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

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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

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between socioeconomic adversity and allostatic load (β=.10, $p = .035$) and a significant, inverse association between socioeconomic adversity and social resources (β=−.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 ($\alpha_{English}$= .78; $\alpha_{Spanish}$ = .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) ($\alpha_{English}$=.71; $\alpha_{Spanish}$ = .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 ($\alpha_{English}$= .78, $\alpha_{Spanish}$= .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; $\alpha_{English}$= .79, $\alpha_{Spanish}$= .84; responsiveness; $\alpha_{English}$= .73, $\alpha_{Spanish}$= .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" responsivemess); 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; β=.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; β =−.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; β=−.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;β=−.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.

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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

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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.

[a]Total sample sizes vary slightly across variables due to missing data. Only valid percentages are reported.

[b]Weighted 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 (*N* = 1343)			
Female	679	50.6	48.9 (45.5–52.4)
Male	664	49.4	51.1 (47.6–54.5)
Age (*N* = 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 (*N* =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 (*N* =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 (*N* = 1339)			
Spanish	264	19.7	21.0 (17.4–25.3)
English	1075	80.3	79.0 (74.7–82.6)
Field center (*N* = 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 (*N* = 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 (*N* = 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 (*N* = 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.

[a]Total sample sizes vary slightly across variables due to missing data. Only valid percentages are reported.

[b]Weighted data use sampling weights from SOL Youth to account for differential selection probabilities and non-response.

[c]Reported 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