two core dimensions: demandingness (setting and enforcing clear limits; monitoring youth behavior and activities) and responsiveness (being accepting and affectionate; providing support). The items within each subscale were averaged, with higher scores indicating more responsiveness or demandingness (range 1 to 4) (in the current sample, demandingness; $\alpha_{\text{English}} = .79$, $\alpha_{\text{Spanish}} = .84$; responsiveness; $\alpha_{\text{English}} = .73$, $\alpha_{\text{Spanish}} = .74$). Following other studies, subscales were dichotomized, using median splits, and combined to create four parenting styles: authoritative (“high” demandingness, “high” responsiveness); authoritarian (“high” demandingness, “low” responsiveness); neglectful (“low” demandingness, “low” responsiveness); and indulgent (“low” demandingness, “high” responsiveness (41)). Youth whose caregivers reported an authoritative style (41.5% of sample) were compared to those whose caregivers reported all other parenting styles.

Descriptive data for the individual indicators and social resources composite scores are shown in Supplemental Table 2. The sample distribution for the social resources composite is shown in Supplemental Figure 3.

Statistical Analyses

Descriptive statistics using complex survey procedures were calculated in IBM SPSS Statistics 20.0 (IBM, Inc., Armonk, NY). MPLUS (43) and the maximum likelihood robust (MLR) estimation procedure was used to estimate model parameters for all remaining analyses.

This procedure produces unbiased parameter estimates and standard errors under various missing data conditions (44). All analyses accounted for design effects (strata and clustering) and sample weights. Census blocks were used as the primary sampling unit at the first stage of sample selection and represented the primary clustering variable. The standard errors used in survey-data analysis additionally accounted for the clustering of siblings in households [see (45, 46)].

Multivariable linear regression models were used to examine the association of socioeconomic adversity with social resources, and the hypothesized main and interactive effects of socioeconomic adversity and social resources with allostatic load. Path analysis with MacKinnon’s asymmetric confidence interval tested the statistical significance of the indirect effect (47) from socioeconomic adversity, to social resources, to allostatic load. All models controlled for conceptually relevant sociodemographic factors that could shape allostatic load or social experiences: youth age, sex, nativity, Hispanic/Latino background,

field center, and number of youth in the family enrolled in SOL Youth. Regression/path analysis models were repeated to test for effect modification by age and sex of participant. No interaction was statistically significant (all p values $> .05$) and therefore these models are not discussed further.

Supplementary analyses were conducted to examine the bivariate associations among the individual indicators forming each composite. Additionally, multivariable linear regression models were conducted to examine the associations of socioeconomic adversity and social resources with individual allostatic load system risk scores. Finally, to ensure that social desirability did not substantively impact findings, multivariable models testing associations among socioeconomic adversity, social resources, and allostatic load scores were repeated with additional control for youth scores on a brief social desirability scale [i.e., the “Lie” subscale from the Revised Children’s Manifest Anxiety Scale (48)].

Results

Descriptive Statistics and bivariate associations

Descriptive statistics for the sample are shown in Table 2. The population was 48.9% female, and 42.6% were 8–11 years old. The majority (77.9%) was born in the US mainland and completed the interview in English (79%); nearly half (49.5%) were of Mexican heritage. Nearly three quarters (70.1%) had household yearly incomes $< \$30,000$ and 36.6% of caregivers had less than a high school education or GED.

As shown in Supplemental Table 3, bivariate associations revealed statistically significant associations among the allostatic load system scores that were small (i.e., cardiovascular with other systems) to moderate in magnitude. Bivariate associations among the socioeconomic adversity variables were small to moderate and statistically significant, and ranged from $r=.058$ (economic hardship and single parent family structure) to $r=.477$ (receipt of food assistance and family income below the poverty line) (Supplemental Table 4). For social resources, associations were generally small, but statistically significant with the exception of parenting style and peer support (Supplemental Tables 5a and 5b).

Socioeconomic Adversity, Social Resources and Allostatic Load

Table 3 shows the results of analyses regressing allostatic load on covariates and social adversity and social resources (tested separately). As shown, higher socioeconomic adversity related to higher allostatic load [Unstandardized Regression Coefficient (B)=.060, 95% CI .004, .116; $\beta=.099$, 95% CI .013, .186; $p=.035$]. An interaction term was added to this regression model to test whether or not this association was moderated by social resources, and was not statistically significant (B=−.007, 95% CI −.051, .038; $\beta=−.003$, 95% CI −.156, .163; $p=.767$). After accounting for covariates (total $R^2=1.7\%$), higher socioeconomic adversity related to lower social resources (B=−.060, 95% CI −.011, −.003; $\beta=−.10$; 95% CI −.169, −.022; $p=.013$; $R^2=.008$). However, as shown in Table 3, there was no significant association between social resources and allostatic load (B=−.040, 95% CI −.100, .029; $\beta=−.049$, 95% CI −.110, .032; $p=.224$). Further, the indirect effect from adversity to resources to

allostatic load was not statistically significant (MacKinnon's 95% Asymmetric CI $-.002$ to $.008$).

Supplementary multivariable analyses regressing the five allostatic load system risk scores on the socioeconomic adversity and social resources composite scores are depicted in Supplemental Table 6. The only statistically significant association was between higher socioeconomic adversity and greater lipid dysregulation. When multivariable models testing associations among social adversity, social resources, and allostatic load composite and system scores were repeated with additional control for social desirability, there was no substantive change in the magnitude or pattern of observed associations (results not shown).

Discussion

The current study tested associations of socioeconomic adversity with allostatic load, and whether social resources moderated or helped explain this association, in a diverse cohort of US Hispanic/Latino youth. Consistent with predictions, greater socioeconomic adversity related to significantly higher allostatic load scores, albeit modestly. Likewise, there was a small but significant association of higher socioeconomic adversity with lower social resources. However, social resources neither related directly to allostatic load, nor mediated or modified the association between socioeconomic adversity and allostatic load. There was no evidence that associations of social factors with allostatic load varied by youth age or sex.

The research adds to the literature showing that the association between socioeconomic adversity and health risk, as defined by a composite of physiological dysregulation, can be observed early in life (21, 22, 49), in an at-risk, growing, and understudied population group. Interestingly, analyses in the HCHS/SOL adult cohort also showed an association of socioeconomic adversity (i.e., lower income and education) with higher allostatic load scores; however, this was observed only in women (50). The fact that such an association also occurs in youth may reflect the direct biological embedding of early adversity with effects on neural development and stress processing, as well as emotional reactions to stress (3–5, 51). Differences in stress exposure, and associated behavioral, psychological, and biological responses, may play a role in the physiological wear and tear of socioeconomic adversity (7, 51).

The small association of adversity with allostatic load observed in SOL Youth may reflect – in part – range restriction due to a high level of socioeconomic adversity across the sample. Nearly 50% of youth had socioeconomic adversity scores of three or greater. More than two thirds of youth lived in households with incomes below the poverty line, 40% of caregivers reported past-year economic hardship, and 57% of families were receiving food assistance. In comparison, only 14% of non-Hispanic white children in the US were residing in homes with incomes below the poverty line in 2013, around the time that SOL Youth was conducted (2). Furthermore, 33% of all US Hispanic/Latino children resided in households with poverty level incomes in 2013 (2) – approximately half the estimate in SOL Youth. Less than two-thirds of SOL Youth participants lived in households with both caregivers present, though notably, this figure is higher than a 2015 national study in which 55% of US Hispanic/Latino children were living in dual-parent households (52). Our multi-site cohort

reflects trends that U.S. Hispanic/Latino youth are more likely to suffer poverty and related social stressors relative to their non-Hispanic white counterparts.

Not only did SOL Youth participants show a high level of socioeconomic adversity, they also benefited from relatively strong social resources despite this adversity. Moreover, the inverse association of socioeconomic adversity with social resources was quite small. Reports of strong resources did not appear to be a result of social desirability in our young participants, as social desirability and social resources scores were only weakly correlated ($r=.05$; NS). Thus, consistent with resilience models (8, 9, 14), in part the presence of protective social-cultural resources, which were largely present across the socioeconomic spectrum, may have contributed to the relatively weak association of socioeconomic adversity with allostatic load. Such patterns of strong social resources (i.e., high peer support, close parental relationships) are congruent with Hispanic/Latino cultural values and research showing that Hispanics/Latinos report higher levels of social support and closer, more interdependent relationships with family than non-Hispanic whites (53). Furthermore, the proportion of caregivers in our sample with an authoritative parenting style (41.5%) was markedly higher than in non-Hispanic White parents (26.8% authoritative), but comparable to less acculturated immigrant Mexican parents (37.8% authoritative) when assessed by a similar parenting measure in the US-based National Longitudinal Study of Adolescent health (54). Authoritative parenting, characterized by firm limit setting combined with warmth, compassion, and a collaborative communication style, is associated with positive youth developmental and health outcomes (55, 56). Further, early life maternal nurturance and warmth has been shown to protect against the association between childhood poverty and metabolic syndrome (10) and pro-inflammatory signaling (57) in adulthood. To the extent that Hispanic/Latino youth benefit from strong familial and social resources, they may experience health benefits.

On the other hand it is important to note that we observed no buffering, direct, or indirect role of social resources in relation to allostatic load. This indicates that although social resources may have had a protective role overall, they were not important in explaining variation in allostatic load in the cohort. This finding may also reflect range restriction to some degree - i.e., inasmuch as even youth with “low” composite scores may have had relatively high resources. It also concurs with a recent systematic review that found an inconsistent association between psychosocial resources with allostatic load, in adults and youth (58). These inconsistent findings seem to contradict the large body of research showing that social resources (e.g., perceived social support, social integration, family support) protect against morbidity and mortality, through interconnected physiological and behavioral mechanisms (59–61). In general, additional research is needed to understand how social resource variables relate to allostatic load in Hispanic/Latino youth and other groups, and the degree to which these variables help explain “resilience,” or the observed paradoxical trends in Hispanic/Latino health (e.g., better than expected health despite significant adversity; attenuated socioeconomic gradients in health) (62, 63).

Allostatic load scores tended to cluster at the lower end of the distribution in the current study, consistent with the younger age of the SOL Youth cohort. As such, the small association in the current study would be expected to increase in the future as early risk

translates into clinical conditions. In general, the Hispanic/Latino youth in our sample already display a high level of physiological dysregulation when compared to other youth population groups. For example, obesity was prevalent in 28% of males and 25% in females in SOL Youth (64). Furthermore, SOL Youth demonstrated a high prevalence of cardiovascular risk factors, including dyslipidemia (24.6% of males and 22.0% of females) pre-diabetes/diabetes (20.9% of males and 11.8% of females) and elevated liver enzymes (ALT >25 U/L 15% in males and 10% in females) (64, 65). This level of cardiometabolic risk is considerably higher than has been observed in non-Hispanic white youth, and similar to levels in Hispanic/Latino youth, in the National Health and Nutrition Survey (NHANES). For example, in NHANES 2015–2016, only 14% and 13.5% of non-Hispanic white boys and girls aged 2–19 were obese, whereas obesity prevalence was 28% and 23.6% in Hispanic/Latino boys and girls, respectively (66). In NHANES 2005–2014, prevalence of diabetes and prediabetes was 0.60% and 15.1%, respectively, in non-Hispanic white adolescents 12–19 years, versus and .76% and 22.9%, respectively, among Hispanic/Latino adolescents (67). Research that identifies modifiable risk and protective factors is essential to inform early prevention and intervention efforts to reduce disparities in Hispanics/Latinos.

The current study has several strengths, including a large, multi-site cohort reflecting diverse Hispanic/Latino backgrounds, a thorough characterization of socioeconomic adversities and social resource factors, and a clinical exam with multiple biomarkers. However, limitations of the research must also be considered. Foremost, this study's cross-sectional design limits conclusions regarding temporality or causality. Furthermore, the study sites were all large urban areas, and the findings cannot be assumed to generalize to rural areas, where Hispanic/Latino populations are growing (68.). Although we examined a range of socioeconomic adversities, SOL Youth did not include information regarding other adverse child experiences (e.g., abuse, bullying from peers) with relevance to allostatic load and health. Likewise, beyond social resources, our study did not examine other protective processes [e.g., shift and persist strategies; (69); intra-personal resources (62)] that deserve attention in future research. We also did not address health risk and protective behaviors, or negative emotions, which could help explain or moderate associations of socioeconomic adversity with health (70, 71).

Another limitation of the study relates to the allostatic load conceptualization. There is little consensus on the optimal conceptualization of allostatic load (18, 72–74), and operational definitions have varied widely in the number and types of indicators captured, and how they are combined. The current approach of applying empirically derived cut scores based on sample distributions is widely used (20, 72), has been validated in relation to predicting diverse health outcomes and mortality in other studies (20, 72), and was considered appropriate in the current sample, given the young age and lack of applicable clinical cut-scores. Although alternative methods for summarizing biomarker scores have been investigated, associations with social factors and health are generally comparable, as described in a recent systematic review (20). Our allostatic load conceptualization was also limited by available data, which did not include the neuroendocrine stress hormones (e.g., cortisol and catecholamines) viewed as primary mediators in the model (3). The composite did include consideration of inflammatory and hemostatic indicators, another category of

primary mediators. In general, the allostatic load research would benefit from greater agreement regarding optimal assessment and operationalization approach.

Conclusions

Recent statements highlight childhood as a critical period for preventing cardiometabolic disorders (75) and point to the importance of early life adversity as a correlate of cardiometabolic risk across the lifespan (76). Early exposure to low socioeconomic status and related adverse conditions can have long-term consequences for health and well-being, even if socioeconomic circumstances improve later in life (77, 78). The current study revealed a small but statistically significant association between socioeconomic adversity and allostatic load in Hispanic/Latino youth, in the context of overall high socioeconomic risk and strong social resource factors. Given disparities in obesity and related conditions, additional research is needed to understand the social risk and protective factors that may lead to physiological dysregulation and chronic disease risk in the large and growing US Hispanic/Latino youth population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Source of Funding: SOL Youth is supported by grant R01HL102130 from the National Institutes of Health/ National Heart, Lung, and Blood Institute (NIH/NHLBI). The Hispanic Community Health Study/Study of Latinos is a collaborative study supported by contracts from the NIH/NHLBI to the University of North Carolina (HHSN268201300001I / N01-HC-65233), University of Miami (HHSN268201300004I / N01-HC-65234), Albert Einstein College of Medicine (HHSN268201300002I / N01-HC-65235), University of Illinois at Chicago – HHSN268201300003I / N01-HC-65236 Northwestern University), and San Diego State University (HHSN268201300005I / N01-HC-65237). The following Institutes/Centers/Offices have contributed to the HCHS/SOL through a transfer of funds to the NHLBI: National Institute on Minority Health and Health Disparities, National Institute on Deafness and Other Communication Disorders, National Institute of Dental and Craniofacial Research, National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Neurological Disorders and Stroke, NIH Institution-Office of Dietary Supplements. We thank the staff and participants of HCHS/SOL and SOL Youth for their important contributions.

Acronyms:

HCHS/SOL	Hispanic Community Health Study/Study of Latinos
SOL Youth	Study of Latino Youth
BMI	Body Mass Index
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure
HbA1c	Glycosylated Hemoglobin
HOMA-IR	Homeostatic Model Assessment of Insulin Resistance
HDL-C	High Density Lipoprotein Cholesterol

LDL-C	Low Density Lipoprotein Cholesterol
Hs-CRP	High-Sensitivity C-Reactive Protein
PAI-1	Plasminogen Activator Inhibitor-1

References

1. National Council of La Raza. Toward a More Equitable Future: The Trends and Challenges Facing America's Latino Children Washington D.C.: 2016 Available from: <http://publications.nclr.org/handle/123456789/1627>. Retrieved 10/13/2017.
2. Kids Count Data Center - Annie E. Casey Foundation. Children in Poverty by Race and Ethnicity Baltimore, MD: 2017 Available from: <http://datacenter.kidscount.org/data/tables/44-children-in-poverty-by-race-and-ethnicity-detailed/>. Retrieved 11/2/2017.
3. Johnson SB, Riis JL, Noble KG. State of the art review: Poverty and the developing brain. *Pediatrics* 2016;137:e20153075. [PubMed: 26952506]
4. Duncan GJ, Magnuson K, Votruba-Drzal E. Moving beyond correlations in assessing the consequences of poverty. *Annu Rev Psychol* 2017;68:413–34. [PubMed: 27648987]
5. Ursache A, Noble KG. Neurocognitive development in socioeconomic context: Multiple mechanisms and implications for measuring socioeconomic status. *Psychophysiology* 2016;53:71–82. [PubMed: 26681619]
6. Nusslock R, Miller GE. Early-life adversity and physical and emotional health across the lifespan: A neuro-immune network hypothesis. *Biol Psychiatry* 2016;80:23–32. [PubMed: 26166230]
7. Miller GE, Chen E, Parker KJ. Psychological stress in childhood and susceptibility to the chronic diseases of aging: moving toward a model of behavioral and biological mechanisms. *Psychol Bull* 2011;137:959–97. [PubMed: 21787044]
8. Cicchetti D Annual research review: Resilient functioning in maltreated children--past, present, and future perspectives. *J Child Psychol Psychiatr* 2013;54:402–22. [PubMed: 22928717]
9. Rutter M Resilience as a dynamic concept. *Dev Psychopathol* 2012;24:335–44. [PubMed: 22559117]
10. Miller GE, Lachman ME, Chen E, Gruenewald TL, Karlamangla AS, Seeman TE. Pathways to resilience: maternal nurturance as a buffer against the effects of childhood poverty on metabolic syndrome at midlife. *Psychol Sci* 2011;22:1591–9. [PubMed: 22123777]
11. Repetti RL, Taylor SE, Seeman TE. Risky families: family social environments and the mental and physical health of offspring. *Psychol Bull* 2002;128:330–66. [PubMed: 11931522]
12. Masten AS. Global perspectives on resilience in children and youth. *Child Dev* 2014;85:6–20. [PubMed: 24341286]
13. Traub F, Boynton-Jarrett R. Modifiable resilience factors to childhood adversity for clinical pediatric practice. *Pediatrics* 2017; 139(5). pii: e20162569. [PubMed: 28557726]
14. Cardoso JB, Thompson SJ. Common Themes of resilience among Latino immigrant Families: A systematic review of the literature. *Fam Soc* 2010;91:257–65.
15. Chapman M, Perreira K. The Well-being of immigrant Latino youth: A framework to inform practice. *Fam Soc* 2005;86:104–11.
16. McEwen BS, Gianaros PJ. Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. *Ann NY Acad Sci* 2010;1186:190–222. [PubMed: 20201874]
17. McEwen B, Lasley EN. Allostatic load: When protection gives way to damage. *Adv Mind Body Med* 2003;19:28–33. [PubMed: 12825411]
18. Gallo LC, Fortmann AL, Mattei J. Allostatic load and the assessment of cumulative biological risk in biobehavioral medicine: Challenges and opportunities. *Psychosom Med* 2014;76:478–80. [PubMed: 25141272]
19. Dowd JB, Simanek AM, Aiello AE. Socio-economic status, cortisol and allostatic load: a review of the literature. *Int J Epidemiol* 2009;38:1297–309. [PubMed: 19720725]

20. Beckie TM. A Systematic review of allostatic load, health, and health disparities. *Biol Res Nurs* 2012;14:311–46. [PubMed: 23007870]
21. Evans GW, Kim P, Ting AH, Tesher HB, Shannis D. Cumulative risk, maternal responsiveness, and allostatic load among young adolescents. *Dev Psychol* 2007;43:341–51. [PubMed: 17352543]
22. Rainisch BK, Upchurch DM. Sociodemographic correlates of allostatic load among a national sample of adolescents: findings from the National Health and Nutrition Examination Survey, 1999–2008. *J Adolesc Health* 2013;53:506–11. [PubMed: 23763967]
23. Brody GH, Lei MK, Chae DH, Yu T, Kogan SM, Beach SRH. Perceived discrimination among African American adolescents and allostatic load: a longitudinal analysis with buffering effects. *Child Dev* 2014;85:989–1002. [PubMed: 24673162]
24. Sorlie PD, Aviles-Santa LM, Wassertheil-Smoller S, Kaplan RC, Daviglus ML, Giachello AL, Schneiderman N, Raij L, Talavera G, Allison M, LaVange L, Chambless LE, Heiss G. Design and Implementation of the Hispanic Community Health Study/Study of Latinos. *Ann Epidemiol* 2010;20:629–41. [PubMed: 20609343]
25. LaVange LM, Kalsbeek WD, Sorlie PD, Aviles-Santa LM, Kaplan RC, Barnhart J, Liu K, Giachello A, Lee DJ, Ryan J, Criqui MH, Elder JP. Sample Design and Cohort Selection in the Hispanic Community Health Study/Study of Latinos. *Ann Epidemiol* 2010;20:642–9. [PubMed: 20609344]
26. Isasi CR, Carnethon MR, Ayala GX, Arredondo E, Bangdiwala SI, Daviglus ML, Delamater AM, Eckfeldt JH, Perreira K, Himes JH, Kaplan RC, Van Horn L. The Hispanic Community Children's Health Study/Study of Latino Youth (SOL Youth): Design, objectives, and procedures. *Ann Epidemiol* 2014;24:29–35. [PubMed: 24120345]
27. Ayala GX, Carnethon M, Arredondo E, Delamater AM, Perreira K, Van Horn L, Himes JH, Eckfeldt JH, Bangdiwala SI, Santisteban DA, Isasi CR. Theoretical foundations of the Study of Latino (SOL) Youth: implications for obesity and cardiometabolic risk. *Ann Epidemiol* 2014;24:36–43. [PubMed: 24246265]
28. Gruenewald TL, Karlamangla AS, Hu P, Stein-Merkin S, Crandall C, Koretz B, Seeman TE. History of socioeconomic disadvantage and allostatic load in later life. *Soc Sci Med* 2012;74:75–83. [PubMed: 22115943]
29. Brody GH, Yu T, Chen YF, Kogan SM, Evans GW, Beach SR, Windle M, Simons RL, Gerrard M, Gibbons FX, Philibert RA. Cumulative socioeconomic status risk, allostatic load, and adjustment: a prospective latent profile analysis with contextual and genetic protective factors. *Dev Psychol* 2013;49:913–27. [PubMed: 22709130]
30. Evans GW. A multimethodological analysis of cumulative risk and allostatic load among rural children. *Dev Psychol* 2003;39:924–33. [PubMed: 12952404]
31. Kim S, Brody GH. Longitudinal pathways to psychological adjustment among Black youth living in single-parent households. *J Fam Psychol* 2005;19:305–13. [PubMed: 15982108]
32. Byles J, Byrne C, Boyle MH, Offord DR. Ontario Child Health Study: Reliability and validity of the general functioning subscale of the McMaster Family Assessment Device. *Fam Process* 1988;27:97–104. [PubMed: 3360100]
33. Kabacoff RM, Ivan W, Bishop DS, Epstein NB, Keitner GI. A psychometric study of the McMaster Family Assessment Device in psychiatric, medical, and nonclinical samples. *J Fam Psychol* 1990;3:431–9.
34. Miller IW, Epstein NB, Bishop DS, Keitner GI. The McMaster Family Assessment Device: Reliability and Validity. *J Marital Fam Ther* 1985;11:345–56.
35. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The Multidimensional Scale of Perceived Social Support. *J Pers Assess* 1988;52:30–41.
36. Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. *J Pers Assess* 1990;55:610–7. [PubMed: 2280326]
37. Cobb CL, Xie D. Structure of the Multidimensional Scale of Perceived Social Support for Undocumented Hispanic Immigrants. *Hisp J Behav Sci* 2015;37:274–81.

38. Edwards LM. Measuring Perceived Social Support in Mexican American Youth: Psychometric Properties of the Multidimensional Scale of Perceived Social Support. *Hisp J Behav Sci* 2004;26:187–94.
39. Orth U, Robins RW, Widaman KF, Conger RD. Is low self-esteem a risk factor for depression? Findings from a longitudinal study of Mexican-origin youth. *Devel Psychol* 2014;50:622–33. [PubMed: 23895172]
40. Taylor ZE, Conger RD, Robins RW, Widaman KF. Parenting practices and perceived social support: Longitudinal relations with the social competence of Mexican-origin children. *J Latina/o Psychol* 2015;3:193–208.
41. Jackson C, Henriksen L, Foshee VA. The Authoritative Parenting Index: Predicting health risk behaviors among children and adolescents. *Health Educ Behav* 1998;25:319–37. [PubMed: 9615242]
42. Taylor A, Wilson C, Slater A, Mohr P. Parent- and child-reported parenting. Associations with child weight-related outcomes. *Appetite* 2011;57:700–6. [PubMed: 21896297]
43. Muthén LK, Muthén BO. *Mplus Los Angeles*: Muthén & Muthén; 2006.
44. Enders CK. *Applied missing data analysis* New York: Guilford Press; 2010.
45. LaVange LM, Koch GG, Schwartz TA. Applying sample survey methods to clinical trials data. *Stat Med* 2001;20:2609–23. [PubMed: 11523072]
46. Angeles G, Guilkey DK, Mroz TA. The impact of community-level variables on individual-level outcomes: Theoretical results and applications. *Sociol Methods Res* 2005;34:76–121.
47. Tofighi D, MacKinnon DP. RMediation: an R package for mediation analysis confidence intervals. *Behav Res Methods* 2011;43:692–700. [PubMed: 21487904]
48. Reynolds CR, Richmond BO. What I think and feel: A revised measure of children's manifest anxiety. *J Abnorm Child Psychol* 1978;6:271–80. [PubMed: 670592]
49. Evans GW, Kim P. Childhood poverty and young adults' allostatic load: the mediating role of childhood cumulative risk exposure. *Psychol Sci* 2012;23:979–83. [PubMed: 22825357]
50. Salazar CR, Strizich G, Seeman TE, Isasi CR, Gallo LC, Aviles-Santa ML, Cai J, Penedo FJ, Arguelles W, Sanders AE, Lipton RB, Kaplan RC. Nativity differences in allostatic load by age, sex, and Hispanic background from the Hispanic Community Health Study/Study of Latinos. *SSM Popul Health* 2016;2:416–24. [PubMed: 27540567]
51. Chen E, Brody GH, Miller GE. Childhood close family relationships and health. *Am Psychol* 2017;72:555–66. [PubMed: 28880102]
52. Kids Count Data Center. Children in poverty by race and ethnicity Baltimore, MD: Annie E. Casey Foundation; 2017 [cited 2018 July 18]; Available from: <https://datacenter.kidscount.org/data/tables/44-children-in-poverty-by-race-and-ethnicity?loc=1&loct=1-detailed/1/any/false/36/10,11,9,12,1,185,13/324,323>.
53. Pew Research Center Parenting in America: Outlook, worries, aspirations are strongly linked to financial situation Washington D.C. 2015 [cited 2017 September 2]; Available at <http://www.pewsocialtrends.org/2015/12/17/parenting-in-america/>.
54. Campos B, Kim HS. Incorporating the cultural diversity of family and close relationships into the study of health. *Am Psychol* 2017;72:543–54. [PubMed: 28880101]
55. Driscoll AK, Russell ST, Crockett LJ. Parenting styles and youth well-being across immigrant generations. *J Fam Issues* 2008;29:185–209.
56. Sokol RL, Qin B, Poti JM. Parenting styles and body mass index: A systematic review of prospective studies among children. *Obes Rev* 2017;18:281–92. [PubMed: 28086262]
57. Zolkoski SM, Bullock LM. Resilience in children and youth: A review. *Child Youth Serv Rev* 2012;34:2295–303.
58. Chen E, Miller GE, Kobor MS, Cole SW. Maternal warmth buffers the effects of low early-life socioeconomic status on pro-inflammatory signaling in adulthood. *Mol Psychiatry* 2011;16:729–37. [PubMed: 20479762]
59. Wiley JF, Bei B, Bower JE, Stanton AL. Relationship of psychosocial resources with allostatic load: A systematic review. *Psychosom Med* 2017;79:283–92. [PubMed: 27768647]

60. Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: A meta-analytic review. *PLoS Med* 2010;7:e1000316. [PubMed: 20668659]
61. Barth J, Schneider S, von Känel R. Lack of social support in the etiology and the prognosis of coronary heart disease: A systematic review and meta-analysis. *Psychosom Med* 2010;72:229–38. [PubMed: 20223926]
62. Shor E, Roelfs DJ, Yogev T. The strength of family ties: A meta-analysis and meta-regression of self-reported social support and mortality. *Soc Networks* 2013;35:626–38.
63. Isasi CR, Parrinello CM, Ayala GX, Delamater AM, Perreira KM, Daviglus ML, Elder JP, Marchante AN, Bangdiwala SI, Van Horn L, Carnethon MR. Sex differences in cardiometabolic risk factors among Hispanic/Latino youth. *J Pediatr* 2016;176: 121–7. [PubMed: 27344220]
64. Parrinello CM, Rudolph BJ, Lazo M, Gallo LC, Thyagarajan B, Cotler SJ, Qi Q, Seeherunvong T, Vidot DC, Strickler HD, Kaplan RC, Isasi CR. Associations of insulin resistance and glycemia with liver enzymes in Hispanic/Latino Youth: Results from the Hispanic Community Children's Health Study/Study of Latino Youth (SOL Youth) 2017 (Epub) ahead of print; doi: 10.1097/MCG.0000000000000946.
65. Hales CM, Fryar CD, Carroll MD, Freedman DS, Ogden CL. Trends in obesity and severe obesity prevalence in us youth and adults by sex and age, 2007–2008 to 2015–2016. *JAMA* 2018;319:1723–5. [PubMed: 29570750]
66. Menke A, Casagrande S, Cowie CC. Prevalence of diabetes in adolescents Aged 12 to 19 Years in the United States, 2005–2014. *JAMA* 2016;316:344–5. [PubMed: 27434447]
67. Monnat SM. The new destination disadvantage: Disparities in Hispanic health insurance coverage rates in metropolitan and nonmetropolitan new and established destinations. *Rural Sociol* 2017;82:3–43. [PubMed: 28479612]
68. Chen E, Miller GE. “Shift-and-Persist” Strategies: Why low socioeconomic status isn't always bad for health. *Perspect Psychol Sci* 2012;7:135–58.
69. Gallo LC, Penedo FJ, Espinosa de los Monteros K, Arguelles W, Espinosa de Los Monteros K, Gallo LC, Elder JP, Talavera GA. Resiliency in the face of disadvantage: Do Hispanic cultural characteristics protect health outcomes? *J Pers* 2009;77:1707–46. [PubMed: 19796063]
70. Gallo LC, Matthews KA. Understanding the association between socioeconomic status and physical health: do negative emotions play a role? *Psychol Bull* 2003;129:10–51. [PubMed: 12555793]
71. Myers HF. Ethnicity- and socio-economic status-related stresses in context: An integrative conceptual model. *J Behav Med* 2009;32:9–19. [PubMed: 18989769]
72. Juster R-P, McEwen BS, Lupien SJ. Allostatic load biomarkers of chronic stress and impact on health and cognition. *Neuroscience & Biobehavioral Reviews* 2010;35:2–16. [PubMed: 19822172]
73. Gersten O. Neuroendocrine biomarkers, social relations, and the cumulative costs of stress in Taiwan. *Soc Sci Med* 2008;66:507–19. [PubMed: 18022742]
74. Wiley JF, Gruenewald TL, Karlamangla AS, Seeman TE. Modeling multisystem physiological dysregulation. *Psychosom Med* 2016;78:290–301. [PubMed: 26734956]
75. Lloyd-Jones DM, Hong Y, Labarthe D, Mozaffarian D, Appel LJ, Van Horn L, Greenlund K, Daniels S, Nichol G, Tomaselli GF, Arnett DK, Fonarow GC, Ho PM, Lauer MS, Masoudi FA, Robertson RM, Roger V, Schwamm LH, Sorlie P, Yancy CW, Rosamond WD. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. *Circulation* 2010;121:586–613. [PubMed: 20089546]
76. Suglia S, Koenen K, Boynton-Jarrett R, Chan P, Clark C, Danese A, Faith M, Goldstein B, Hayman L, Isasi C, Pratt C, Slopen N, Sumner J, Turer A, Turer C, Zachariah J. Childhood and adolescent adversity and cardiometabolic outcomes: A Scientific statement from the American Heart Association. *Circulation* 2018; 137:e15–e28. [PubMed: 29254928]
77. Cohen S, Janicki-Deverts D, Chen E, Matthews KA. Childhood socioeconomic status and adult health. *Ann N Y Acad Sci* 2010;1186:37–55. [PubMed: 20201867]
78. Shonkoff JP, Boyce WT, McEwen BS. Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *JAMA* 2009;301:2252–9. [PubMed: 19491187]

Table 1.

Descriptive statistics and 75 percentile cut-point values for individual biomarkers and the multi-system allostatic load index.

System and representative biomarkers	N ^a	Unweighted M (SD)	Weighted M (SE) ^b	75% Cut-point
General metabolic function				
BMI (kg/m ²)	1343	22.2 (5.8)	22.3 (0.2)	25.14
Waist circumference (cm)	1343	77.4 (15.0)	77.1 (0.5)	85.7
Cardiovascular function				
SBP (mmHg)	1343	103.7(10.1)	104.5 (0.4)	110.5
DBP (mmHg)	1343	59.7 (7.7)	60.1 (0.3)	64.5
Resting Pulse (bpm)	1343	73.6 (10.9)	73.1 (0.5)	80.50
Glucose metabolism				
HbA1c (%)	1339	5.2 (0.3)	5.3 (0.0)	5.5
Fasting glucose (mg/dL)	1343	91.9 (6.8)	91.6 (0.3)	97.0
HOMA-IR (pmol/L)	1338	3.4 (2.4)	3.3 (0.1)	4.3
Lipids				
HDL-C (mg/dL)	1343	51.7 (10.9)	52.0 (0.4)	59.0
LDL-C (mg/dL)	1341	86.6 (23.1)	86.3 (0.9)	101.0
Triglycerides (mg/dL)	1343	78.0 (43.8)	78.3 (1.8)	95.0
Inflammation and hemostatic function				
hs_CRP (mg/L)	1343	1.2 (2.6)	1.2 (0.1)	1.1
E-Selectin (ng/dL)	1343	50.8 (21.5)	50.0 (0.8)	64.5
PAI-1 (ng/dL)	1341	2.9 (3.0)	2.8 (0.1)	3.59
Allostatic load composite (range = 0–5)	1343	1.2 (1.0)	1.2 (0.0)	

Note. BMI = Body Mass Index; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; HbA1c = Glycosylated Hemoglobin A1c; HDL-C = High-Density Lipoprotein; HOMA-IR = Homeostatic Model Assessment of Insulin Resistance; LDL-C = Low-Density Lipoprotein; hs_CRP = High-Sensitivity C-reactive Protein; PAI-1 = Plasminogen Activator Inhibitor type 1.

^aTotal sample sizes vary slightly across variables due to missing data. Only valid percentages are reported.

^bWeighted data use sampling weights from SOL Youth to account for differential selection probabilities and non-response.

Table 2.

Sample characteristics for youth (N = 1343) and caregiver participants (N=960)

Characteristic	N ^a	Sample %	Weighted % (95% CI) ^b
Sex (<i>N</i> = 1343)			
Female	679	50.6	48.9 (45.5–52.4)
Male	664	49.4	51.1 (47.6–54.5)
Age (<i>N</i> = 1343)			
Children, ages 8–11 years	605	45.0	42.6 (39.3–45.8)
Adolescents, ages 12–16 years	738	55.0	57.4 (54.2–60.7)
Hispanic/Latino Heritage (<i>N</i> =1273)			
Central American	99	7.8	6.1 (4.6–8.0)
Cuban	95	7.5	5.4 (4.0–7.2)
Dominican	155	12.2	13.5 (10.7–16.8)
Mexican	601	47.2	49.5 (44.5–54.5)
Puerto Rican	121	9.5	10.3 (8.0–13.3)
South American	61	4.8	4.0 (2.9–5.6)
More than one/other	141	11.1	11.2 (9.0–13.8)
Nativity/immigration status (<i>N</i> =1331)			
Not born in the U.S. mainland	302	22.7	22.1 (18.9–25.6)
Born in the U.S. mainland	1029	77.3	77.9 (74.4–81.1)
Language of interview (<i>N</i> = 1339)			
Spanish	264	19.7	21.0 (17.4–25.3)
English	1075	80.3	79.0 (74.7–82.6)
Field center (<i>N</i> = 1343)			
Bronx, NY	396	29.5	36.6 (32.3–41.2)
Chicago, IL	325	24.2	15.2 (12.6–18.1)
Miami, FL	239	17.8	13.3 (10.6–16.6)
San Diego, CA	383	28.5	34.9 (29.9–40.2)
Youth with siblings in the study (N=1343)			
0 siblings enrolled	660	49.1	47.0 (42.4–51.7)
1 siblings enrolled	450	33.5	35.0 (30.6–39.7)
2 or more siblings enrolled	233	17.3	18.0 (13.9–22.9)
Health insurance status (<i>N</i> = 1329)			
Not covered by health insurance	126	9.5	9.8 (7.7–12.3)
Covered by health insurance	1203	90.5	90.2 (87.7–92.3)
Household Yearly Income (<i>N</i> = 944) ^c			
<\$30,000	673	71.3	70.1 (65.8–74.1)
≥\$30,000	271	28.7	29.9 (25.9–34.2)
Caregiver education (<i>N</i> = 959) ^c			
< HS diploma or GED	358	37.3	36.6 (32.8–40.6)
HS diploma or GED	268	27.9	29.1 (25.4–33.1)

Characteristic	N ^a	Sample %	Weighted % (95% CI) ^b
> HS diploma or GED	333	34.7	34.4 (30.5–38.4)

Note. HS = High School; GED = General Education Development test.

^aTotal sample sizes vary slightly across variables due to missing data. Only valid percentages are reported.

^bWeighted data use sampling weights from SOL Youth to account for differential selection probabilities and non-response.

^cReported by enrolled caregivers

Table 3.

Results of multi-variable analyses regressing allostatic load composite on covariates and socioeconomic adversity and social resources (tested in separate models).

	B	95% CI
Covariates - R ² for step =.011		
Age (0 = <12 years, 1 = ≥12)	-0.033	-0.181 to 0.116
Sex (0=girl, 1=boy)	0.162 *	0.017 to 0.308
Nativity (0 = not US born, 1 = born on US mainland)	-0.154	-0.338 to 0.030
Youth Hispanic/Latino Background (0 = other, 1 = Mexican)	0.021	-0.288 to 0.330
Parent Hispanic/Latino Background (0 = other, 1 = Mexican)	-0.920	-0.355 to 0.171
Number of enrolled youth in the family	-0.029	-0.129 to 0.071
Site (3 dummy-coded variables)		
Bronx (code=0), Chicago (code=1)	0.061	-0.212 to 0.334
Bronx (code=0), Miami (code=1)	0.025	-0.235 to 0.286
Bronx (code=0), San Diego (code=1)	-0.005	-0.357 to 0.346
Main Effects		
Socioeconomic Adversity Composite - R ² for step = .01	0.060 *	0.004 to 0.116
Social Resources Composite - R ² for step =.011	-0.040	-0.108 to 0.025

Table Notes. Coding for dichotomous variables is presented in parentheses. Main effects of socioeconomic adversity and social resources composites tested in separate models, following control for all covariates listed at Step 1.

*
<.05