HHS Public Access

Author manuscript

J Prev Interv Community. Author manuscript; available in PMC 2019 November 12.

Published in final edited form as:

J Prev Interv Community. 2019 ; 47(4): 279–294. doi:10.1080/10852352.2019.1617386.

Environmental stress and socioeconomic status: Does parent and adolescent stress influence executive functioning in urban youth?

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Abstract

This study examined whether parental and adolescent stress act as mediators between socio-economic status (SES) and adolescent executive functioning (EF) in urban youth. Two hundred and sixty-seven 6th–11th grade students (ages 11–16, 55.4% female; 49.1% Black/African American) attending racially and socioeconomically diverse schools in Chicago, Illinois, completed self-report measures on urban stress and EF. Parents of adolescents completed measures on parental chronic stress and demographic information on the family's socioeconomic status. Results indicated that parent stress was directly related to adolescent stress, while adolescent stress was directly related to behavior components of EF (i.e., emotion control, set shifting, and inhibition). Although parental stress was related to adolescent's ability to shift from one task to another, no relationship was found with adolescent's ability to modulate mood or delay impulsive behaviors. Implications for socio-ecological mental health interventions for youth residing in urban environments are discussed.

Keywords

Environmental stress; executive functioning; parent and adolescent stress; SES; urban youth

Introduction

Adolescence is a developmental period marked by many socio-emotional and physical changes. It is a time that requires one to navigate relationships, explore one's identity, establish autonomy, and respond to new environmental demands and expectations. In the face of chronically stressful surroundings such as urban communities; unmanaged or unchecked stress can have a profound impact on an adolescent's physical and mental well-

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being leading to such illnesses as anxiety and depression (Chandra & Batada, 2006; Grant et al., 2006). In addition to urban environments, neurocognitive factors such as executive functioning (EF) have also been found to be an important vulnerability factor for mental health outcomes (Dickson, Ciesla, & Zelic, 2017).

Although adolescence marks a developmental shift to less dependence and reliance on parents, parents continue to influence psychological well-being even in adulthood (Laible, Carlo, & Roesch, 2004). Thus, parental stress is thought to have a relationship to adolescent psychological and neurocognitive functioning. Parental stress can be influenced by a number of factors; specifically, residing in an urban environment can be quite costly. Socioeconomic status impacts not only where one lives but how one lives and can be a significant source of stress. This study aims to examine the relationship between parent and adolescent environmental stress, socioeconomic status, and components of EF.

The heightened risk for negative mental health outcomes in urban communities has been widely attributed to chronic, uncontrollable stress and increased social evaluative threat (Landis et al., 2007; Lederbogen et al., 2011). More specifically, processing social stress in the urban environment is thought to underlie the risk for negative psychological outcomes and directly affect the brain. For example, Lederbogen et al. (2011) found a link between urban living and increased activity in the brain's amygdala and a key region for regulation of fear and stress – perigenual anterior cingulate cortex (pACC). The amygdala, which among other functions signals negative affect and environmental threat, has been strongly implicated in anxiety disorders and depression (Lederbogen et al., 2011).

Youth residing in *low-resource* urban communities may experience even higher rates of stress (e.g., community violence) and are tasked with negotiating an ecological context that affects growth, development, and adjustment (Murry, Berkel, Gaylord-Harden, Copeland-Linder, & Nation, 2011). The accumulative stress of living in high-stress, high-poverty environments coupled with the normative developmental tasks of adolescence is thought to place youths at risk for negative mental and physical outcomes (Evans & Kim, 2013; Murry et al., 2011).

Research on adolescent stress and its relationship with mental and physical health problems has primarily focused on associations between specific stressors (e.g., community violence and/or traumatic events) and specific psychological outcomes (e.g., anxiety or depression) (Grant et al., 2006). Fewer studies have considered *how* and *why* stressors influence adolescent mental health. For example, broad systemic stressors (e.g., poverty) may increase more proximal stressful experiences (e.g., parent and adolescent major events and daily hassles), which in turn may affect executive processing skills that govern adaptive responses to novel or complex situations (Blair, 2010).

Executive functioning, adolescent stress, and the urban context

EF is the umbrella term that encompasses higher-order cognitive skills involved in the control of thoughts, actions, and emotions (Zelazo & Muller, 2002). Although there lacks a general consensus of specific elements involved in EF, some well-documented aspects

include attentional control, goal-directed behaviors, inhibition, organization, planning, shifting, information updating, and working memory (Hughes, 2011; Miyake et al., 2000). Neurocognitive mechanisms underlie the perception of emotional and social cues and guide decision making within a social context. Emotion control, set shifting, and inhibition are core skills of EF, which involves being able to control one's attention, behavior, thoughts, and/or emotions in the face of events that may provoke a response. Deficits in EF may affect emotional responses *via* reduction in inhibitory controls and/or inaccurate appraisals of environmental and interpersonal inputs (Fishbein et al., 2006). Problems with these emotional centers may play a direct role in behavioral problems by compromising the ability to regulate reactions to community risk factors. Given the complex role of EF in emotional and affective processing, it is important to understand associations with these components of EF and stress within youths' environment.

There is a wealth of evidence that has examined the relation of SES to EF abilities (Hackman, Farah, & Meaney, 2010; McEwen & Gianaros, 2010; Miller, Chen, & Parker, 2011; Shonkoff, Boyce, & McEwen, 2009) but few studies have tested the stress mechanisms that link socio-economic status (SES) and EF outcomes. Research has shown a link between early exposure to chronic stress and changes to brain structure and functioning (Arnsten, 1998; Lupien, McEwen, Gunnar, & Heim, 2009). Continuous exposure to stress has been shown to alter stress response systems and to have specific effects on neurobiological abilities that promote or impede cognitive and affective processing skills (Blair, 2010). Research also has begun to examine the effects of SES and environmental context on EF for youth in urban communities (Burgers & Drabick, 2016; Evans & Fuller-Rowell, 2013; Evans & Kim, 2013; Hackman, Betancourt, Brodsky, Hurt, & Farah, 2012). Burgers and Drabick (2016) investigated whether EF moderated the relation between community violence exposure and anxiety symptoms for youth in an urban context. The EF abilities of emotional control and shifting each moderated the relation between direct victimization and both parent- and child-reported anxiety symptoms. Findings indicated that children with elevated levels of direct victimization experienced higher anxiety symptoms in the context of lower levels of EF abilities. This study builds upon these findings by taking an ecological approach to examine how stress in the youth's environment may mediate broader socio-economic effects on EF.

Ecological model and adolescent stress

Bronfenbernner's ecological systems theory provides a relatively comprehensive approach to understanding how context impacts adolescent development and subsequent socio-emotional and/or affective processing abilities. A central tenet to this theory is that the child/adolescent is influenced by ongoing qualities of the environment/context in which he or she participates and the extent and nature of the interaction between these settings (Bronfenbrenner, 1979, 1988; Gorman-Smith, Tolan, & Henry, 2000). Parents are key influencers of child and adolescent well-being. Thus, in the context of Bronfenbernner's theory, it is important to consider the impact of family (in this study, parents) and the ecological context of communities on youth development (Gorman-Smith et al., 2000). Among the few more proximal and more malleable ecological factors that have shown to predict EF is the quality of parent-child interactions. Rochette and Bernier (2014)

investigated the relationship between parenting, family SES and child EF in a longitudinal study with 114 middle-class mother-child dyads. Overall, family SES and several dimensions of maternal behavior were associated with child EF performance, and positive links between quality of maternal behavior and child EF were most pronounced among children from relatively lower-SES families. More specifically, higher quality maternal behavior was predictive of better performance only on the EF skill of impulse control among children from lower-SES families. Findings such as these suggest that youth's parents' experiences of stress may influence the relationship between urban poverty and youth EF, which in turn, may influence coping strategies and psychological symptoms.

Purpose of current study

This study tested the effects of parent and adolescent experiences of chronic stress on EF skills in the urban context with particular interest in the influence of SES on this relation. Given that (a) adolescence is a vulnerable developmental period and that half of all mental illness begins by the age of 14 (www.nami.org) and (b) youth with lower SES in urban environments are at higher risk for mental health problems because they are exposed to more stressors, it is important to understand the mechanisms associated with mental health symptoms for this population in order to effectively prevent them.

This study addressed this gap in the literature with a racially and socioeconomically diverse sample of adolescents residing in urban communities. In particular, this study tested the hypothesis that parent and adolescent stress will mediate the relationship between SES and EF, specifically emotion control, set shifting, and inhibition. It was predicted that lower SES would be associated with higher levels of parent stress, which in turn would influence adolescent stress and that adolescent stress, in turn, would influence adolescent EF.

Method

Sample

Participants were part of a larger study examining the relationship between stressful life experiences and developmental psychopathology among 402 racially, ethnically, and socioeconomically diverse adolescents, aged 11–17, residing in a large Midwestern city. The overall purpose of this study was to test for mediating and moderating processes in the relationship between stressors and developmental outcomes among a diverse sample of urban adolescents. No exclusion criteria were applied during recruitment and the total recruited sample completed data collection.

Data from 267 adolescents (M = 15 years, SD = 1.87) and parents who reported as Black/African American (49.1%) or White/Caucasian (50.9%) were analyzed for this study. Of the 267 participants, 55.4% were female. All adolescents attended one of three public schools in (two K – 8th; one high-school). The schools were selected due to their diverse student enrollment. For this study, 23% of the participants were enrolled in 6th–8th grade, 9.7% were enrolled in 9th grade, 20.6% were enrolled in 10th grade, 31.5% were enrolled in 11th grade, and 13.19% were in grade 12. Approximately 44.6% lived with 2adults; however, mothers were the primary informant for this study.

The average number of parent-figures reported living in the home was 2.9 (*SD* = 1.3). Family income was based on categorical scores distributed as follows: 1=$0–$25,000 (14.6%), 2=$25,001$50,000 (18.7%), 3=$50,001–$80,000 (12.0%), 4=$80,001–$100,000 (7.1%), 5=$100,001–$150,000 (5.6%), and 6 = Over $150,000 (3.7%). Mean family income for the participants was between $25,000 and $50,000. Parents were relatively well educated: <5.6% did not finish high school, 6.4% graduated high school or equivalent (GED), 9.0% graduated high school and attended a vocational school or 2-year school, 9.4% graduated high school and attended some college, 6.7% graduated high school and completed a degree at vocational or a 2-year school, 11.6% completed a 4-year degree, 10.9% completed a Master's degree, and 4.1% completed a Ph.D., J.D., or other equivalent professional degree.

Measures

Family SES—SES was assessed by self-report questionnaires completed by adolescent and parent informant independently. Parent level of education, job description, income, and home address were considered in calculating "Family SES Score." To determine family socioeconomic status, Hollingshead's Four Factor Index of Social Status coding was utilized (Adams & Weakliem, 2011). This index was developed from a detailed list of occupations based on U.S. Census classification (Adams & Weakliem, 2011). This study also categorized occupations not represented in the original coding structure. The codes are represented by a numeric ranging from 19 to 66 with lower numbers representing lower earning/lower education positions. This sample fell within the mid-range (*M* = 43.81, *SD* = 12.50) of social stratum groupings: *medium business, minor professional*, and *technical positions*. Census tract and block data on median family income were collected and assessed using local or federal government records. In particular (1) exposure to community violence was assessed by mapping student addresses onto police crime reports by block (Chicago Police Department, 2000) and by coding schools for safety based on Chicago School Report Card data (Chicago Public Schools, 2011) and (2) deprivation was assessed using census and block data on median family income and % unemployed (U.S. Census Bureau, 2000).

Executive functioning—Adolescent EF abilities were assessed using the Behavior Rating Inventory Function – Self Report (BRIEF-SF; Gioia, Isquith, Guy, & Kenworthy, 2000). The BRIEF-SR is an 80-item self-report measure that assesses problem behaviors in eight EF domains in daily life. Adolescents were asked to rate the frequency that they exhibited particular behaviors on a scale from 1 (*Never*) to 3 (*Often*). The BRIEF has been shown to have good test-retest reliability, construct validity, and predictive validity (Gioia, Kenworthy, & Isquith, 2010; Gioia et al., 2000).

This study considered the affective or behavioral regulation skills of emotion control, shifting, and inhibition subscales. The emotional control subscale assesses the ability to modulate emotional responses. The shift subscale assesses the ability to move freely from one situation, activity, or aspect of a problem to another as the circumstances demand. The inhibit scale assesses inhibitory control and impulsivity. The BRIEF-SR has demonstrated reliability, validity, and clinical utility as an ecologically valid assessment of executive functions across a range of conditions (Hughes, 2011). It is designed to be completed by

older children and adolescents with a 5th-grade or higher reading ability, including individuals with attention disorders, language disorders, traumatic brain injuries, lead exposure, learning disabilities, high-functioning autism spectrum disorders, and other developmental, neurological, psychiatric, and medical conditions (Hughes, 2011).

Adolescent stress—Youth reported on their stressful life events using the Urban Adolescent Life Experiences Scale (UALES; Allison et al., 1999), a measure based on the Adolescent Perceived Events Scale (APES; Compas, Davis, Forsythe & Wagner, 1987), a well-established, valid, and reliable measure of stressful life events, developed on predominantly middle-class European American adolescents. The UALES items were generated by low-income urban, pre-dominantly ethnic minority, youth (Allison et al., 1999). Respondents are asked to rate the frequency with which they have been exposed to each of a series of stressful experiences on a scale ranging from 1 through 5, with higher numbers indicating greater frequency of exposure. Sample major life event items include: “A friend has died,” “I broke up with a boyfriend or girlfriend,” and “A friend goes to jail.” Sample daily hassle items include: “I have poor school supplies” and “I have transportation problems.” Test-retest reliability of the UALES was .84 in a pilot study of 6th through 12th graders (Allison et al., 1999). The original measure includes positive and negative events. In this study, the measure was shortened to include only negative events, as positive events have not been shown to predict psychological problems (Siegel & Brown, 1988). Furthermore, eight items that overlapped with items on the Youth Self-Report (YSR; Achenbach, 1991) were omitted to ensure that artificially high correlations were not found between stressors and psychological symptoms. The modified version of the UALES used in this study had a two-week test-retest reliability of .80 and internal consistency reliability of . 92. (Grant et al., 2000).

Parent chronic stress—A series of items asked participants to endorse whether, over the past year, they had experienced none, some, or a lot of stress due to a variety of objective circumstances. Included were items assessing work-related, family, relationship, and financial stress (Turner, Wheaton, & Lloyd, 1995). Sample questions include: “Your rent or mortgage is too much,” “You have a lot of conflict with your partner,” and “A child’s behavior is a source of serious concern for you.” For our purposes, responses were dichotomized: participants either had or had not experienced stress in these domains. Subscale scores were calculated by summing affirmative responses in each domain, and a total chronic stress score was calculated by summing endorsements across all domains.

Procedures

Research teams consisted of undergraduate and graduate-level students under the supervision of the Principal Investigators of the larger study. Research team members recruited students from grades 6–11 in three socioeconomically and racially/ethnically diverse public schools (two K-8 schools and one high-school). During recruitment sessions, the study was described and consent forms were distributed to students to take home to parents. Parent consent forms described the larger project, the voluntary nature of participation, the confidentiality of the data collected, and invited parents to contact the researcher if they had any questions. Parents that consented were instructed to complete

adult forms and return them with their children in sealed envelopes during administration of youth protocols. Youth assent was collected prior to data collection.

Data collection took place during Saturday sessions at one of the participating universities. Transportation from each school was provided. Data collection sessions included time for breakfast, lunch, and dinner, and breaks for relaxation/recreation, short movies, college informationals, and a college tour. Students were randomly assigned to an order of participation in the measures and tasks; only the self-report and parent report measures related to this study are described below. At the end of the day, all participants were provided with a $50 gift card to Target, Old Navy, or Best Buy. Students received an additional $20 in gift cards if they returned parent rating forms ($10 for themselves and $10 for their parents).

Results

The bivariate correlations, means, and standard deviations for the study variables are displayed in Table 1. Adolescent stress was positively associated with EF skills of emotional control ($r = .27$; $p < .05$), shifting ($r = .29$; $p < .05$), and inhibition ($r = .35$; $p < .05$). Adolescent stress was also found to be positively associated with parent stress ($r = .27$; $p < .05$), school grade ($r = .32$; $p < .05$), and adolescent age ($r = .33$; $p < .05$). No other variable associations were observed.

Primary mediation analyses

Multiple mediation analysis using bootstrapping (Hayes, 2009) was utilized to investigate whether parent and adolescent stress mediated the effect of SES on EF. In the first model, the effect of SES on emotion control (EF) was assumed to occur via parent stress and adolescent stress, namely that SES would enhance parent stress, increase adolescent stress, and affect emotion control (EF).

Although correlational analyses did not indicate an association between SES and emotion control, an indirect relationship may exist when parent stress and adolescent stress are considered. Family SES did not significantly predict parent stress ($b = -.001$, $SE = .0846$, ns). However, parent stress proved to be a significant predictor of adolescent stress ($b = .541$, $SE = .147$, $p < .05$) and adolescent stress proved to significantly predict emotion control ($b = .061$, $SE = .020$, $p < .01$). Once adolescent stress entered the model, parent stress no longer proved to be a significant predictor; however, the model that included parent stress, adolescent stress, SES, and emotion control was significant and accounted for 12% of the variance ($R^2 = 12$, $p < .01$). No direct effect was found between SES and emotion control ($b = .005$, $SE = .035$, ns), similarly, no indirect effect was found. Results did not support mediation as hypothesized but provided some evidence that adolescent stress may serve as an indirect pathway between parent stress and EF.

EF skills of shifting and inhibition were also tested (respectively) through multiple mediation analyses (Hayes, 2009). The effect of SES on shifting was assumed to occur *via* parent stress and adolescent stress. Results were similar to emotion control whereby no mediational effects were found ($b = -.01$, $SE = .03$, ns). Within the model, SES did not

prove to be a significant predictor of parent stress ($b = -.00$, $SE = .08$, ns). However, parent stress was a significant predictor of adolescent stress ($b = .54$, $SE = .15$, $p < .01$) although this component of the model only accounted for 10% of the variance ($R^2 = .10$, $p < .01$). When the model considered SES, parent stress, and adolescent stress on shifting, adolescent stress was the only significant predictor $t(130) = 3.51$, $p < .01$) and the model accounted for 15% of the variance ($R^2 = .15$, $p < .01$). Similarly, no direct or indirect effects were found for inhibition; thus, no mediation was supported ($R^2 = .027$, ns). Thus, adolescent stress proved to be a significant predictor of EF.

Supplemental moderation analyses

Given that the hypothesized mediation model was not supported and only adolescent stress was significantly and consistently associated with EF, additional supplemental analyses were conducted to test for moderators of this significant relationship. A series of multiple linear regression analyses with interaction terms were used to test for moderation (see Tables 2-4). In each regression model, race, gender, age, and parent stress were entered along with the predictor variable (adolescent stress) and outcome variable (EF skill) to determine if there were any direct effects. Significant direct main effects were found for adolescent stress and each EF skill (emotion control: $\beta = .311$, $p < .01$; shifting: $\beta = .300$, $p < .05$, and inhibition: $\beta = .397$, $p < .01$). No direct main effect was found for parent stress and emotion control or inhibition. However, a direct main effect was found for parent stress and shifting ($\beta = .153$, $p < .05$), such that higher stress resulted in greater difficulty with shifting.

Discussion

This study sought to extend the emerging literature on factors that may impact EF in the context of urban poverty. Although a growing body of empirical studies confirm the significance of these neurologically based skills involving mental control and self-regulation in helping urban youth to plan, organize and achieve tasks, this study fills a gap in the extant literature by exploring the link between environmental factors and adolescent developmental processes that impact EF. As such, our findings highlight the importance of considering bio-ecological, developmental, and psychological factors when attempting to assess the direct and indirect impacts of one's lived experiences on EF.

Although this study was largely exploratory given the dearth of empirical work examining similar variables within this racially, ethnically, and socioeconomically diverse population, it was not surprising that a significant relationship between adolescent stress and EF emerged. Various studies on an array of outcome variables suggest that stress elicits negative physiological, psychological, and behavioral reactions (Koolhaas et al., 2011). Furthermore, research suggests that prefrontal cortex regions with a high density of stress hormone receptors are affected by stress (Arnsten, 2009). When faced with a particularly stressful situation, one's ability to utilize higher order cognitive processes is decreased, due to the diminishing of the executive control network (Diamond, 2013).

The finding that adolescents within the study sample were significantly affected by their stressful, urban environments suggests that close attention must also be paid to elements within the urban environment (structural and interpersonal) that may have the unique power

to alter youths' ability to change from one task to another and adapt to new situations, modulate mood, and delay or stop impulsive behavior.

Bronfenbrenner's ecological systems model (1989) provides an appropriate context within which to interpret the shift from "storm and stress" as a result of the individual's direct interaction with his/her immediate environment, to "storm and stress" as a result of a complex level of interactions with environments that are both direct and more distant from the individual, but have a powerful impact on components of EF that impact behavior regulation. Specifically, current day, urban environments are fraught with a number of potential stressors (i.e., higher rates of community violence, financial strain, crowding, and limited access to resources) that hinder the adolescent's ability to successfully navigate Erikson's psychosocial developmental stage of adolescence and beyond, during which the optimal goal is to develop healthy identities and blossom into a productive citizen within our society. Results of the current study clearly indicate that one of the barriers to achieving this goal is exposure to urban stress, which in turn challenges one's ability to effectively utilize executive functions.

Based on the extant literature, the significant relationship between stress and EF was expected. However, one surprising result was that, although parental stress was related to their adolescent's ability to shift from one task to another, it did not impact the adolescent's ability to modulate mood nor delay impulsive behaviors. Given the relatively recent wave of studies that suggest a link between mother's stressful environments, even as early as in vitro, on child outcomes, the fact that parental stress did not significantly impact all areas of EF deserves further investigation. Perhaps this finding can contribute to the discourse on the value of isolating the various executive function subcomponents in neuropsychological assessment and prediction of functional abilities.

Another interesting and unexpected finding was that there was no significant differentiation in many of the demographic variables as they relate to stress or behavior regulation. This was surprising because of the trend in the literature that links ascribed status with a variety of psychosocial outcomes, including components of EF. However, when considering shifting as an outcome, the finding that SES significantly predicted parent stress, and parent stress predicted adolescent stress in the model suggests that there may be some unidentified pathways that can explain the precursors of adolescent stress, which significantly predicts shifting and other elements of EF. Despite the lack of mediational effects, across the three models tested, there is evidence of a significant path for each hypothesized relationship. There is also evidence that some of the more distal relationships became non-significant with the introduction of the more proximal variables, all of which provide some limited evidence of the model and/or indirect effects across hypothesized pathways.

Limitations and future directions

Although the above findings help to address a gap in the existing literature as it relates to factors that predict EF, rather than treating EF as a predictor, there were several limitations in the research. First, a self-report measure was used to assess EF. Whereas this subjective measure offers a relatively reliable method of tapping into this important cognitive capacity, particularly when administered as part of a multimeasure survey to large groups of subjects,

a more objective measure of this construct may offer further insight into the observed relationships. Also, a global rather than area-specific measure of stress was used in the study. Utilizing a more refined measure of stressors and linking the specificity of stressors to specific outcomes (i.e., different components of EF) may help to identify specific environmental factors within the urban environment that can undermine one's ability to delay impulsive behaviors, modulate mood or adapt to new situations.

In spite of these limitations, the current findings help to continue the dialog about the importance of EF by lending insights into the relationships between stress and EF, specifically focusing on the latter as an outcome rather than a predictor. Increasing our knowledge of how stressors are related to different aspects of EF and our ability to utilize higher order cognitive processes can help to develop targeted interventions designed to identify strategies that help adolescents better cope with the pervasive stressors within urban environments. A growing body of research has shown that mindfulness meditation can have positive effects on EF (Teper & Inzlicht, 2013). Furthermore, there is an emerging list of evidence-based programs and practices (see SAMHSA (2017)'s NREEP database) that can be modified for urban youth in order to promote EF in spite of exposure to any toxicity to which they are exposed.

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Table 1.

Bivariate correlations, means, and standard deviations among study variables.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Race	1.00	–	–	–	–	–	–	–	–	–	–
2. Grade	.15*	1.00	–	–	–	–	–	–	–	–	–
3. Age	.12*	.97*	1.00	–	–	–	–	–	–	–	–
4. Gender	.03	.02	.02	1.00	–	–	–		–	–	–
5. SES	−.17*	−.27*	−.31*	−.03	1.00	–	–	–	–	–	–
6. SES group	−.24*	−.27*	−.30	−.03	.95*	1.00	–	–	–	–	–
7. BRIEF_Inhib	.05	.11	.09	.08	.08	.06	1.00	–	–	–	–
8. BRIEF_Shift	.14*	.23*	.21*	.15*	−.05	−.04	.70*	1.00	–	–	–
9. BRIEF_EmC	.15*	.17*	.16*	.29*	−.04	−.03	.71*	.70*	1.00	–	–
10. Adol stress	.01	.33*	.33*	−.01	−.04	−.03	.35*	.29*	.27*	1.00	–
11. Parent stress	−.07	−.04	−.04	−.01	.01	.01	.13	.15	.09	.27*	1.00
M	3.04	4.72	15.00	–	46.22	3.97	12.81	15.22	15.23	145.7	–
SD	2.00	1.86	1.95	–	10.50	.86	3.50	4.10	4.10	21.73	–
n	267	267	267	267	68	68	264	264	264	247	–

* $p < .05$.

Black/African American was coded as 0, White/Caucasian was coded as 5.

Female was coded as 2; male was coded as 1.

Table 2.

Multiple linear regression and interaction predicting EF (emotion control).

Variable	B	SE B	β	R^2
Model 1	–	–	–	.215
Race	.337	.179	.140	–
Gender	2.55	.718	.262	–
Age	−.016	.192	−.006	–
Adolescent stress		.019	.311*	–
Parent stress	.071	.031	.102	
Model 2				.216
Race	.337	.179	−.005	–
Gender	2.58	.731	.266**	–
Age	.012	.193	−.005	–
Adolescent stress	.064	.035	.278*	–
Parent stress	−.018	.226	−.044	–
Adolescent * parent	.000	.002	.160	–

* $p < .05$,

** $p < .01$.

Table 3.

Multiple linear regression and interaction predicting EF (shifting).

Variable	B	SE B	β	R^2
Model 1	–	–	–	.208
Race	.255	.153	.124	–
Gender	.572	.615	.069	–
Age	.262	.165	.126	–
Adolescent stress	.059	.016	.300**	–
Parent stress	.052	.027	.153	–
Model 2	–	–	–	.208
Race	.255	.154	.124	–
Gender	.558	.627	.067	–
Age	.260	.166	−.005	–
Adolescent stress	.062	.030	.317*	–
Parent stress	.077	.194	.225	–
adolescent *parent stress	.000	.001	−.080	–

*$p < .05$,

**$p < .01$.

Table 4.

Multiple linear regression and interaction predicting EF (inhibit).

Variable	B	SE B	β	R^2
Model 1	–	–	–	.192
Race	.108	.125	.066	–
Gender	−.058	.502	−.009	–
Age	−.150	.135	−.090	–
adolescent stress	.063	.013	.397*	–
Parent stress	.035	.022	.125	–
Model 2				.192
Race	.108	.125	.066	–
Gender	.003	.511	.000	–
Age	−.145	.135	−.086	–
Adolescent stress	.049	.024	.308*	–
Parent stress	−.073	.158	−.262	–
Adolescent stress *parent stress	.001	.001	.425	–

*$p < .05$,

**$p < .01$.