

Psychological Science

<http://pss.sagepub.com/>

Is Resilience Only Skin Deep?: Rural African Americans' Socioeconomic Status–Related Risk and Competence in Preadolescence and Psychological Adjustment and Allostatic Load at Age 19

Gene H. Brody, Tianyi Yu, Edith Chen, Gregory E. Miller, Steven M. Kogan and Steven R. H. Beach

Psychological Science 2013 24: 1285 originally published online 30 May 2013

DOI: 10.1177/0956797612471954

The online version of this article can be found at:

<http://pss.sagepub.com/content/24/7/1285>

Published by:



<http://www.sagepublications.com>

On behalf of:



[Association for Psychological Science](http://www.sagepublications.com)

Additional services and information for *Psychological Science* can be found at:

Email Alerts: <http://pss.sagepub.com/cgi/alerts>

Subscriptions: <http://pss.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

>> [Version of Record](#) - Jul 12, 2013

[OnlineFirst Version of Record](#) - May 30, 2013

[What is This?](#)

Is Resilience Only Skin Deep? Rural African Americans' Socioeconomic Status–Related Risk and Competence in Preadolescence and Psychological Adjustment and Allostatic Load at Age 19

Psychological Science
24(7) 1285–1293
© The Author(s) 2013
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/0956797612471954
pss.sagepub.com


Gene H. Brody¹, Tianyi Yu¹, Edith Chen², Gregory E. Miller²,
Steven M. Kogan³, and Steven R. H. Beach⁴

¹Center for Family Research, University of Georgia; ²Department of Psychology, Northwestern University;
³Department of Human Development and Family Science, University of Georgia; and ⁴Institute for
Behavioral Research, University of Georgia

Abstract

Many African American youth may develop high levels of allostatic load, a measure of physiological wear and tear on the body, by developing psychosocial competence under conditions of high risk related to socioeconomic status (SES). The current study was designed to test this hypothesis, which is based on John Henryism theory. In a representative sample of 489 African American youth living in the rural South, cumulative SES-related risks and teacher-reported competence were assessed at ages 11 to 13; depressive symptoms, externalizing behavior, and allostatic load were assessed at age 19. The data revealed that rural African American preadolescents who evinced high psychosocial competence under conditions of high cumulative SES-related risk displayed low levels of adjustment problems along with high allostatic load at age 19. These results suggest that, for many rural African Americans, resilience may indeed be only “skin deep.”

Keywords

adolescent development, environmental effects, health, neuroendocrinology, socioeconomic status

Received 9/25/12; Revision accepted 11/28/12

In the Black Belt that stretches across rural South Carolina, Georgia, Alabama, Mississippi, and Louisiana, poverty rates are nearly 20% (Proctor & Dalaker, 2003). The socioeconomic risk factors that characterize this region have considerable consequences for the development of rural African American children, adolescents, and young adults. These risk factors include chronic, endemic poverty and limitations in occupational and educational opportunities, frequent housing adjustments in response to economic pressures, changes in employment status, interpersonal and institutional racism, difficulty in accessing pediatric and adolescent medical care, and marginalization by health-care professionals (Dressler, Oths, & Gravlee, 2005). Nevertheless, a remarkable number of African American children and adolescents in the rural

South evince high levels of planful self-regulation, academic achievement, and psychological adjustment despite a lifetime of exposure to such challenges (Brody, Kogan, & Grange, 2012). These children have been called *resilient* because their competence develops in the face of contextual adversity, enabling them to “beat the odds” with which their environments present them.

The resilience literature is characterized by a widespread assumption that if children and youth who face major adversities are doing well as indexed by external

Corresponding Author:

Gene H. Brody, University of Georgia, Center for Family Research,
1095 College Station Rd., Athens, GA 30602-4527
E-mail: gbrody@uga.edu

behaviors—for example, if they excel academically and evince high levels of self-esteem—they have successfully negotiated those adversities. An intriguing hypothesis, however, is that these types of external successes take an internal, physiological toll, particularly on rural African Americans. Thus, there may be a cost in maintaining high levels of self-regulation and psychosocial competence in the presence of the myriad risks associated with low socioeconomic status (SES). Low-SES youth whose external behaviors appear to reflect resilience may be incurring outwardly undetectable wear and tear on their bodies that renders them vulnerable to negative physiological health outcomes over the long term. For rural African American youth, conceptions of resilience may have to go beyond overt behavioral indicators to include manifestations of physiological well-being. The purpose of the study reported here, then, was to test the hypothesis that African American preadolescents whose teachers rate them as self-controlled, academically competent, and socially competent and who live with high levels of SES-related risk will, at age 19, (a) report low levels of depressive symptoms and externalizing behaviors, but (b) manifest high levels of biological indicators of physiological stress. In the following paragraphs, we use constructs from allostasis theory and John Henryism (JH) theory to explain this hypothesis.

The myriad stressors that African American youth of low SES encounter elicit changes in multiple bodily systems. As the concept of allostasis emphasizes, the body achieves stability during stress through changes in multiple, interconnected systems. When these systems are repeatedly perturbed by stress, a biological toll, with potential implications for long-term health status, may be exacted. Some researchers refer to this presumptive toll as allostatic load (AL). Often, AL is operationalized as a composite reflecting various mediators and outcomes of the stress response, including the sympathetic adrenomedullary system, the hypothalamic-pituitary-adrenal axis, lipid metabolism, fat deposition, indices of inflammation, and immune functioning (McEwen, 2000; Seeman, McEwen, Rowe, & Singer, 2001). Only recently has a connection between exposure to SES-related stress and the development of AL been established among African American youth (Brody, Yu, et al., 2013), despite the pivotal role that AL is conjectured to play in the development of chronic diseases and health disparities (see Shonkoff, Boyce, & McEwen, 2009). We hypothesized that growing up with SES-related risk during preadolescence would forecast higher AL levels at age 19 years among participants who exhibited higher competence.

This hypothesis was also informed by JH theory (James, 1994). JH is a high-effort coping style characterized by a determination to succeed by working hard even

in the face of overwhelming stressors (James, 1994). The JH construct takes its name from the legend of John Henry, the “steel-driving man.” According to the story (Williams, 1983), John Henry was an African American railroad worker in the late 1800s who participated in a steel-driving contest in which he defeated a steam-powered drill. John Henry was forced to harness his great strength to overpower the mechanical drill but afterward died of exhaustion. For James, the fabled actions of John Henry illuminated associations among high-effort coping, chronic nervous system arousal, and health problems such as hypertension. The JH construct comprises three main characteristics: efficacious mental and physical vigor, a strong commitment to hard work, and a single-minded determination to succeed. Although no studies involving adolescents have been conducted, low-SES adults who have high levels of JH show higher blood pressure, greater total peripheral resistance, and increased risk of hypertension compared with low-SES adults who have low levels of JH (James, Keenan, Strogatz, Browning, & Garrett, 1992; James, Strogatz, Wing, & Ramsey, 1987). Thus, JH theory can be used to predict that African American youth who show high levels of effort and determination in the form of planful self-control, academic competence, and social competence while growing up with high levels of SES-related risk will manifest high levels of AL.

With respect to mental-health outcomes, James (1994) speculated that the mental-vigor component of JH protects against depression. Stress-coping research also suggests that persons who deal with challenges through problem-focused coping and who believe they will succeed through persistent effort are less likely to become depressed and more likely to refrain from antisocial behaviors and substance use, compared with their peers who resort to avoidant or emotion-focused coping styles (Bandura, 2002). Applying these ideas to the current study, we hypothesized that African American preadolescents who have high levels of the hard-work, problem-focused coping, and success elements of JH, such as planful self-regulation and academic competence, and who grow up with high SES-related risk would at age 19 exhibit good mental health, as evinced by low levels of depression and behavioral problems.

We investigated the hypothesized SES-Related Risk \times Competence interactions in a representative sample of 489 rural African American youth. Data on SES-related risk and teachers' ratings of planful self-regulation, academic competence, and social competence were gathered during preadolescence, when the youth were 11 to 13 years of age. Depressive symptoms, externalizing behaviors, and AL were assessed at the beginning of young adulthood, at age 19.

Method

Participants

The sample for this study was taken from a larger sample of African American target youth and their primary caregivers, who participated in annual data collections; the mean age of the target youth was 11.2 years at the first assessment and 19.2 years at the last assessment. The families resided in nine rural counties in Georgia, in small towns and communities where poverty rates are among the highest in the nation and unemployment rates are above the national average (Proctor & Dalaker, 2003). Of the youth in the sample, 53% were female and 47% were male. Although the primary caregivers in the sample worked an average of 39.4 hr per week at the first assessment, 46.3% lived below federal poverty standards; at the last assessment, 49.1% did. At the age-11 data collection, 78% of the caregivers had completed high school or earned a general equivalency diploma. The median family income per month was \$1,655 at the age-11 data collection and \$1,169 at the age-19 data collection. The decrease in family income and increase in the percentage of families living in poverty over time were due to the economic recession that was occurring in 2010, when the last wave of data was collected. Overall, the families can be characterized as working poor.

At the first assessment, 667 families were selected randomly from lists of fifth-grade students that schools provided (see Brody et al., 2004, for a full description). From a sample of 561 at the age-18 data collection (a retention rate of 84%), 500 youth were selected randomly to participate in assessments of AL and other variables at age 19. Of this subsample, 489 agreed to participate; they constituted the sample in the present study. Analyses indicated that the sample providing data at age 19 was comparable to the larger sample who provided data at ages 11 through 13 on indicators of SES-related risk and self-control/competence.

Procedure

All data were collected in participants' homes using a standardized protocol. One home visit that lasted approximately 2 hr took place at each wave of data collection. Two African American field researchers worked separately with the primary caregiver and target youth in each family. Interviews were conducted privately, with no other family members present or able to overhear the conversation. Written informed consent was obtained at each wave. Primary caregivers consented to their own and minor youths' participation in the study, and minor youth assented to their own participation. Upon reaching 18 years of age, youth consented to their own participation.

Measures

Preadolescent SES-related risk and self-control/competence. Preadolescent data were collected at three waves, when the target youth were 11, 12, and 13 years of age. Numerous studies of both physical morbidity and psychological dysfunction support the basic tenet of SES-related risk. Six standard risk indicators were assessed, with each risk factor scored dichotomously (0 if absent, 1 if present; see Evans, 2003; Kim & Brody, 2005; Rutter, 1993). The indicators were current family poverty according to U.S. government criteria, primary caregiver's non-completion of high school or an equivalent, current unemployment of the primary caregiver, single-parent family structure, current family receipt of Temporary Assistance for Needy Families, and income rated by the primary caregiver as currently inadequate to meet all needs. SES-related risk was defined as the average of the summed risk factors across the three preadolescent assessments. The resulting index ranged from 0 to 6 ($M = 2.29$, $SD = 1.34$).

One of each target youth's teachers assessed the youth's self-control and competence at each of the three waves of preadolescent data collection. Self-control was assessed using the 12-item Self-Control Inventory (Humphrey, 1982). Each item was rated on a Likert scale ranging from 0 (*never*) to 4 (*almost always*). Example items include, "sticks to what he/she is doing even during long, unpleasant tasks until finished," "works toward a goal," and "pays attention to what he/she is doing." Alphas across waves ranged from .94 to .95. Self-control was operationalized as the average of the teachers' ratings across the three preadolescent assessments. The teachers also completed a revised version of the Perceived Competence Scale (Harter, 1982), which measures scholastic and social competence. The scale consists of 14 items rated on a Likert scale ranging from 1 (*not at all*) to 4 (*always*). Example items include, "very good at his/her school work," "just as smart as other kids his/her age," and "has a lot of friends." Alphas across the three waves ranged from .86 to .88. Competence was operationalized as the average of the teachers' ratings across the three preadolescent assessments. The self-control and competence measures were highly correlated ($p < .001$); they were standardized and then summed to form the self-control/competence score.

Depressive symptoms and externalizing behavior in young adulthood. At age 19, the youth reported their own depressive symptoms, externalizing behavior, and substance use. Self-reports of depressive symptoms were obtained using the Center for Epidemiologic Studies–Depression scale (Radloff, 1977), which is widely used with community samples. The youth rated each of

20 symptoms on the following scale: 0 (*rarely or none of the time*), 1 (*some or little of the time*), 2 (*occasionally or a moderate amount of time*), or 3 (*most or all of the time*). Responses to these items were summed. Alpha was .86. Externalizing symptoms were measured using the Adult Self-Report (Achenbach & Rescorla, 2003). The Aggressive, Intrusive, and Rule Breaking subscales were used to index externalizing symptoms; alpha for the 36 items on these subscales was .92. The youth also reported their past-month cigarette, alcohol, and marijuana use and their excessive drinking on a widely used instrument from the Monitoring the Future Study (Johnston, O'Malley, Bachman, & Schulenberg, 2007). Responses to these four items were summed to form a substance-use composite, a procedure that is consistent with prior research (Brody & Ge, 2001; Newcomb & Bentler, 1988). The measures of externalizing symptoms and substance use were highly correlated ($p < .001$); they were standardized and then summed to form the externalizing-problems score.

AL in young adulthood. The protocol for measuring AL when the youth were 19 years of age was based on procedures that Evans (2003) developed for field studies involving children and adolescents. Resting blood pressure was monitored with a Critikon (Tampa, FL) Dinamap Pro 100 while the youth sat reading quietly. Three readings were taken every 2 min, and the average of the last two readings was used as the resting index. This procedure yields highly reliable indices of chronic resting blood pressure (Kamarck et al., 1992).

Overnight urinary catecholamines and cortisol were assayed. Beginning on the evening of data collection, all urine that the young adult voided from 8:00 p.m. to 8:00 a.m. was stored on ice in a container with metabisulfite as a preservative. Urine was delivered to the Emory University Hospital medical laboratory in Atlanta, Georgia, for assaying. Total unbound cortisol was assayed with a radioimmunoassay (Contreras, Hane, & Tyrrell, 1986). Epinephrine and norepinephrine were assayed with high-pressure liquid chromatography with electrochemical detection (Riggin & Kissinger, 1977). Creatinine was assayed to control for differences in body size and incomplete urine voiding (Tietz, 1976). Technicians blind to the participants' SES-related risk status assayed the samples.

AL was calculated by summing the number of physiological indicators on which each young adult scored in the top quartile of risk; possible scores ranged from 0 to 6. The AL indicators were overnight cortisol, epinephrine, and norepinephrine; resting diastolic and systolic blood pressure; and body mass index (weight in kilograms divided by the square of height in meters).

Health problems in young adulthood. The youth reported their health problems at age 19 using the General Health Perceptions subscale from the RAND 36-Item

Short-Form Health Survey (Hays, Sherbourne, & Mazel, 1993). This five-item subscale includes a single-item rating of overall health (from 1, *excellent*, to 5, *poor*) and four items assessing current health status on a scale from 1 (*definitely false*) to 5 (*definitely true*). Examples of these latter items are "I am as healthy as anybody I know" and "I seem to get sick a little easier than other people." Some of the items were reverse-scored, so that higher scores indicated more health problems and poorer general health. According to the instructions that Hays et al. (1993) provided for the scoring of this instrument, the responses are to be coded so that the lowest possible score is 0 and the highest possible score is 100. Therefore, after reverse-scoring, a response of 1 was assigned a value of 0, 2 was assigned a value of 25, 3 was assigned a value of 50, 4 was assigned a value of 75, and 5 was assigned a value of 100. After these values were assigned, responses to all items were averaged to yield a health-problems score, which could range from 0 to 100 ($\alpha = .72$).

Results

Preliminary analyses

Table 1 presents descriptive statistics for the sample, along with bivariate correlations. The bivariate correlations support our hypothesis and the inclusion of gender and health problems as controls in the data analyses. Teachers reported that male youth evinced lower levels of self-control/competence than did female youth across preadolescence. At age 19, young men reported lower levels of depressive symptoms and higher levels of externalizing behavior than did young women. SES-related risk assessed across preadolescence was associated positively with AL at age 19, and higher teacher ratings of preadolescent self-control/competence forecast lower levels of self-reported depressive symptoms and externalizing behavior at age 19.

Hypothesis testing

To test our hypothesis, we constructed regression equations in which depressive symptoms, externalizing problems, and AL in young adulthood were predicted from successive blocks of variables: gender and health problems as controls, SES-related risk and self-control/competence, and a product term representing the latter two variables.

The results of the analyses for depressive symptoms and externalizing problems are presented in Table 2. Both analyses revealed that teacher-rated preadolescent self-control/competence robustly predicted self-reported outcomes in young adulthood. These main effects were qualified by the SES-Related Risk \times Self-Control/

Table 1. Descriptive Statistics and Correlations Among Study Variables (*N* = 489)

Variable	Mean (<i>SD</i>)	Correlations					
		1	2	3	4	5	6
1. Gender (male = 1, female = 0)	0.458 (0.499)	—					
2. SES-related risk (ages 11–13)	2.294 (1.339)	-.003	—				
3. Self-control/competence (ages 11–13)	0.087 (4.049)	-.289***	-.229***	—			
4. Allostatic load (age 19)	1.495 (1.255)	.069	.147**	-.044	—		
5. Externalizing problems (age 19)	-0.001 (1.589)	.112*	.023	-.251***	.000	—	
6. Depressive symptoms (age 19)	13.065 (8.920)	-.093*	.069	-.213***	-.040	.449***	—
7. Health problems (age 19)	24.908 (17.478)	-.222***	.151**	-.181***	.040	.261***	.389***

Note: SES = socioeconomic status.
p* < .05. *p* < .01. ****p* < .001.

Competence interaction—depressive symptoms: $\Delta F(1, 483) = 4.271, p < .04, \Delta R^2 = .007$; externalizing problems: $\Delta F(1, 483) = 4.762, p < .03, \Delta R^2 = .009$.

To interpret these results, we plotted estimated levels of depressive symptoms and externalizing problems at low (1 *SD* below the mean) and high (1 *SD* above the mean) levels of preadolescent SES-related risk and self-control/competence (Aiken & West, 1991). Figures 1a and 1b show that the interactions were consistent with the hypothesis. When youth lived with low levels of SES-related risk, teacher-rated preadolescent self-control/

competence was not associated with depressive symptoms (simple slope = -0.194, *SE* = 0.136, n.s.) or externalizing problems (simple slope = -0.034, *SE* = 0.025, n.s.) during early adulthood. These associations became progressively stronger as the level of SES-related risk to which youth were exposed increased and ultimately reached significance (at 1 *SD* above the mean SES-related risk, simple slope = -0.580, *SE* = 0.138, *p* < .001, for depression and simple slope = -0.109, *SE* = 0.025, *p* < .001, for externalizing problems). Self-reports of depressive symptoms and externalizing problems were

Table 2. SES-Related Risk and Self-Control/Competence in Preadolescence as Predictors of Depressive Symptoms, Externalizing Problems, and Allostatic Load at Age 19 (*N* = 489)

Predictor	Outcome											
	Depressive symptoms				Externalizing problems				Allostatic load			
	<i>b</i>	<i>SE</i>	β	<i>R</i> ²	<i>b</i>	<i>SE</i>	β	<i>R</i> ²	<i>b</i>	<i>SE</i>	β	<i>R</i> ²
Gender (male = 1, female = 0)	-1.169	0.804	-0.065		0.381	0.147	0.120*		0.209	0.122	0.083	
Health problems	0.175	0.022	0.343***	.151	0.024	0.004	0.260***	.099	0.003	0.003	0.046	.008
SES-related risk	-0.190	0.284	-0.028	.151	-0.076	0.052	-0.064	.099	0.143	0.043	0.153**	.028
Self-control/competence	-0.387	0.100	-0.176***	.176	-0.072	0.018	-0.183***	.127	0.007	0.015	0.023	.028
SES-Related Risk × Self-Control/Competence	-0.144	0.070	-0.085*	.183	-0.028	0.013	-0.093*	.135	0.029	0.011	0.122**	.043

Note: SES = socioeconomic status.
p* < .05. *p* < .01. ****p* < .001.

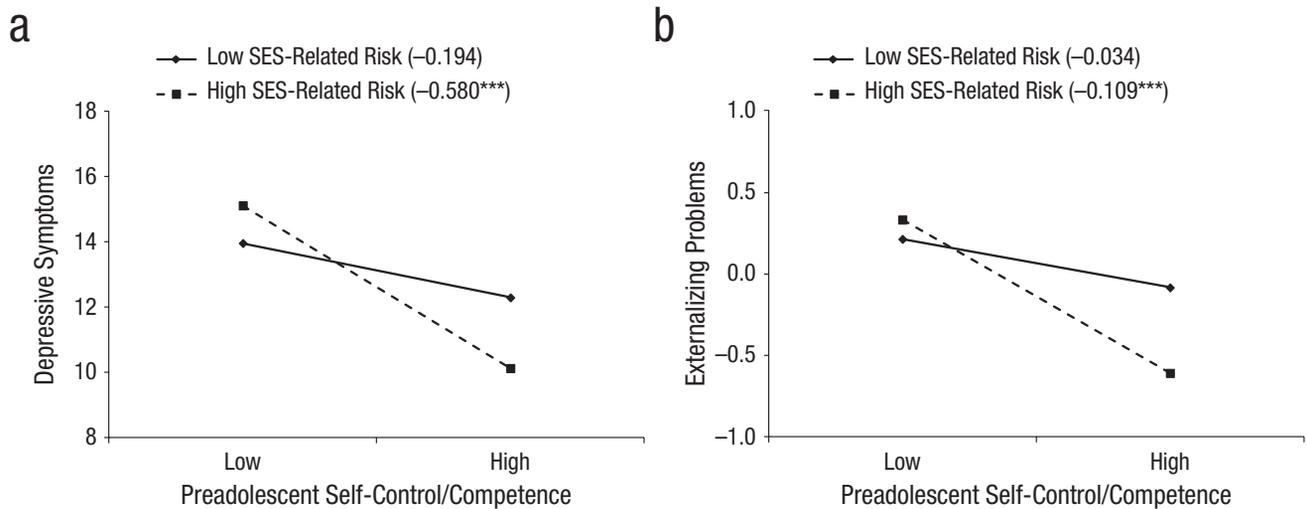


Fig. 1. Young adults' (a) depressive symptoms and (b) externalizing problems as a function of their socioeconomic status (SES)-related risk and self-control/competence in preadolescence (low = 1 *SD* below the mean; high = 1 *SD* above the mean). The lines represent the results of regression analyses at low and high levels of SES-related risk, and the numbers in parentheses refer to the simple slopes (***) $p < .001$.

highest among young adults who, during preadolescence, had received low ratings on self-control/competence from their teachers and had also experienced high levels of SES-related risk. Self-reports of these two outcomes were lowest among young adults who, as preadolescents, had experienced high levels of SES-related risk but had received high ratings on self-control/competence from their teachers. Thus, young adults who, during preadolescence, had manifested age-appropriate indicators of hard work and success while experiencing high levels of SES-related risk reported the lowest levels of internalizing and externalizing behaviors. JH theory suggests that a single-minded focus on success protected these youth from psychological adjustment problems.

The results of the analysis for AL are presented in Table 2. A main effect emerged for SES-related risk: High levels of risk during preadolescence forecast high AL at age 19. This main effect was qualified by the SES-Related Risk \times Self-Control/Competence interaction, $\Delta F(1, 483) = 7.455, p < .01, \Delta R^2 = .015$. To interpret this finding, we plotted estimated levels of AL at low (1 *SD* below the mean) and high (1 *SD* above the mean) levels of SES-related risk and self-control/competence (Aiken & West, 1991); the results are presented in Figure 2. Teacher-rated self-control/competence during preadolescence was not associated with AL when youth had lived with low levels of SES-related risk (simple slope = $-0.032, SE = 0.021, n.s.$). In contrast, youth who had experienced high levels of SES-related risk had higher AL as young adults if their self-control/competence in preadolescence had been higher (simple slope = $0.046, SE = 0.021, p < .03$). As predicted in our hypothesis, the highest level of AL

emerged among young adults who, during preadolescence, had received high teacher ratings on self-control/competence and had also experienced high levels of SES-related risk. The success-oriented, highly active coping style these youth employed in the presence of high risk was associated with cumulative wear and tear on their bodies that was detected during young adulthood.

A comparison of Figures 1a, 1b, and 2 reveals a distinct pattern of psychological adjustment and physiological outcomes for this sample of young adults. Highly

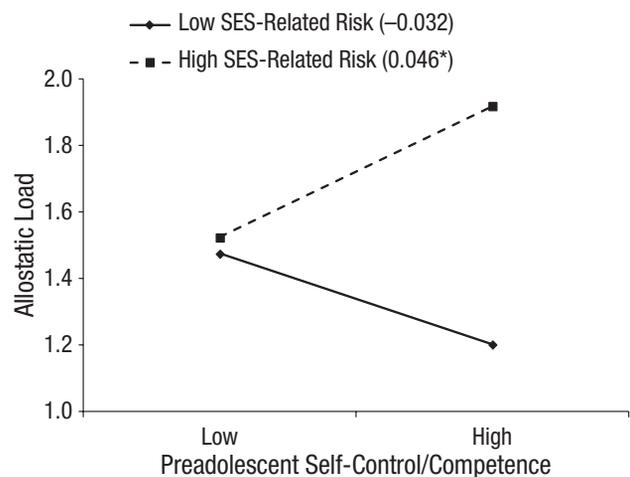


Fig. 2. Young adults' allostatic load as a function of socioeconomic status (SES)-related risk and self-control/competence in preadolescence (low = 1 *SD* below the mean; high = 1 *SD* above the mean). The lines represent the results of regression analyses at low and high levels of SES-related risk, and the numbers in parentheses refer to the simple slopes (* $p < .05$).

self-controlled/competent youth living with high levels of SES-related risk in preadolescence subsequently manifested both low levels of adjustment problems and particularly high levels of physiological stress during young adulthood.

Discussion

In this study, we found that rural African American preadolescents who evinced high levels of self-control/competence under conditions of high SES-related risk displayed low levels of adjustment problems but high levels of physiological risk (high AL) during young adulthood, at age 19. These findings are consistent with a counterintuitive pattern of mental- and physical-health outcomes that JH theory suggests. According to this theory, many rural African Americans should resemble the legendary folk hero John Henry: While growing up in a high-risk context, they are expected to be highly goal oriented and hardworking, to focus persistently on success, and to avoid unconventional behavior, but eventually to manifest indicators of physiological stress. Our findings are consistent with propositions that poor health and health disparities during adulthood are tied to earlier experiences; they also reinforce the importance of obtaining data on both overt behavioral adjustment and covert physiological distress (Shonkoff et al., 2009).

This study also has heuristic value for furthering the understanding of a remarkably similar, counterintuitive set of findings in the health-disparities literature. This literature indicates that African American adults experience greater physical morbidity and mortality than do adults of other ethnicities. For example, African American adults are twice as likely as are European Americans to die from heart disease, cancer, and diabetes (Lantz et al., 2001; Mensah, Mokdad, Ford, Greenlund, & Croft, 2005). Conversely, in epidemiological surveys, African Americans consistently report lifetime rates of mental disorders that are no higher than the rates reported by European Americans, even with exposure to SES-related risk controlled (Breslau, Kendler, Su, Aguilar-Gaxiola, & Kessler, 2005; Kendler, Kuhn, Vittum, Prescott, & Riley, 2005; Riolo, Nguyen, Greden, & King, 2005). In the present study, we found a parallel discrepancy between participants' psychological adjustment and health, as indexed by AL. This suggests that resilience is multidimensional; hidden indicators of compromised physiological health, such as high AL, may accompany observable competence and positive adjustment. In such cases, resilience may indeed be only "skin deep."

We applied JH theory to derive a hypothesis about rural African American youth. An obvious question is whether the same pattern would be found for a broader

cross section of disadvantaged youth, including urban African Americans or Latinos. We suggest that JH theory and the hypotheses it generates would be applicable to youth from other racial and ethnic groups who have the determination to succeed academically while grappling with chronic economic stressors, limitations in occupational and educational opportunities, and interpersonal and institutional racism.

A premise of this study was that when low-SES, rural African Americans make active efforts to beat the odds, a toll may be exacted on their bodily systems. For example, low-SES adults who use active coping to deal with stressors that are largely uncontrollable have higher blood pressure, greater total peripheral resistance, and greater risk of hypertension than do low-SES adults who are rated low on active coping (James et al., 1992; Wright, Treiber, Davis, & Strong, 1996). The present results are consistent with these findings and suggest the need for further research that elucidates the mediating mechanisms responsible for the physiological costs associated with active coping (Chen & Miller, 2012; Cohen, Evans, Stokols, & Krantz, 1986). Clearly, refined analyses of the coping mechanisms that underlie the results presented here are needed.

Strengths of the present study include its prospective, longitudinal design and analysis of a large sample. The measures of the constructs minimized common method variance. SES-related risk across preadolescence was indexed from mothers' reports; preadolescent self-control and competence were assessed from teachers' reports; indicators of AL at age 19 were measured with a standard protocol that included overnight urine voids, blood pressure readings, and body mass index; and psychological adjustment was evaluated through young adults' self-reports. Limitations of the study also should be noted. It is not known whether the results would generalize to low-SES European American or Latino families living in either urban or rural communities. The JH construct was not assessed directly because no valid measure of it is available for children and adolescents. Instead, age-appropriate indicators that exemplify this construct, self-control and competence, were assessed, and our hypothesis was tested using those indicators. Nevertheless, the results suggest that rural African American youth who live in low-SES circumstances and manifest psychological resilience may be at risk for developing high AL.

Author Contributions

T. Yu, E. Chen, G. E. Miller, S. M. Kogan, and S. R. H. Beach provided critical revisions. T. Yu performed the data analysis under G. H. Brody's supervision. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Funding

This research was supported by Award No. R01HD030588 from the National Institute on Child Health and Human Development and Award No. P30DA027827 from the National Institute on Drug Abuse. The content is solely the authors' responsibility and does not necessarily represent the sponsoring agencies' official views.

References

- Achenbach, T. M., & Rescorla, L. A. (2003). *Manual for the ASEBA adult forms and profiles*. Burlington: University of Vermont, Research Center for Children, Youth, and Families.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage.
- Bandura, A. (2002). Selective moral disengagement in the exercise of moral agency. *Journal of Moral Education, 31*, 101–119. doi:10.1080/0305724022014322
- Breslau, J., Kendler, K. S., Su, M., Aguilar-Gaxiola, S., & Kessler, R. C. (2005). Lifetime risk and persistence of psychiatric disorders across ethnic groups in the United States. *Psychological Medicine, 35*, 317–327. doi:10.1017/S0033291704003514
- Brody, G. H., & Ge, X. (2001). Linking parenting processes and self-regulation to psychological functioning and alcohol use during early adolescence. *Journal of Family Psychology, 15*, 82–94. doi:10.1037/0893-3200.15.1.82
- Brody, G. H., Kogan, S. M., & Grange, C. M. (2012). Translating longitudinal, developmental research with rural African American families into prevention programs for rural African American youth. In R. B. King & V. Maholmes (Eds.), *The Oxford handbook of poverty and child development* (pp. 551–568). New York, NY: Oxford University Press.
- Brody, G. H., Murry, V. M., Gerrard, M., Gibbons, F. X., Molgaard, V., McNair, L. D., . . . Neubaum-Carlan, E. (2004). The Strong African American Families program: Translating research into prevention programming. *Child Development, 75*, 900–917. doi:10.1111/j.1467-8624.2004.00713.x
- Brody, G. H., Yu, T., Chen, Y.-f., Kogan, S. M., Evans, G. W., Beach, S. R. H., . . . Philibert, R. A. (2013). Cumulative socioeconomic status risk, allostatic load, and adjustment: A prospective latent profile analysis with contextual and genetic protective factors. *Developmental Psychology, 49*, 913–927. doi:10.1037/a0028847
- Chen, E., & Miller, G. E. (2012). “Shift-and-persist” strategies: Why low socioeconomic status isn't always bad for health. *Perspectives on Psychological Science, 7*, 135–158. doi:10.1177/1745691612436694
- Cohen, S., Evans, G. W., Stokols, D., & Krantz, D. S. (1986). *Behavior, health, and environmental stress*. New York, NY: Plenum Press.
- Contreras, L. N., Hane, S., & Tyrrell, J. B. (1986). Urinary cortisol in the assessment of pituitary-adrenal function: Utility of 24-hour and spot determinations. *Journal of Clinical Endocrinology & Metabolism, 62*, 965–969. doi:10.1210/jcem-62-5-965
- Dressler, W. W., Oths, K. S., & Gravlee, C. C. (2005). Race and ethnicity in public health research: Models to explain health disparities. *Annual Review of Anthropology, 34*, 231–252. doi:10.1146/annurev.anthro.34.081804.120505
- Evans, G. W. (2003). A multimethodological analysis of cumulative risk and allostatic load among rural children. *Developmental Psychology, 39*, 924–933. doi:10.1037/0012-1649.39.5.924
- Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development, 53*, 87–97. doi:10.2307/1129640
- Hays, R. D., Sherbourne, C. D., & Mazel, R. M. (1993). The RAND 36-item health survey 1.0. *Health Economics, 2*, 217–227. doi:10.1002/hec.4730020305
- Humphrey, L. L. (1982). Children's and teachers' perspectives on children's self-control: The development of two rating scales. *Journal of Consulting and Clinical Psychology, 50*, 624–633. doi:10.1037/0022-006X.50.5.624
- James, S. A. (1994). John Henryism and the health of African-Americans. *Culture, Medicine, and Psychiatry, 18*, 163–182. doi:10.1007/BF01379448
- James, S. A., Keenan, N. L., Strogatz, D. S., Browning, S. R., & Garrett, J. M. (1992). Socioeconomic status, John Henryism, and blood pressure in Black adults: The Pitt County study. *American Journal of Epidemiology, 135*, 59–67.
- James, S. A., Strogatz, D. S., Wing, S. B., & Ramsey, D. L. (1987). Socioeconomic status, John Henryism, and hypertension in Blacks and Whites. *American Journal of Epidemiology, 126*, 664–673.
- Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2007). *Monitoring the Future: National survey results on drug use, 1975-2006: Vol. I. Secondary school students* (NIH Publication No. 07-6205). Bethesda, MD: National Institute on Drug Abuse. Retrieved from http://monitoringthefuture.org/pubs/monographs/vol1_2006.pdf
- Kamarck, T. W., Jennings, J. R., Debski, T. T., Glickman-Weiss, E., Johnson, P. S., Eddy, M. J., & Manuck, S. B. (1992). Reliable measures of behaviorally-evoked cardiovascular reactivity from a PC-based test battery: Results from student and community samples. *Psychophysiology, 29*, 17–28. doi:10.1111/j.1469-8986.1992.tb02006.x
- Kendler, K. S., Kuhn, J. W., Vittum, J., Prescott, C. A., & Riley, B. (2005). The interaction of stressful life events and a serotonin transporter polymorphism in the prediction of episodes of major depression: A replication. *Archives of General Psychiatry, 62*, 529–535. doi:10.1001/archpsyc.62.5.529
- Kim, S., & Brody, G. H. (2005). Longitudinal pathways to psychological adjustment among Black youth living in single-parent households. *Journal of Family Psychology, 19*, 305–313. doi:10.1037/0893-3200.19.2.305
- Lantz, P. M., Lynch, J. W., House, J. S., Lepkowski, J. M., Mero, R. P., Musick, M. A., & Williams, D. R. (2001). Socioeconomic disparities in health change in a longitudinal study of US adults: The role of health-risk behaviors. *Social Science & Medicine, 53*, 29–40. doi:10.1016/S0277-9536(00)00319-1

- McEwen, B. S. (2000). The neurobiology of stress: From serendipity to clinical relevance. *Brain Research*, 886, 172–189. doi:10.1016/S0006-8993(00)02950-4
- Mensah, G. A., Mokdad, A. H., Ford, E. S., Greenlund, K. J., & Croft, J. B. (2005). State of disparities in cardiovascular health in the United States. *Circulation*, 111, 1233–1241. doi:10.1161/01.CIR.0000158136.76824.04
- Newcomb, M. D., & Bentler, P. M. (1988). *Consequences of adolescent drug use: Impact on the lives of young adults*. Thousand Oaks, CA: Sage.
- Proctor, B. D., & Dalaker, J. (2003). *Poverty in the United States: 2002* (Current Population Reports No. P60-222). Washington, DC: U.S. Census Bureau. Retrieved from http://www.dlc.org/documents/Census_2002_Poverty.pdf
- Radloff, L. S. (1977). The CES–D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385–401. doi:10.1177/014662167700100306
- Riggin, R. M., & Kissinger, P. T. (1977). Determination of catecholamines in urine by reverse-phase liquid chromatography with electrochemical detection. *Analytical Chemistry*, 49, 2109–2111. doi:10.1021/ac50021a052
- Riolo, S. A., Nguyen, T. A., Greden, J. F., & King, C. A. (2005). Prevalence of depression by race/ethnicity: Findings from the National Health and Nutrition Examination Survey III. *American Journal of Public Health*, 95, 998–1000. doi:10.2105/AJPH.2004.047225
- Rutter, M. L. (1993). Resilience: Some conceptual considerations. *Journal of Adolescent Health*, 14, 626–631. doi:10.1016/1054-139X(93)90196-V
- Seeman, T. E., McEwen, B. S., Rowe, J. W., & Singer, B. H. (2001). Allostatic load as a marker of cumulative biological risk: MacArthur studies of successful aging. *Proceedings of the National Academy of Sciences, USA*, 98, 4770–4775. doi:10.1073/pnas.081072698
- Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *Journal of the American Medical Association*, 301, 2252–2259. doi:10.1001/jama.2009.754
- Tietz, N. W. (Ed.). (1976). *Fundamentals of clinical chemistry* (2nd ed.). Philadelphia, PA: Saunders.
- Williams, B. (1983). *John Henry: A bio-bibliography*. Westport, CT: Greenwood Press.
- Wright, L. B., Treiber, F. A., Davis, H., & Strong, W. B. (1996). Relationship of John Henryism to cardiovascular functioning at rest and during stress in youth. *Annals of Behavioral Medicine*, 18, 146–150. doi:10.1007/BF02883390