



Childhood poverty, catecholamines, and substance use among African American young adults: The protective effect of supportive parenting

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ABSTRACT

From a sample of African American families living in the rural South, this study tested the hypothesis that growing up in poverty is associated with heightened biological stress levels in youth that, in turn, forecast elevations in drug use in young adulthood. Supportive parenting during adolescence was hypothesized to protect youth's biological stress levels from rising in the context of poverty. African American youth and their primary caregivers from 385 families participated in a 14-year prospective study that began when youth were 11 years of age. Data were collected from 2001 to 2016. All families lived in impoverished communities in the rural South. Linear regression models and conditional indirect effect analyses were executed in 2016 to test the study hypotheses. High number of years living in poverty across adolescence was associated with high catecholamine levels, but only among those youth who received low levels of supportive parenting. Youth catecholamine levels at age 19 forecast an increase in substance use from age 19 to age 25. Conditional indirect effects confirmed a developmental cascade linking family poverty, youth catecholamine levels, and increases in substance use for youth who did not receive high levels of supportive parenting. Current results suggest that, for some African American youth, substance use vulnerability may develop “under the skin” from stress-related biological weathering years before elevated drug use. Receipt of supportive parenting, however, can protect rural African American youth from biological weathering and its subsequent effects on increases in substance use during adulthood.

1. Introduction

A growing body of research has tested the hypothesis that growing up in poverty can contribute to lifelong trajectories in cognitive development, psychosocial development, and physical health (Bradley and Corwyn, 2002; Heckman, 2006; Miller et al., 2011a). More recently, researchers have begun to examine the ways in which growing up in poverty, and the life stressors that accompany it, presage initiation and escalation of drug use at later stages of development (Gordon, 2002; Sinha, 2008). This work is driven in part by surveillance data indicating that African Americans, who experience childhood poverty more than do any other ethnic group in the United States (Patten and Krogstad, 2015), use drugs less frequently than do Caucasians during adolescence yet engage in similar or even higher levels of substance use in adulthood (National Institute on Drug Abuse, 2003). This pattern has been termed the racial crossover effect (Watt, 2008).

The explanation most frequently offered for the racial crossover effect involves the stressors young people experience as they transition to adult roles (Aseltine Jr and Gore, 2005; Brody et al., 2010; Paschall

et al., 2000). Emerging research, however, suggests that a sole focus on the effects of concurrent stressors is of limited value in understanding African Americans' drug use etiology. Recent studies suggest that, for some young people, vulnerability to drug use in young adulthood is a developmental process occurring “beneath the skin” from the weathering of biological systems (Gordon, 2002; Sinha, 2008). Growing up in poverty can noticeably alter individuals' sympathetic nervous system (SNS) and its release of stress hormones such as the catecholamines epinephrine and norepinephrine. Although beneficial for managing short-term threats, chronic hormonal surges triggered by the SNS can accumulate over time and dysregulate SNS activity, an effect that has been documented in both children (Evans, 2003) and adults (Miller et al., 2011a). Previous research has linked stress-regulated “weathering” from SNS activity to physical and mental health problems (Reuben et al., 2000), and some research has hypothesized that it also renders individuals more susceptible to drug use and abuse (Sinha, 2008). In this study, we tested components of this hypothesis. Specifically, we sought to determine whether African American youth in rural Southern environments who spent more years in poverty during

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adolescence would display elevated levels of the catecholamine stress hormones epinephrine and norepinephrine during young adulthood. In turn, we investigated the association between high catecholamine levels at the beginning of young adulthood and increases in drug use across the young adult years.

Not all children and adolescents who grow up in poverty, however, experience its adverse psychosocial and physiological consequences. Concerning psychosocial outcomes, multiple studies have indicated that supportive caregiving practices can offset many of the cognitive and behavioral disadvantages besetting children in poverty (Brody et al., 2012; Rutter, 2005). Mounting evidence also reveals that supportive parenting can protect youth physiologically by favorably molding the stress-response tendencies of vulnerable children (Cicchetti and Blender, 2006; Gunnar and Quevedo, 2007) and mitigating the wear-and-tear that adverse experiences inflict on children's physiology (Chen et al., 2011; Evans et al., 2007). Parental support, for instance, has been shown to buffer the effects of neighborhood poverty on adolescents' allostatic load, a measure of cardiometabolic risk (Brody et al., 2014), as well as the effects of low childhood SES on proinflammatory signaling (Chen et al., 2011) and metabolic profiles (Miller et al., 2011b) in adulthood. To date, however, much of this literature has relied on cross-sectional findings or retrospective reports of childhood environments (e.g., Chen et al., 2011 and Miller et al., 2011b; for an exception, see Evans et al., 2007). Consequently, prospective research exploring the protective effect of supportive parenting for youths' SNS dysregulation is quite limited, particularly among minority, low-SES youth.

The current study was designed to address these limitations. Using a 14-year prospective research design involving rural African American youth and their primary caregivers, the current study tested the hypothesis that exposure to poverty for rural African American youth would be associated with high catecholamine levels that would then predict increases in drug use. Supportive parenting was expected to moderate the association between childhood poverty and catecholamine levels, with high levels of supportive parenting buffering African American youth from poverty-related biological weathering and its subsequent effects on increases in substance use during adulthood.

2. Methods

2.1. Study sample

The data for this study were drawn from the Strong African American Families Healthy Adult Project (SHAPE). The families resided in rural counties in Georgia in which poverty rates are among the highest in the nation and unemployment rates are above the national average (DeNavas-Walt and Proctor, 2014). African American primary caregivers and a target youth selected from each family participated in data collections; youths' mean age was 11.7 years ($SD = 0.3$) at the first assessment in 2001; the last wave of data was collected from 2014 to 2016. Of the youth in the sample, 53% were female. At the first assessment, 80% of the caregivers had completed high school or earned a GED. Economically, these households can be characterized as working poor. The primary caregivers worked an average of 30.6 h per week and had a median household income of \$1612 per month. Of the families, 42.3% were living below federal poverty thresholds.

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 of the recruitment process). From a sample of 561 at age 18 (a retention rate of 84%), 500 families were selected randomly to continue to participate in the study. The selection of a random subsample was necessary because of financial constraints associated with the costs of collecting and assaying catecholamine from urine samples. Of these 500 participants, 489 provided urine samples at age 19. Of this subsample, 385 agreed to take part in data collection at age 25; they constituted the sample for the present study (Supplemental Fig. S1 presents a participant retention flow chart). Comparisons on

demographic and study variables, using independent *t*-tests and chi-square tests, of the families in the study sample with those not in the sample revealed one difference: on average, families in the study sample experienced more years of poverty than did those not in the sample, $t(663) = -2.59$, $p = .010$; M study sample = 2.32 ($SD = 1.91$); M missing sample = 1.94 ($SD = 1.77$).

2.2. Procedure

All data were collected in participants' homes using a standardized protocol. African American field researchers visited families' homes to administer computer-based interviews at each wave of data collection, allowing responses to sensitive questions to be input privately by respondents. All assessments were conducted with no other family members present. Catecholamine and substance use were assessed when the youth were 19 years of age ($M = 19.3$, $SD = 0.66$). Data on substance use were also obtained when the youth were 25 years of age ($M = 24.7$, $SD = 0.65$). At each wave, primary caregivers consented to their minor youth's participation in the study, and minor youth assented to their own participation. The Institutional Review Board of the sponsoring institution approved the study protocol.

2.3. Measures

Family poverty was computed when participants were 11 to 13 years of age, and again when they were 16 to 18 years of age. Caregivers provided data on their families' income-to-needs ratios, based on family size. Poverty status at these six assessment waves were summed to determine the number of years youth spent living at or below federal poverty levels when they were 11 to 18 years of age ($M = 2.32$, $SD = 1.91$).

The supportive parenting construct, assessed at ages 11 to 13 and 16 to 18 and expressed as a composite, was derived from measures of parental support and nurturant-involved parenting. Parental support was measured using youth reports on two scales. The 4-item Emotional Support subscale from the Carver Support Scale (Carver et al., 1989) was administered at ages 11 to 13 and 16 to 18. On a scale ranging from 1 (*not at all true*) to 5 (*very true*), youth responded to items such as, "I get emotional support from my caregiver" and "I get sympathy and understanding from my caregiver." Cronbach's alphas ranged from 0.78 to 0.90. The second support assessment, the 11-item Family Support Inventory (Wills et al., 1992), was administered at ages 16 to 18. Youth rated statements on a scale ranging from 1 (*not at all true*) to 5 (*very true*) about the support their parents provided to them. Examples include, "I feel that I can trust my caregivers as someone to talk to," and "If I talk to my caregiver they have suggestions about how to handle problems." Cronbach's alphas ranged from 0.94 to 0.95.

The nurturant-involved parenting instrument (Brody et al., 2001) was administered to youth at ages 11 to 13 and 16 to 17. This measure included 9 questions with responses ranging from 1 (*never*) to 4 (*always*). It was used to assess the extent to which parents were aware of the youth's activities, talk with the youth about issues that bother the youth, listen to the youth's perspectives during arguments, and consider the youth's opinions when making decisions on family matters. Cronbach's alphas ranged from 0.76 to 0.89. The parent support, family support, and nurturant-involved parenting measures were highly correlated ($r_s = 0.58$ – 0.77 , $p_s < 0.001$); measures were averaged, standardized, and summed to form an indicator of supportive parenting.

Substance use was assessed at participant age 19 and age 25. Participants reported their past-month frequencies of cigarette smoking, alcohol use, heavy drinking, and marijuana use on a widely used instrument from the Monitoring the Future Study (Johnston et al., 2007). A response set ranging from 0 (*not at all*) to 6 (*more than two packs a day*) was used for cigarette smoking; a scale ranging from 0 (*none*) to 5 (*20 or more times*) was used to measure alcohol use, heavy drinking, and marijuana use. Responses were summed to form a

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