

Fall 11-20-2018

The Ecology of Educational Attainment: Resilience Among Black High School Students

Jacqueline O. Davis
DePaul University, jdavi153@depaul.edu

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The Ecology of Educational Attainment: Resilience Among Black High School Students

A Thesis

Presented into

Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

By

Jacqueline Olivia Davis

November 15, 2018

Department of Psychology
College of Science and Health
DePaul University
Chicago, Illinois

Thesis Committee

Susan D. McMahon, Ph.D., Chairperson

Bernadette Sánchez, Ph.D.

Acknowledgments

I would like to express my sincere appreciation to my thesis chair Susan McMahon and committee member Bernadette Sánchez for their encouragement and insights throughout this project. My deepest gratitude goes to my partner, parents, and sisters for their unwavering support throughout this process.

Biography

Jacqueline Olivia Davis was born in Norwood, Massachusetts, January 10, 1992. She graduated from Sharon High School in Sharon, Massachusetts. She received a Bachelor of Arts degree in Psychology from Boston College in 2014. She is currently pursuing a Doctor of Philosophy degree in Clinical Psychology at DePaul University.

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Abstract

Achievement gaps among students of color in the United States are pervasive and persistent. Identifying trajectories of resilience among Black teens is an important step toward promoting their educational attainment. This study identified risk and protective factors at the individual, family, and school levels hypothesized to influence Black high school students' attainment. The effects of these risk (behavior problems, lack of college planning, and school problems) and protective factors (academic self-efficacy, parent involvement, and academic climate) on Black students' educational attainment at 10-year follow-up were assessed. The sample included 2,423 Black 10th-grade students who participated in the Education Longitudinal Study of 2002. Multiple hierarchical regression was employed to test the compensatory and protective factor models of resilience. Fewer behavior problems and school problems significantly predicted greater educational attainment at age 26. Higher academic self-efficacy, more college planning, and a more academically oriented climate also predicted greater educational attainment at age 26. In addition, academic climate moderated the relationship between school problems and educational attainment: Black students attending schools with fewer problems benefitted more from an academically oriented climate than students attending schools with more problems. The findings provide a better understanding of how factors at multiple levels contribute to Black youths' educational attainment in adulthood. Implications for future research and practice are discussed, including recommendations for reducing school problems, increasing college planning, and promoting an academic climate.

Introduction

A long-standing and well-documented academic achievement gap exists between students of color and their White counterparts in the U.S. (Barton & Coley, 2009; Howard, 2010). Despite gradual increases in educational attainment for all racial/ethnic groups, this gap persists for Black¹ students. In 2013, 71% of Black high school freshmen graduated within four years compared to 87% of White students (McFarland, Stark, & Cui, 2016), and the difference in Black and White U.S. citizens earning a Bachelor's degree has remained between 11-14% since the late 1980s (Ryan & Bauman, 2016). Black youth are a particularly vulnerable group, as they experience disproportionately high rates of chronic stressors (e.g., poverty, community violence, racism), which often negatively impact academic success (Deater-Deckard, Dodge, Bates, & Pettit, 1998; Evans, 2004). However, many Black youth also benefit from protective factors that promote resilience and educational attainment; these factors are typically unexamined within an achievement gap narrative that emphasizes Black students' failures to achieve. Furthermore, much research on the academic outcomes of Black youth examines only low-SES, urban, and disadvantaged youth; this focus lends itself to a deficit-based perspective and leaves researchers with limited knowledge of normative, typically-developing Black youth (Brown & Jones, 2004; Howard, 1996). In taking a strengths-based, within-group approach to examine Black adolescents' educational attainment, protective factors at the individual, family, and school levels are important to consider.

Resilience and Academic Outcomes

Despite added challenges Black students face during their schooling, many overcome

¹ The author uses the term 'Black' in this paper, as it is considered to be a more inclusive descriptor. 'African-American' will be used when citing other researchers who used this term in their own work.

them and demonstrate resilience via their academic outcomes (e.g., achievement, attainment). Resilience involves “factors and processes that interrupt the trajectory from risk to problem behaviors or psychopathology and thereby result in adaptive outcomes even in the presence of adversity” (Zimmerman & Arunkumar, 1994, p. 4). Resilience functions in various ways. The compensatory model of resilience says a protective factor compensates for the effect of a risk factor on an outcome (Garmezy, Masten, & Tellegen, 1984). For instance, having friends who drink alcohol increases an adolescent’s likelihood of drinking alcohol, but involvement in extracurricular activities reduces the likelihood of this outcome (Zimmerman, Bingenheimer, & Notaro, 2002). In the protective factor model of resilience, a protective variable may (a) reduce the effect of a risk factor (risk-protective mechanism) or (b) promote the effect of another protective factor (protective-protective mechanism) (Zimmerman & Arunkumar, 1994). For instance, assertiveness and high self-esteem have been found to reduce the negative effects of parental conflict on adolescent girls’ depressive moods (risk-protective mechanism) (Brook, Nomura, & Cohen, 1989). The present study tests the compensatory model and the risk-protective mechanism of the protective factor model to examine the effects of both risk and protective factors on Black youths’ educational attainment. More specifically, the author assesses (a) whether the identified risk and protective factors have significant main effects on educational attainment, and (b) whether Black students with higher risk experience stronger effects from these protective factors on their educational attainment.

Despite a surge of resilience research over the past 30 years, the literature still has limitations. Some of these include poor distinction between resilience and related concepts, varying definitions of risk and protective factors, and a lack of basis in research particular to the studied group (Luthar, 2015; Luthar, Cicchetti, & Becker, 2000). In addition, while some

exemplary resilience work with Black adolescents exists (e.g., Caldwell, Sellers, Bernat, & Zimmerman, 2004; Gutman, Sameroff, & Eccles, 2002; Hurd, Sánchez, Zimmerman, & Caldwell, 2012), additional research examining multiple levels of influence is warranted. Resilience literature often focuses on individual and personal attributes, which can lead to victim-blaming and interventions overly focused on changing the individual (Zimmerman & Arunkumar, 1994). The current study examines risk and protective factors influencing the resilience and educational attainment of Black students at multiple ecological levels.

Ecological Framework

Scholars have proposed numerous, interconnected causes of achievement gaps, including socioeconomic status (SES) (e.g., Anyon, 2014), disproportionate discipline of Black students (e.g., Skiba et al., 2011), and lower expectations for Black students (e.g., Ogbu, 2003). Identifying protective factors that support Black students' resilience is one way to promote their educational attainment. An ecological framework allows for identification of such factors on multiple levels of analysis and a greater understanding of the complex processes underlying a social problem (e.g., Flynn, Sánchez, & Harper, 2011; McMahon, Keys, Berardi, & Crouch, 2011b). The present study includes factors at the individual (e.g., self-efficacy), microsystem (e.g., at-home parent involvement), and mesosystem (e.g., school-based parent involvement) levels of Bronfenbrenner's (1979) ecological model. Specifically, the author examines risk and protective factors at the individual, family, and school levels as facilitators or barriers to the educational attainment of Black students.

Individual level factors. Variables at the individual level can impact one's expressed resilience both positively or negatively. Academic self-efficacy is a strong predictor of student achievement, motivation, and persistence (McMahon, Parnes, Keys, & Viola, 2008). A positive

academic self-concept predicts African-American students' achievement at historically Black colleges and universities (Nasim, Roberts, Harrell, & Young, 2005) and may protect against the negative effects of community violence and poverty (Li, Nussbaum, & Richards, 2007).

Alternatively, youth who display behavior problems in school are at risk for worse academic outcomes (e.g., Masten et al., 2005). Perceived externalizing behavior, even when misinterpreted, contributes to reduced academic performance among Black boys (e.g., Skiba, Michael, Nardo, & Peterson, 2002). In contrast, behavioral self-regulation buffers against effects of community violence and poverty for African-American youth (Shumow, Vandell, & Posner, 1999). This study examines academic self-efficacy and behavior problems as individual-level risk and protective factors, respectively.

Family level factors. The family is a vital source of support for Black youth (e.g., McMahon, Felix, & Nagarajan, 2011a). Among Black adolescents, parental involvement protects against negative effects of poverty (Li et al., 2007) and is associated with academic achievement (e.g., Hill & Craft, 2003; Tatum, 2004). Parent involvement may be more salient for Black youth due to increased challenges they face from systemic oppressive forces (Hill et al., 2004). One important function of parent involvement for teens is planning for college and the future generally. Parent encouragement is the strongest predictor of students' post-secondary education plans (e.g., Cabrera & La Nasa, 2000). The odds of college enrollment increase based on the frequency with which parents discuss education-related topics with their child, including college entrance exams and college applications (Perna & Titus, 2005). Thus, the present study examines general parent involvement as a protective factor and lack of college planning as a risk factor at the family level.

School level factors. The school itself also influences students' achievement (Cohen, McCabe, Michelli, & Pickeral, 2009); however, less research at this level has specifically focused on Black students. Generally, perceptions of academic climate can positively influence minority students' achievement (Wilkins & Kuperminc, 2009). Schools are more effective when more time is spent on instruction, demanding curricula are offered, and teachers set high expectations for students (Phillips, 1997). Among a sample of urban high school students, 53% of whom were African-American, Roderick, Coca, and Nagaoaka (2011) found those who attend schools where: (a) there is a pattern of attending college, (b) teachers set high expectations, and (c) teachers provide strong supports for college attendance, students are more likely to plan for, be accepted to, and enroll in a four-year college. However, problems within the school negatively impact students' success. Issues such as truancy, peer harassment, fighting, and poor student-teacher relations are associated with diminished academic achievement (e.g., Crosnoe, Johnson, & Elder Jr., 2004), as are more severe issues that reduce perceptions of school safety (e.g., possession of weapons, gang activity, robbery) (Barton & Coley, 2009). Alternatively, an orderly school environment and positive student-faculty relationships promote achievement (e.g., Cohen et al., 2009; McMahon et al., 2008). The present study examines academic climate as a protective factor and school problems as a risk factor.

Rationale for Current Study

The purpose of this study is to gain a better understanding of factors contributing to Black high school students' resilience and educational attainment in adulthood. Risk and protective factors are assessed at the individual (academic self-efficacy and behavior problems), family (parent involvement and lack of college planning), and school levels (academic climate and school problems). Much of the research on Black students' educational outcomes includes

only urban and disadvantaged youth; this limitation lends itself to a deficit-based perspective and restricted knowledge of normative Black youth development (e.g., Brown & Jones, 2004).

Furthermore, resilience literature often focuses on personal attributes, which can lead to victim-blaming (Zimmerman & Arunkumar, 1994). There is a need for longitudinal resilience research with a nationally representative sample of Black youth examining multiple ecological levels (e.g., Fergus & Zimmerman, 2005; Luthar et al., 2000). This study builds upon prior research by: (a) using a large, nationally representative sample of Black 10th-grade students, (b) studying risk and protective variables at the individual, family, and school levels, (c) testing theoretical models of resilience with longitudinal data, and (d) taking a strengths-based perspective by conducting a within-group study focused on promotion of attainment. By identifying resilience processes among Black teens at the individual, family, and school levels, caregivers, educators, researchers, and policy-makers can then work to support these protective factors to promote attainment.

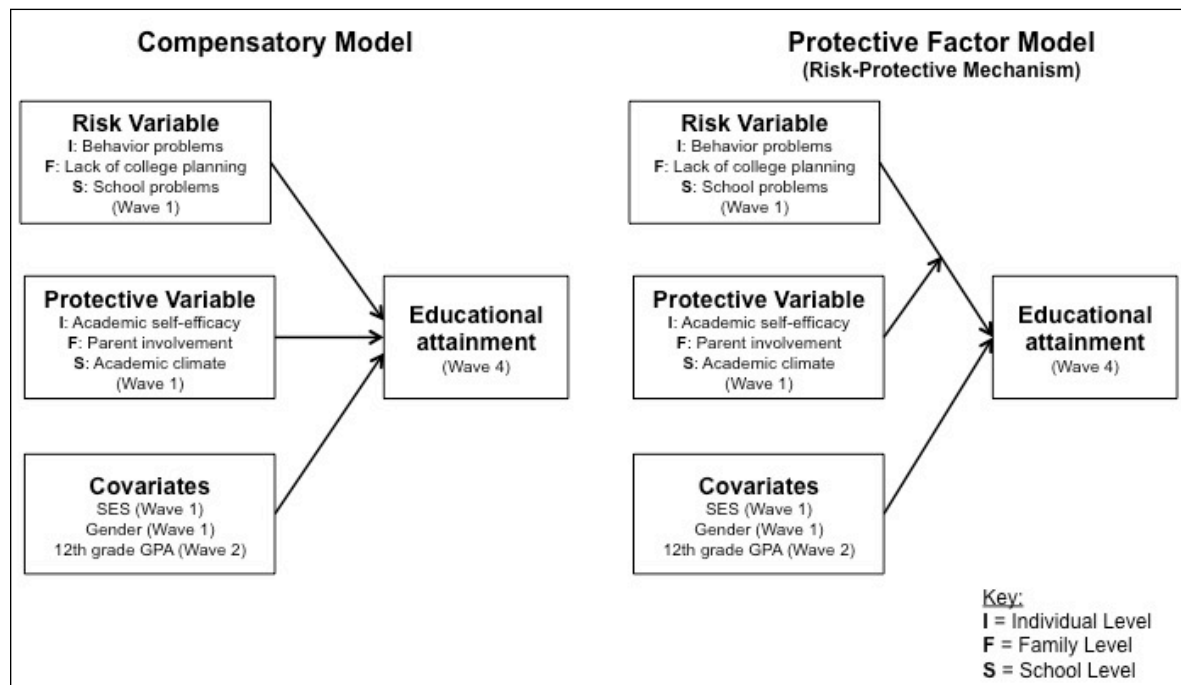


Figure 1. Compensatory and Protective Factor Models of Resilience

The author hypothesizes: (1) The compensatory model will be supported (see Figure 1), such that each risk variable will have a negative main effect on educational attainment at follow-up, and each protective variable will have a positive main effect on educational attainment at follow-up. (2) The risk-protective mechanism of the protective factor model will be supported (see Figure 1): interaction terms examined by level will yield significant results, such that students with higher levels of risk will experience a stronger effect from the protective variable, resulting in greater educational attainment at follow-up. There will be significant interactions between: (a) behavior problems and academic self-efficacy, (b) lack of college planning and parent involvement, and (c) school problems and academic climate.

Method

Data Source and Participants

The data used are from the Education Longitudinal Study of 2002 (ELS:2002), a multi-site, longitudinal study sponsored by the National Center for Education Statistics (NCES). ELS:2002 examined the educational, vocational, and personal development of a nationally representative sample of U.S. high school students over the course of 10 years. NCES collected data from students, parents, teachers, school administrators, and school records. Base year data collection began in 2002 (Wave 1) when participants were enrolled in 10th grade. Follow-up data collection took place in 2004 (Wave 2, 12th grade), 2006 (Wave 3, age 20), and 2012 (Wave 4, age 26). Full procedures are described elsewhere (Ingels, Pratt, Rogers, Siegel, & Stutts, 2004; Lauff & Ingels, 2014). This study used data from the 2,423 ELS:2002 participants who self-identified as Black or African-American.

Measures

Data were drawn from student, parent, and administrator surveys at Wave 1, school records at Wave 2, and student surveys at Wave 4. Risk and protective predictors were drawn from the student, parent, and administrator Wave 1 surveys. Risk factors assessed were behavior problems (individual level), lack of college planning (family level), and school problems (school level). Protective factors assessed were academic self-efficacy (individual level), parent involvement (family level), and academic climate (school level). The outcome, educational attainment, was drawn from participant surveys at Wave 4. The mean was used for all variables composed of multiple survey items.

Behavior problems. Six items from the student Wave 1 survey measured behavior problems in school. Students were asked how often they experienced certain behavior problems in school within the first semester of the year. Problems ranged from minor (e.g., being late to school) to severe (e.g., being suspended). Response options were coded on a 1 (*Never*) to 5 (*10 or More Times*) scale. Higher scores indicate greater frequency of behavior problems in school (Cronbach's $\alpha=.69$).

Academic self-efficacy. Academic self-efficacy was measured as the mean of two Wave 1 composite variables: math self-efficacy ($\alpha=.98$) and English self-efficacy ($\alpha=.99$). NCES created each self-efficacy composite variable by combining responses to five items rated on a four-point scale (1 = *Almost Never*, 4 = *Almost Always*). Items included statements such as "I'm certain I can master the skills being taught in my math/English class" and "I'm confident I can do an excellent job on my math/English assignments." The math and English self-efficacy variables were standardized to z-scores with a mean of zero and a standard deviation of one. Higher values indicate greater academic self-efficacy ($\alpha=.99$).

Lack of college planning. Two items from the parent Wave 1 survey assessed lack of college planning within the family. The items asked how often the parents had provided information to their 10th-grader over the past year about plans and preparation for college entrance exams and applying to college. The response option scale ranged from 1 (*Never*) to 3 (*Often*). Items were reverse recoded; higher scores indicate a lack of college planning ($\alpha=.76$).

Parent involvement. A set of 16 items from the parent Wave 1 survey measured parent involvement. Four items asked parents how often they perform certain monitoring and involvement activities on a 1 (*Never*) to 4 (*Always*). These items included checking the child's homework completion, discussing the child's report card, and making and enforcing a curfew for the child. Twelve items asked parents how often over the past year they participated in various activities with their child on a four-point scale from 1 (*Never*) to 4 (*Frequently*). A broad range of activities were assessed, including attending school activities, working on homework, attending family social functions, working on a hobby, and spending time talking. These 16 items were combined to create one parent involvement scale ($\alpha=.87$). Higher values indicate greater parent involvement.

School problems. A set of 19 items from the Wave 1 administrator survey measured school problems. The principal was asked how frequently various problems occurred at his/her school. Some of the problems included tardiness, absenteeism, physical conflicts, theft, vandalism, weapon possession, gang activity, and use or sale of alcohol or drugs. Response options ranged from 1 (*Happens Daily*) to 5 (*Never Happens*). Items were reverse recoded; higher values indicate a greater magnitude of school problems ($\alpha=.87$).

Academic climate. Using principal factor analysis, NCES created a composite variable from five items on the administrator Wave 1 survey to measure academic climate. The principal

was asked how much each statement described his/her school's climate on a scale from 1 (*Not Accurate at All*) to 5 (*Very Accurate*). Example statements included: "Teachers press students to achieve," and "learning is high priority for students." Higher values indicate a more academically-oriented school climate ($\alpha=.99$).

Educational attainment. At Wave 4, participants were asked to report their highest level of education attained. NCES organized the response options into 10 categories from 1 (*Did Not Finish High School*) to 10 (*Doctoral Degree*). This measure accounts for highest degree completed at Wave 4, regardless of whether participants were in the process of completing advanced degrees.

Covariates. Analyses controlled for SES, given its known effects on educational attainment (e.g., Anyon, 2014). SES was measured with a composite variable created by NCES from parent questionnaire data. The SES composite variable is based on five equally-weighted, standardized components: family income, mother/guardian's education and occupation, and father/guardian's education and occupation. SES scores were standardized to z-scores with a mean of zero and a standard deviation of one. Analyses also controlled for gender because some studies have found differential gender effects related to resilience outcomes (e.g., Erdem & Slesnick, 2010; Evans, Marsh, & Weigel, 2010). Gender was assessed via one item on the Wave 1 student survey. The response options were dichotomous (male or female) and, therefore, did not allow participants to select other gender identities. Finally, due to its correlation with educational attainment ($r = .374, p < .01$), all models controlled for 12th grade GPA. Participants' 12th grade GPA was drawn from school transcripts at Wave 2. GPA is based on a four-point scale (A = 4.0, F = 0.0) and unweighted.

Analyses

Analyses were conducted using SPSS statistical software. Hierarchical multiple regression was used to test the compensatory model and the risk-protective mechanism of the protective factor model. This method is useful when there is a logical or temporal reason to enter predictors into a regression equation in a certain order and provides the unique contribution of each predictor to the total variance (Cohen & Cohen, 1975). Many researchers have found this to be an effective means to examine risk and protective effects and resilience models (e.g., Erdem & Slesnick, 2010; Evans et al., 2010; Garmezy et al., 1984).

To begin the individual level analyses, the covariates (gender, SES, and 12th grade GPA) were entered together as a block to control for their effects on educational attainment (Block 1). Next, the risk variable (behavior problems) and the protective variable (academic self-efficacy) were entered in Blocks 2 and 3, respectively, to assess the compensatory model. Finally, the protective factor model was assessed with the addition of the interaction term in Block 4 (behavior problems X academic self-efficacy). The same procedure was used to test the compensatory and protective factor models at the family and school levels.

Results

Table 1 presents descriptive statistics and bivariate correlations among the variables of interest. Descriptive statistics and a histogram showed the distribution of behavior problems was negatively skewed. All analyses including behavior problems used a log transformation of the variable to improve the distribution. Diagnostics revealed the transformation was successful in reducing the skew. In addition, SPSS identified four cases with extreme values (defined as > 3.0 interquartile ranges outside the vertical boxplot) on school problems. These cases were omitted from all analyses. No other cases with extreme values were identified. All bivariate correlations among variables were in the expected positive or negative direction; however, not all correlations

were statistically significant (see Table 1). A preliminary multiple regression model including the covariates explained 19.3% of the variance in educational attainment ($R^2 = .193$, $F(3, 1413) = 112.525$, $p < .001$). SES ($\beta = .236$, $p < .001$) and 12th grade GPA ($\beta = .329$, $p < .000$) were significant predictors, but gender was not ($\beta = .047$, $p = .053$).

Table 1

Correlations, Means, and Standard Deviations

Variable	Mean (SD)	1	2	3	4	5	6	7
1. Educational attainment	3.87 (1.67)	–						
2. Behavior problems	0.213 (0.12)	-.226**	–					
3. Academic self-efficacy	0.03 (0.82)	.146**	-.139**	–				
4. Lack of college planning	1.74 (0.69)	-.166**	.069**	-.099**	–			
5. Parent involvement	3.15 (0.51)	.127**	-.086**	.055	-.364**	–		
6. School problems	2.4 (0.38)	-.124**	.117**	-.077*	.047	-.071*	–	
7. Academic climate	-0.02 (0.16)	.138**	-.120**	.026	-.039	.058*	-.386**	–

* $p < .05$; ** $p < .01$

Individual Level Analyses

The compensatory model was supported: demonstrating fewer behavior problems and greater academic self-efficacy was associated with greater educational attainment at age 26 (see Table 2). The compensatory model (Blocks 1-3) explained 19.5% of the variance in educational attainment ($R^2 = .195$, $F(5, 749) = 36.259$, $p < .001$). The addition of the interaction term in Block 4 was not significant; therefore, the protective factor model was not supported.

Family Level Analyses

Lack of college planning was associated with less educational attainment at age 26 ($R^2 = .222$, $F(4, 1064) = 75.860$, $p < .001$) (Block 2; see Table 2). However, parent involvement did not influence educational attainment, nor did the interaction term. Therefore, neither the compensatory model nor the protective factor model was supported.

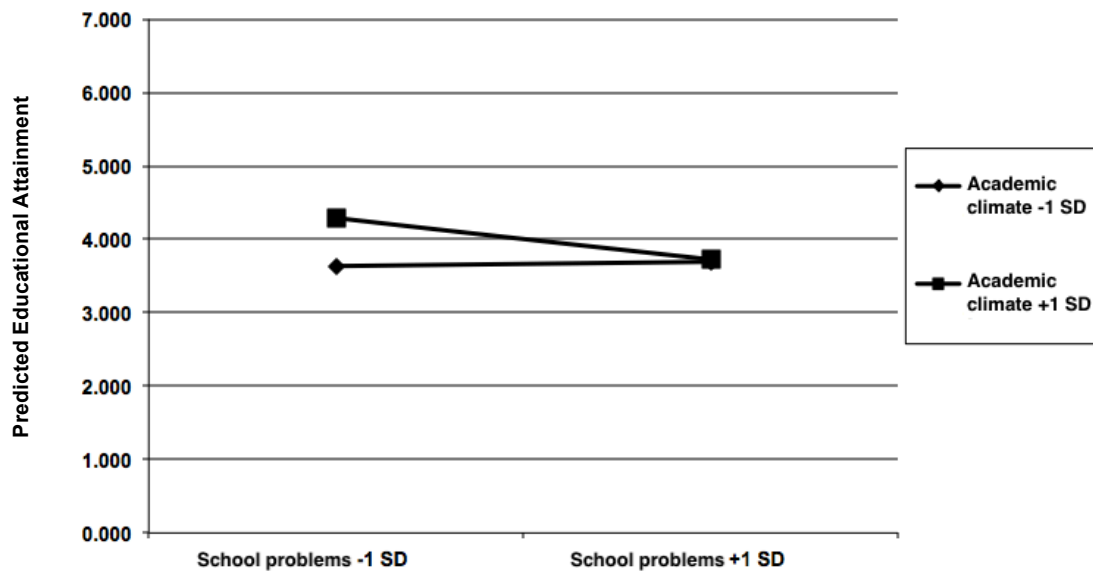


Figure 2. Academic climate as a moderator of the association between school problems and educational attainment

School Level Analyses

The compensatory model was supported. In Block 2, fewer school problems predicted greater educational attainment at age 26 ($\beta = -.067$, $p = .018$). In Block 3, a more academically oriented climate also predicted greater educational attainment; however, school problems became non-significant (see Table 2). The compensatory model (Blocks 1-3) explained 20.3% of the variance in educational attainment ($R^2 = .203$, $F(5, 1024) = 52.179$, $p < .001$). The addition of the interaction term in Block 4 was also significant: academic climate moderated the relationship between school problems and educational attainment (see Figure 2). However, this interaction was not in the expected direction, so the protective factor model was not supported. Rather than

Table 2

Hierarchical Multiple Regression Models Predicting Educational Attainment in Adulthood

	Variable	Compensatory Model (Block 3)				Protective Factor Model (Block 4)			
		<i>B</i>	<i>SE B</i>	β	<i>p</i>	<i>B</i>	<i>SE B</i>	β	<i>p</i>
<u>Individual Level</u>	Gender	.046	.117	.013	.696	.045	.117	.013	.384
	SES	.517	.086	.204	.000	.517	.086	.203	.000
	12th grade GPA	.634	.077	.299	.000	.634	.077	.299	.000
	Behavior problems	-1.035	.513	-.071	.044	-1.037	.513	-.072	.044
	Academic self-efficacy	.202	.069	.096	.004	.220	.127	.105	.084
	Behavior problems X Academic self-efficacy	—	—	—	—	-0.092	0.52	-0.011	0.86
<u>Family Level</u>	Gender	.162	.094	.047	.086	.161	.094	.047	.090
	SES	.598	.070	.243	.000	.599	.070	.243	.000
	12th grade GPA	.730	.060	.335	.000	.729	.060	.335	.000
	Lack of college planning	-.268	.073	-.109	.000	-.024	.406	-.010	.953
	Parent involvement	-.009	.100	-.003	.930	.134	.253	.040	.598
	Lack of college planning X Parent involvement	—	—	—	—	-.078	.128	-.094	.541
<u>School Level</u>	Gender	.187	.094	.056	.047	.187	.094	.056	.047
	SES	.549	.069	.230	.000	.535	.069	.225	.000
	12th grade GPA	.665	.061	.311	.000	.657	.061	.307	.000
	School problems	-.182	.132	-.042	.169	-.144	.132	-.033	.277
	Academic climate	.725	.313	.071	.021	5.243	1.742	.511	.003
	School problems X Academic climate	—	—	—	—	-1.899	.720	-.442	.009

providing a stronger protective effect for students who attended schools with more problems, results indicated Black students who attended schools with fewer school problems experienced a greater benefit from a more academically oriented climate in terms of their educational attainment at age 26. For Black students who attended schools with a high level of school problems, academic climate did not influence educational attainment in adulthood. This moderation model explained 20.8% of the total variance ($R^2 = .208$, $F(6, 1023) = 44.893$, $p < .001$).

Discussion

The present study contributes to the existing literature on Black youths' educational attainment by taking a resilience, strengths-based, and ecological approach and using longitudinal data from a nationally-representative sample. Findings indicated individual, family, and school level factors influenced Black adolescents' educational attainment at 10-year follow-up (approximately age 26), above and beyond the influence of prior academic achievement and SES. Academic self-efficacy and an academically oriented climate promoted students' educational attainment, whereas behavior problems, a lack of college planning, and school problems negatively influenced educational attainment. Black students who attended schools with fewer problems benefitted more from an academically oriented climate than those whose schools had more problems. These findings have implications for future research in this area, as well as for parent and school intervention strategies for promoting Black teens' educational attainment.

Individual Level

Individual level analyses found students who reported fewer behavior problems and greater academic self-efficacy demonstrated greater resilience in terms of educational attainment

10 years later, taking into account prior achievement (i.e., 12th grade GPA). These findings support previous research indicating students displaying behavior problems in school are at risk for worse academic outcomes (e.g., McMahon et al., 2011b), while those with positive academic self-efficacy demonstrate greater achievement (e.g., Nasim et al., 2005). However, the protective factor model was not supported, suggesting academic self-efficacy was not a salient enough protective factor to counteract the influence of behavior problems on Black students' educational attainment. Other protective factors may counteract these effects more successfully. For instance, mentoring positively impacts students' academic outcomes (e.g., Sánchez, Hurd, Neblett, & Vaclavik, 2017), and students with behavior problems are more likely to benefit from mentoring programs than students without these problems (DuBois, Portillo, Rhodes, Silverthorn & Valentine, 2011). In addition, it is possible high levels of both academic self-efficacy and behavior problems do not coincide frequently, which could make it more difficult to observe this interaction in a general student population. Students struggling academically often display disruptive behavior in the classroom due to frustration or embarrassment (Hirschi, 1969). These students likely have poor academic self-efficacy and may require additional socioemotional and academic supports to achieve fully.

Family Level

As hypothesized, results indicated students whose parents engaged in less college planning with them had less educational attainment at 10-year follow-up, taking into account 12th grade GPA. This finding emphasizes the importance of caregivers' support and involvement in their children's education and college planning (e.g., Cabrera & La Nasa, 2000; Perna & Titus, 2005). Charles, Roscigno, and Torres (2007) found parents of minority groups and low-SES background are less likely than White and more affluent parents to discuss college plans with

their child. Therefore, schools must assist parents and students with this process—especially schools serving students of color and low-SES youth.

Contradictory to prior evidence (e.g., Connell, Spencer, & Aber, 1994; Epstein & Sanders, 2002; Hill & Taylor, 2004; Hill et al., 2004), general parent involvement did not affect Black students' educational attainment in this study. However, much of the research on parent involvement focuses on elementary school youth. It is possible this study's measure of parent involvement, which assessed a broad range of activities (e.g., parental monitoring, home-based school involvement, social activities, quality time spent together), did not effectively capture the types of involvement most salient for Black students' educational attainment. Based on the literature, parent school involvement (e.g., communicating with teachers, helping with academic activities at home, and attending school events) may be particularly protective for Black youth (e.g., Hill et al., 2004). In addition, parent support is protective for African-American adolescents (e.g., Benhorin & McMahon, 2008; Caldwell et al., 2004; McMahon et al., 2011a; Zimmerman, Ramirez-Valles, Zapert, & Maton, 2000). Future research should examine these parental protective factors more specifically across developmental stages to assess their benefits on the educational attainment of Black youth.

School Level

Results of school level analyses indicated Black students who attended high schools with fewer school problems and a more academically oriented climate have greater educational attainment at age 26. Further, Black students who attended high schools with fewer school problems benefitted more from academic climate than students whose high schools had more problems. Students whose schools had high levels of school problems did not benefit from an academically oriented climate. This interaction suggests schools may have difficulty promoting

an academically oriented climate without first (or simultaneously) reducing school problems. These findings emphasize the importance of both addressing problems and promoting academic climate within schools (e.g., Roderick et al., 2011). While school problems (e.g., tardiness, absenteeism, fights, theft, weapons possession, drug possession) are not simple to eliminate, effective and consistently applied school policies are an important first step (Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013). Further, school communities must maintain high expectations for orderliness, student achievement, and quality of teaching. The high expectations component of academic climate is particularly notable because many teachers, whether consciously or not, may not believe Black students are as capable as their White peers (Ogbu, 2003). Educators must be made aware that differing expectations of students can have long-term negative effects on their educational attainment.

Strengths and Limitations

This study benefits from several strengths, including a large and nationally-representative sample, longitudinal data, multiple ecological levels, and a strengths-based approach. Further, the findings were strengthened by the stringent control variables used, particularly SES and prior achievement (i.e., 12th grade GPA). However, this study also has its limitations. At 10-year follow-up, participants may have been in the process of completing degrees, but the dependent variable only accounted for highest level of education completed. Imperfect scales, both in terms of reliability and validity, are also a limitation of this study. In particular, the parent involvement measure may have been weaker than the others: surprisingly, it was not found to be a significant predictor. Measurement is an important consideration for future resilience research examining these risk and protective factors.

Implications for Future Research

Findings of this study suggest several future directions for research on Black youths' attainment and resilience. First, research identifying protective factors that effectively reduce the impact of behavior problems on educational attainment is warranted, given students displaying disruptive behaviors are at high risk for poor outcomes (e.g., Masten et al., 2005). Next, future studies should examine which types of parent involvement foster Black adolescents' educational attainment, so these kinds of involvement can be promoted. More broadly, additional research is needed examining protective factors for Black youths' resilience on multiple levels of analysis, particularly at the school and community levels (Fergus & Zimmerman, 2005; Li et al., 2007). Finally, more theory-driven resilience research is needed. Researchers often test resilience models without labeling them as such, contributing to a lack of consistent terminology in the literature (Luthar, 2015).

Implications for Parents and Schools

The current findings indicate multilevel intervention is critical for promoting Black adolescents' educational attainment. Family level analyses highlight the importance of caregivers' involvement in their teens' college planning (e.g., discussing grades, entrance exams, and college applications) (Perna & Titus, 2005). However, not all parents have sufficient cultural capital or financial resources to assist with this process. Schools can aid families by offering college preparation and outreach programs and by helping students revise essays, prepare financial aid applications, and locate scholarship opportunities (Choy, Horn, Nuñez, & Chen, 2000).

Given the negative influence of school problems on Black students' educational attainment, schools must implement policies to reduce these issues. Doing so may also improve the school community's ability to foster an academically oriented climate. Discipline policies

should be clear, consistently applied, and appropriate to the severity of the infraction (American Psychological Association Zero Tolerance Task Force, 2008; Thapa et al., 2013); such policies reduce the likelihood of improper discipline of Black students (Skiba et al., 2011). Schools can foster academic climate by setting high expectations for students. For instance, Black students demonstrating the requisite abilities should be encouraged to take advanced courses (Barton & Coley, 2009; Choy et al., 2000). Further, hiring diverse teaching staff should be a priority: teachers of color have higher expectations for Black students (Beady and Hansell, 1981; Klopfenstein, 2004), and bureaucratic representation of teachers of color is associated with greater achievement for students of color (e.g., Pitts, 2007).

Conclusions

Resilience theory provides a useful way of examining both negative and positive influences on Black students' educational attainment. An ecological framework allows for this analysis at multiple levels, thereby keeping the research focus on context and reducing the likelihood of victim-blaming. This study's findings suggest several interconnected ways to support Black adolescents' resilience and educational attainment: fostering students' academic self-efficacy; providing interventions to address behavior problems; increasing caregivers' involvement in their children's college planning; reducing school problems; and promoting an academically oriented climate within the school. There is inevitably a myriad of other risk and protective factors at play that are worth examining in future studies. In particular, researchers should examine different types of parent involvement, as well as school and community factors generally, to improve current understanding of Black students' academic resilience. Addressing school problems and promoting college planning and academic climate are crucial steps toward

increasing Black students' educational attainment and helping them to achieve their full potential.

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Appendix A

Results of Additional Analyses

Regression Models Predicting 12th Grade GPA

The author hypothesized the compensatory and protective factor models of resilience would be supported, such that (1) each risk variable would have a negative main effect on 12th grade GPA at follow-up, (2) each protective variable would have a positive main effect on 12th grade GPA at follow-up, and (3) interaction terms examined by level would yield significant results, where students with higher levels of risk would experience stronger effects from the protective variable on their 12th grade GPA. Hierarchical multiple regression was used to test these models. To begin the individual level analyses, the covariates (gender, SES, and 10th grade GPA) were entered together as a block to control for their effects on 12th grade GPA (Block 1). The risk variable (behavior problems) and protective variable (academic self-efficacy) were entered in Blocks 2 and 3, respectively, to assess the compensatory model. The protective factor model was assessed next, with the addition of the interaction term in Block 4 (behavior problems X academic self-efficacy). The same procedure was used to test the compensatory and protective factor models at the family level and school level.

At the individual level, the compensatory model was supported: fewer behavioral problems and greater academic self-efficacy were associated with higher 12th grade GPA at two-year follow-up (see Table A1). The compensatory model (Blocks 1-3) explained 37.5% of the variance in 12th grade GPA ($R^2 = .375$, $F(5, 917) = 110.188$, $p < .001$). The addition of the interaction term in Block 4 was not significant; therefore, the protective factor model was not supported. At the family level, neither lack of college planning nor parent involvement nor their interaction had a significant effect on 12th grade GPA at two-year follow-up (see Table A1). At

the school level, a positive academic climate was associated with higher 12th grade GPA at two-year follow-up ($R^2 = .365$, $F(5, 1269) = 146.080$, $p < .001$) (Block 3; see Table A1). However, school problems did not influence 12th grade GPA, nor did the interaction term. Therefore, neither the compensatory nor the protective factor model was supported at the family or school level.

Proposed Mediation Model

The author hypothesized 12th grade GPA mediated the effects of the risk and protective predictors on educational attainment at age 26. A multiple regression model including the covariates (gender, SES, and 10th grade GPA), risk factors, and protective factors explained 37.6% of the variance in 12th grade GPA ($R^2 = .376$, $F(9, 484) = 32.372$, $p < .001$). However, aside from the covariates, the behavior problems risk factor was the only significant predictor ($\beta = -0.156$, $p < .001$). A multiple regression model including all predictors explained 22.9% of the variance in educational attainment ($R^2 = .229$, $F(9, 408) = 13.466$, $p < .001$). SES ($\beta = .214$, $p < .001$), academic self-efficacy ($\beta = .088$, $p = .05$), and 12th grade GPA ($\beta = .294$, $p < .001$) were the only significant predictors. Because not all of the risk and protective factors had significant effects on 12th grade GPA, the proposed mediation model (whereby 12th grade GPA mediated the effects of these predictors on educational attainment) could not be assessed.

Discussion

Results indicated fewer behavior problems, greater academic self-efficacy, and a more positive school climate were associated with higher GPA at two-year follow-up for Black adolescents, even after taking into account their prior level of achievement (i.e., 10th grade GPA). These findings support previous research demonstrating (a) the negative impact of behavior problems (e.g., Masten et al., 2005; McMahon et al., 2011b) on student achievement, and (b) the

positive impact of academic self-efficacy (e.g., McMahon et al., 2008; Nasim et al., 2005) and academic climate (e.g., Roderick et al., 2011; Wilkins & Kuperminc, 2009) on student achievement. Lack of college planning, parent involvement, and school problems did not significantly influence Black students' 12th grade GPA. However, results of the primary analyses showed more college planning and fewer school problems promoted greater educational attainment at age 26. Taken together, the findings suggest behavior problems, academic self-efficacy, and academic climate significantly influence students' short-term *and* long-term achievement, while college planning and school problems have greater influence on students' long-term academic outcomes. However, it is also possible that the stringent control variables included in these analyses may have masked more minor effects of some predictors, as 10th grade GPA was a strong predictor of 12th grade GPA ($\beta = .503, p < .001$). The current findings also highlight the importance of examining multilevel factors when studying Black students' academic outcomes and resilience (Fergus & Zimmerman, 2005).

Interventions that reduce student behavior problems and increase academic self-efficacy and academic climate can bolster Black high school students' grades. Examples of interventions aimed at decreasing behavior problems include teachers' use of clear directives, praise for appropriate behaviors, one-on-one coaching, and psychosocial services (Agency for Healthcare Research and Quality, 2016; Rahal, 2010). Parents and educators can foster adolescents' academic self-efficacy by providing both challenges and mastery experiences, focusing on positive progress, scaffolding learning, setting proximal and specific goals, and teaching effective life skills (Schunk & Meece, 2005). Finally, to foster a positive academic climate, school staff must maintain high expectations for all students (Gregory & Huang, 2013). For example, students meeting the requisite criteria should be encouraged to take advanced level

courses (e.g., Choy et al., 2000). These interventions should promote higher 12th grade GPA for Black students, which, according to these results, also predicts greater educational attainment at 10-year follow-up.

Table A1

Hierarchical Multiple Regression Models Predicting 12th Grade GPA

	Variable	Compensatory Model (Block 3)				Protective Factor Model (Block 4)			
		<i>B</i>	<i>SE B</i>	β	<i>p</i>	<i>B</i>	<i>SE B</i>	β	<i>p</i>
<u>Individual Level</u>	Gender	.148	.042	.092	.000	.148	.042	.092	.001
	SES	.093	.032	.079	.004	.092	.032	.078	.004
	10th grade GPA	.540	.031	.513	.000	.540	.031	.513	.000
	Behavior problems	-1.093	.190	-.160	.000	-1.098	.190	-.161	.000
	Academic self-efficacy	-.052	.026	-.053	.050	-.024	.049	-.024	.626
	Behavior problems X Academic self-efficacy	—	—	—	—	-.138	.202	-.034	.495
<u>Family Level</u>	Gender	.126	.036	.080	.000	.126	.036	.080	.000
	SES	.065	.027	.056	.018	.064	.027	.056	.019
	10th grade GPA	.584	.024	.554	.000	.584	.025	.554	.000
	Lack of college planning	.014	.028	.012	.624	-.008	.159	-.007	.962
	Parent involvement	-.026	.039	-.017	.502	-.039	.100	-.025	.701
	Lack of college planning X Parent involvement	—	—	—	—	.007	.050	.018	.892
<u>School Level</u>	Gender	.137	.035	.089	.000	.137	.035	.089	.000
	SES	.070	.026	.063	.006	.071	.026	.064	.006
	10th grade GPA	.583	.024	.569	.000	.584	.024	.569	.000
	School problems	-.008	.049	-.004	.864	-.009	.049	-.004	.853
	Academic climate	.233	.118	.048	.049	.050	.656	.010	.940
	School problems X Academic climate	—	—	—	—	.077	.271	.038	.777

Appendix B

Original Thesis Proposal

Abstract

There is a need to gain a better understanding of risk and protective factors that contribute to Black high school students' academic achievement. Achievement gaps among students of color in the United States are pervasive and persistent. Black youth are a particularly vulnerable group, as they experience disproportionately high rates of chronic stressors, such as poverty, community violence, and racism; however, many also benefit from protective factors that contribute to resilience. Identifying trajectories of resilience among Black teens is an important step toward closing achievement gaps. Based on the extant literature, the present study identified risk and protective factors at the individual, family, and school levels that are hypothesized to impact Black high school students' academic achievement. Risk factors to be assessed include behavior problems, lack of college planning, and school problems. Protective factors to be assessed include academic self-efficacy, parent involvement, and academic climate. Using nationally-representative data from the Longitudinal Study of 2002 (ELS:2002), a study sponsored by the National Center for Education Statistics (NCES), this study will assess the effects of the aforementioned risk and protective factors on approximately 2,323 Black 10th grade students' GPA at 12th grade and educational attainment at age 26. Analyses will use multiple hierarchical regression to test the compensatory (main effects) and protective factor (interaction) models of resilience. It is hypothesized that these models will be supported. The present study will also assess a mediational model, whereby 12th grade GPA mediates the effects of the predictors on educational attainment at age 26. It is hypothesized that the mediational model will also be supported. By assessing the effects of the risk and protective variables on

Black teens' academic achievement, we hope to gain a better understanding of how multilevel factors contribute to achievement gaps and which protective mechanisms might reduce these disparities.

Introduction

In the United States, there exists a long-standing and well-documented academic achievement gap between students of color and their White counterparts (Barton & Coley, 2009; Howard, 2010; Ogbu, 2003). These gaps are reflected in the grades, course level enrollment, graduation rates, standardized test scores, and rates of suspensions and expulsions of groups historically denied equal access to education (Howard, 2010). Black youth are a particularly vulnerable group affected by these educational discrepancies: in the process of getting a formal education, they must simultaneously navigate a sociopolitical landscape embedded in systemic inequality. Black youth experience disproportionately high rates of chronic stressors and risk factors, such as poverty, community violence, and racism (Deater-Deckard, Dodge, Bates, & Pettit, 1998; Evans, 2004), which often impact students' ability to succeed academically. However, many also benefit from protective factors that contribute to resilience and promote achievement. Factors at the individual, family, and school levels that contribute to Black youths' academic achievement are important to consider.

Scope of the Problem

Black Americans make up approximately 13% of the United States population, yet they represent 23% of people living in poverty and 35% of the total prison population (Proctor, Semega, Kollar, Bureau, & Reports, 2016). Today, the median income for Black Americans is \$36,898 compared to \$62,950 for White Americans; this ratio has not changed significantly over the past forty-five years (Proctor et al., 2016). Mirroring this lack of progress, achievement gaps

persist despite gradual increases in academic attainment for all racial/ethnic groups (Howard, 2010; Ryan & Bauman, 2016). Results from the 2015 National Assessment of Educational Progress (NAEP) indicate the percentage of Black students scoring at or above the proficient level in mathematics and reading is the lowest of all racial/ethnic groups. Across grades four, eight, and 12, an average of 29% fewer Black students score at or above proficiency compared to White students (U.S. Department of Education, 2015). Achievement gaps are also reflected in high school and college graduation rates.

An adjusted cohort graduation rate (ACGR) indicates the percentage of high school freshmen who graduate with a diploma within four years (McFarland, Stark, & Cui, 2016). In 2013, the ACGR for Black public school students was 71% compared to 87% for White students (McFarland et al., 2016); however, this rate of 71% may be an overestimate. The Schott Foundation examined data from each state to document graduation rates of Black males. The report found the national graduation rate for Black males in 2012-2013 was 59% (Schott Foundation, 2015). Further, the difference in graduation rates between Black and White males widened from 19% in 2009-2010 to 21% in 2012-2013 (Schott Foundation, 2015). While corresponding data has not been compiled for Black females, these data demonstrate substantial disparity in high school graduation rates for Black youth continues to be a problem.

Given these high school outcomes, it is no wonder disparities also exist at the college level and beyond. Black Americans earn a Bachelor's degree at a rate of 22.5% compared to 36.2% of Whites; this gap has remained between 11-14% since the late 1980s (Ryan & Bauman, 2016). During the 1960s and '70s, President Johnson's "War on Poverty" programs invested heavily in underfunded schools, which improved academic outcomes for students of color. Briefly during the mid-'70s, college attendance rates for White, Black, and Latinx Americans

were equivalent (Howard, 2010). However, as investment in resources for urban and rural schools declined in the 1980s, achievement gaps widened. Thus, achievement gaps are a pervasive and persistent problem for Black students: they are observed from preschool (Howard, 2010) through graduate-level education (Ryan & Bauman, 2016) and have not shown meaningful improvement in decades, despite increasing attainment (Howard, 2010).

Explaining the Gaps

Researchers and scholars have proposed numerous causes and explanations for achievement gaps, including socioeconomic status (SES), racism, and cultural and community forces. Some researchers posit that academic achievement gaps are more an issue of SES than of race (Anyon, 2014; Bowles & Gintis, 1976; MacLeod, 2008). Given the aforementioned SES disparities experienced by Black Americans, this explanation seems logical: achievement gaps are indeed observed among students from different socioeconomic backgrounds and are tied to factors including home and community resources, quality of schools, experienced and prepared teachers, small class size, and preschool readiness—all of which are more likely in more affluent communities (Barton & Coley, 2009; Howard, 2010). SES variables such as income, parental education, growing up in a single-parent household, and number of people in the home have been shown to significantly impact students' test scores and number of years of schooling completed (McLoyd, 1990, 1998; Rumberger, 1987). However, notable differences exist in measures of academic achievement among racial/ethnic groups even when controlling for SES (Jencks & Phillips, 2011; Ogbu, 2003). The test score gap is only reduced slightly when comparing Black and White families with the same schooling and income (Jencks & Phillips, 2011), and Black students typically perform worse than their White peers of similar SES background, even when they live in the same neighborhoods and attend the same schools (Ogbu,

2003). Therefore, achievement gaps cannot be attributed solely to SES; rather, race and SES are inextricably linked factors that affect disparities seen among Black youth.

A second over-arching explanation for achievement gaps is racism: overt, covert, and systemic. Some scholars believe current academic achievement gaps are simply remnants of the eugenics movement and segregation. Eugenicists posited people of color were biologically inferior to Whites and promoted these beliefs in literature and pseudoscience research in the 1920s and '30s. The eugenics movement disseminated the idea that Black Americans naturally had inadequate intelligence and should be relegated to separate schools from Whites (Howard, 2010; Ogbu, 2003). Despite the abolishment of legal segregation with the 1954 *Brown v. Board of Education* ruling, de facto racial segregation persists. Many Black students continue to attend substandard schools due to systemic inequalities that maintain socioeconomic disparities among racial/ethnic groups and limit students of color's access to opportunities and resources, including skilled teachers, quality curriculum, and instructional technology (Barton & Coley, 2009; Darling-Hammond, 2007). In addition, more covert forms of racism such as disproportionate discipline, deficit-based thinking, stereotype threat, and "cultural mismatch" contribute to achievement gaps.

The achievement gap observed among Black students can be explained in part by the disproportionate distribution of discipline they receive (Gregory, Skiba, & Noguera, 2010; Skiba et al., 2011). Data from the Office for Civil Rights indicates Black students are suspended and expelled at rates three times greater than those for White students (U.S. Department of Education, 2014) and are more likely to be suspended or expelled for the same infractions (Skiba et al., 2011). In addition, a disproportionate number of Black males repeat grades, and retention is highly correlated with school suspensions, expulsions, and dropping out (Howard, 2010).

These disparities in discipline are related to different expectations teachers hold for Black students. Researchers have demonstrated many teachers, whether consciously or not, do not believe Black students are as capable as their White peers, and these lower expectations for Black students result in poorer performance (Ogbu, 2003; Steele, 1992). This deficit-based thinking represents one of the aforementioned remnants of eugenicists (Howard, 2010). Students of color, in turn, are aware of racial stigma and expectations of them, which can lead to stereotype threat: the phenomenon where individuals perform worse on an assessment when their membership in a group associated with a negative stereotype is made salient (Steele & Aronson, 1995). In addition, deficit-based thinking is related to “cultural mismatch.” Cultural mismatch theory posits many Black students demonstrate values, behavioral norms, and styles of communication and self-presentation that are at odds with the White, middle-class American educational system (Howard, 2010; Ogbu, 2003). These differences force Black students to navigate multiple cultures within their schooling experiences (i.e. mainstream White culture versus Black culture) and to endure the devaluing of Black culture in schools. Cultural mismatch contributes to the disproportionate discipline problem, lower expectations teachers hold for Black students, academic disengagement, and poorer performance (Boykin, 1986; Howard, 2010; Ogbu, 2003). The Black achievement gap is thus a problem with numerous, interconnected causes related to different forms of resources and racism—none of which has a simple solution.

Ogbu’s (2003) cultural-ecological theory provides a broader explanation for the achievement gap. Ogbu posits minority students’ academic performance is influenced by two factors: (a) the system, meaning educational policies, treatment of minority students in schools, and the way society rewards minority students’ achievement, and (b) community forces, which are minority students’ frames of reference, their beliefs about education, and their relationships

with the education system. One way to work toward closing the achievement gap among Black students is by identifying factors that contribute to their success and resilience so researchers, educators, parents, and policy-makers can work to promote these factors. An ecological framework allows for identification of such factors on multiple levels of analysis and a greater understanding of the complex, interacting processes underlying this problem (Bronfenbrenner, 1979, 1994; Flynn, Sanchez, & Harper, 2011; Jason et al., 2016; Tolan, Keys, Chertok, & Jason, 1990). The proposed study examines factors at the microsystem (immediate contexts the individual engages with, e.g. family, peers, school) and mesosystem (linkages between microsystem settings) levels of Bronfenbrenner's (1979) ecological model in addition to the individual level. Despite the added challenges Black students face during their schooling, many overcome them and are extremely successful and well-adjusted; these youth can be said to demonstrate resilience.

Defining and Modeling Resilience

Resilience has been defined in many ways since resilience theory began to take root in community psychology in the 1970s (Luthar, Cicchetti, & Becker, 2000; Zimmerman & Arunkumar, 1994). For instance, Rutter called resilience “the positive pole of individual differences in people’s response to stress and adversity” (Rutter, 1987, p. 316) and suggested resilience stems from “a belief in one’s own self-efficacy and the ability to deal with change and...a repertoire of social problem-solving skills” (Rutter, 1985, p. 607). Garmezy often used the term ‘stress resistance,’ which he defined as “the manifestations of competence in children despite exposure to stressful events” (Garmezy, Masten, & Tellegen, 1984, p. 98). Garmezy measured various competencies including school-based, classroom behavior, and interpersonal competency. Werner (1993) another pioneer of the resilience literature, used the term resilience

to describe children who cope successfully with social and biological risk factors. Due to its clarity and broad applicability, this study adopts Zimmerman's and Arunkumar's (1994) definition of resilience: "Factors and processes that interrupt the trajectory from risk to problem behaviors or psychopathology and thereby result in adaptive outcomes even in the presence of adversity" (p. 4). In other words, resilience can be explained as successful adaptation despite difficult circumstances, or the ability to bounce back from challenges. Resilience is an unfixed quality that can emerge in response to both chronic stressors or to more singular traumatic events; it varies over time and across contexts in response to different circumstances.

The ways in which resilience develops and functions also vary. Multiple models of resilience have emerged since the theory's conception to account for this. Two of the most prominent models are the compensatory model and the protective factor model. In the compensatory model of resilience, positive factors in an individual's life counteract or neutralize the effects of risk factors (Garmezy et al., 1984; Zimmerman, Bingenheimer, & Notaro, 2002). The compensatory protective factor does not interact with the risk factor, but rather it has an independent, direct effect on the outcome being measured. In the protective factor model of resilience, a protective variable may operate in one of two ways: via a risk-protective mechanism or a protective-protective mechanism. Risk-protective variables lessen the effects of a risk factor, whereas protective-protective variables promote the effects of another protective factor (Zimmerman & Arunkumar, 1994). The proposed study will test the compensatory model and the risk-protective mechanism of the protective factor model. While there has been a surge of research on youth resilience over the past 20 years, this area of research still has its shortcomings: many studies do not explicitly reference a resilience framework or model; only include either risk or protective variables, as opposed to both; or lack a strong basis in research

particular to the group being studied (Luthar & Cicchetti, 2000). While some researchers have conducted exemplary work, including both risk and protective factors and examining resilience models with Black adolescents (Caldwell, Sellers, Bernat, & Zimmerman, 2004; Gutman, Sameroff, & Eccles, 2002; Hurd, Sanchez, Zimmerman, & Caldwell, 2012; Hurd & Zimmerman, 2010; Hurd, Zimmerman, & Xue, 2009), additional studies examining multiple levels of influence are warranted.

In addition, models that elucidate resilience processes can help investigators to better target interventions and shape social policies (Grant et al., 2006; Luthar & Cicchetti, 2000; Luthar et al., 2000). This can be assessed, for instance, by examining the degree to which a variable mediates the effects of a protective variable. Within the resilience literature, there is a call for greater use of mediation and moderation models and longitudinal data to understand how risk and protective factors function (Luthar et al., 2000). Most resilience research has used cross-sectional data or longitudinal data with only two time points, which only allow for a limited understanding of how resilience processes unfold over time (Fergus & Zimmerman, 2005). In a study of African American college students, Boyraz and colleagues (2013) found GPA in the first year partially mediated the effects of trauma symptomatology on the likelihood of leaving college before graduating. Other research also suggests students' high school GPA is a strong predictor later academic achievement (Cohn et al., 2004; Geiser & Santelices, 2007; Hiss & Franks, 2014; Waugh, Micceri, & Takalkar, 1994); the proposed study will further examine GPA as a mediator of Black students' educational attainment.

Within the youth resilience literature, three common types of resilience examined include psychopathology, social functioning, and academic achievement (Garmezy et al., 1984; Masten, 2001; Masten et al., 1988; Rutter, 1982, 1985, 1987). Given the persistent achievement gap

observed among Black students, risk and protective factors impacting resilience in academic achievement among Black youth are an important area of study. Examining these factors from an ecological perspective can help to elucidate the interconnected variables contributing to a social problem or context, such as schools (Benner, Graham, & Mistry, 2008; Gonzales, Cauce, Friedman, & Mason, 1996; Jason et al., 2016; Li, Nussbaum, & Richards, 2007; McMahon, Keys, Berardi, & Crouch, 2011; Tolan et al., 1990). The present study examines risk and protective factors at multiple ecological levels; specifically, we examine potential risk and protective factors as facilitators or barriers to the achievement of Black students at the individual, family, and school levels.

Individual Level Factors

Variables at the individual level can impact one's expressed resilience both positively or negatively. Two such individual variables identified in the literature are self-efficacy, which is protective, and behavior problems, which are associated with risk.

Self-efficacy. Pioneers of resilience research emphasized the central importance of self-esteem and self-efficacy. Rutter (1987) proposed that the establishment and maintenance of these two concepts was one of four main processes involved in protecting against the risks associated with adversity. Similarly, Garnezy (1991) contended self-efficacy is the defining characteristic of resilience. While self-esteem and self-efficacy are separate constructs, both are aspects of a positive self-concept and contribute to a resilience orientation among African-American youth (Howard, 1996). Adolescents who choose to drop out of high school tend to have lower self-esteem and less sense of control (Rumberger, 1987). In contrast, academically-resilient Black youth tend to have a positive sense of self, strong motivation and determination, and an internal locus of control (Ford, 1994), which predicts better adaptation to college (Zea, Jarama, &

Bianchi, 1995). A positive academic self-concept has also been shown to predict African-American students' academic achievement at historically Black colleges and universities (Nasim, Roberts, Harrell, & Young, 2005) and may help protect against the negative effects of community violence and poverty (Li et al., 2007). In a longitudinal study of urban African-American youth exposed to community violence, McMahon and colleagues (2013) found greater self-efficacy was associated with less aggressive behavior reported by teachers and more prosocial behavior reported by peers. Academic self-efficacy, more specifically, is a strong predictor of student achievement, motivation, effort, persistence, and goals (McMahon, Parnes, Keys, & Viola, 2008). The present study will examine academic self-efficacy as an individual-level protective factor.

Behavior problems. While self-efficacy seems to promote resilience among Black youth, individual-level factors can also pose risks to positive youth development. For instance, youth who display behavior problems in school are at greater risk for poor academic outcomes, including chronic disciplinary problems, not graduating on time, and dropping out (Henricsson & Rydell, 2006; Jimerson, Egeland, Sroufe, & Carlson, 2000; Masten et al., 2005; McMahon, Felix, & Nagarajan, 2011; Rumberger, 1987; Tobin & Sugai, 1999; Vitaro, Brendgen, Larose, & Trembaly, 2005). In contrast, behavioral self-regulation can buffer against the effects of community violence and poverty for youth (Shumow, Vandell, & Posner, 1999). Research by Matthews and colleagues (2010) suggests deficits in learning-related skills explain literacy gaps among African-American boys above and beyond the effects of problem behaviors and SES; however, perceived externalizing behavior, even when it is misinterpreted, accounts for some of the reduced academic performance among Black boys (Ferguson, 2001; Skiba, Michael, Nardo, & Peterson, 2002; Zimmerman, Khoury, Vega, Gil, & Warheit, 1995). This study therefore

examines behavior problems in school as an individual-level risk factor for Black students.

Individual-level factors can represent both sources of risk and protection in relation to resilience and achievement.

Family Level Factors

In examining youth resilience, multiple levels of influence must be considered (Luthar & Cicchetti, 2000). One important context and influence on resilience expression is the family. As with any ecological level, family influences can be potentially protective (e.g. in the case of parent involvement) or harmful (e.g. lack of academic socialization and college planning).

Parent involvement. At the family level, most research related to academic outcomes and resilience has examined parent-related variables. Stress-resilient youth typically identify with their parents more strongly and perceive them to be supportive (Masten, Morison, Pellegrini, & Tellegen, 1992; Werner & Smith, 1982). Families and kinship networks provide positive self-esteem and represent vital sources of support for Black youth (Connell, Spencer, & Aber, 1994; Floyd, 1996; Ford, 1994; Hill & Madhere, 1996; Howard, 1996; Maton et al., 1996; McMahon, Felix, & Nagarajan, 2011; Reese, Vera, Simon, & Ikeda, 2000; Taylor, Casten, & Flickinger, 1993). Among Black adolescents, parental support has been shown to protect against negative effects of community poverty (Li et al., 2007) and is associated with self-worth (McMahon, Felix, & Nagarajan, 2011), goal commitment (Maton et al., 1996), less aggressive behavior (Benhorin & McMahon, 2008), fewer symptoms of anxiety and depression (Zimmerman, Ramirez-Valles, Zapert, & Maton, 2000), and better grades and academic success (Floyd, 1996; Gonzales et al., 1996; Tatum, 2004). In addition to providing support, research consistently demonstrates parent involvement positively impacts youths' adjustment and

achievement, and parent involvement is a key element in schools that are successful at closing achievement gaps (Howard, 2010).

Parent involvement can take place at home, in schools, and a wide variety of other settings. Parents' school-related involvement communicates to children that schooling is important and increases students' school engagement and motivation to learn (Chen & Gregory, 2009; Grolnick & Slowiaczek, 1994; Sánchez, Reyes, & Singh, 2006). Parent school involvement covers a broad range of activities, including volunteering at the school, communicating with teachers, helping children with school activities at home, and attending school events, such as PTA meetings and parent-teacher conferences. All of these activities are associated with greater school performance (Epstein & Sanders, 2002; Hill & Craft, 2003). Parent school involvement appears to be particularly protective for Black youth.

Hill and colleagues (2004) followed over 400 adolescents from seventh to 11th grade and found parent academic involvement was positively related to academic achievement for African-American adolescents but not for White adolescents. Parent school involvement is associated with enhanced academic skills, greater school engagement, increased grade point average (GPA), and fewer absences among Black youth (Hill & Craft, 2003). This involvement may be more salient for Black youth due to the increased challenges they face (Hill et al., 2004), but more broadly, parent involvement is associated with children's cognitive development (Barton & Coley, 2009), a greater percentage of homework completed (Epstein & Sanders, 2002), enrollment in a four-year college upon graduating high school (Perna, 2000), and academic achievement generally (Barton & Coley, 2009; Grolnick & Slowiaczek, 1994; Hill et al., 2004; Hill & Craft, 2003; Miedel & Reynolds, 2000). Much of the literature on this topic has focused on elementary school, but parent school involvement continues to be important as youth advance

to middle and high school (Hill & Taylor, 2004). Given Black parents tend to be more involved in school-related activities at home (Barton & Coley, 2009; Eccles & Harold, 1996), the present study examines home-based parent school involvement (e.g. checking the child's homework completion, discussing grades, etc.) as a protective factor at the family level.

Academic socialization and college planning. One important function of parent school involvement in the child's later years of education is helping him or her to plan and prepare for college and the future generally. A future orientation is protective for Black youth, as it is associated with perceptions of education usefulness and academic achievement (Adelabu, 2008; Brown & Jones, 2004). Parents' support, involvement, and future orientation socialization can influence their children's level of future orientation (McCabe & Barnett, 2000; Trommsdorff, 1983; Webley & Nyhus, 2006). Thus, it is not surprising that parental encouragement is the strongest predictor of students post-secondary education plans (Cabrera & La Nasa, 2000), and teens overwhelmingly cite parents as the most influential people in their college decision process (Boyer, 1987). Parents initiate their child's decision to attend college in approximately 50% of cases, and more than 25% of parents report having begun college planning while their child was in elementary school (Murphy, 1981). Parental encouragement not only influences whether a student enrolls in college, but the type of college he or she attends (Conklin & Dailey, 1981; Flint, 1992). Thus, parent assistance in planning for college appears to promote academic achievement. Lack of college planning with the student will be examined as a family-level risk factor in the present study.

School Level Factors

School level influences also play a role in students' academic achievement (Cohen, McCabe, Michelli, & Pickeral, 2009). Academic climate, a protective factor, and school

problems, a risk factor, are two such influences that may contribute to Black youths' academic achievement.

Academic climate. Research on academic climate suggests schools are more effective when more time is spent on instruction, they offer demanding curricula, and teachers set high expectations for their students (Phillips, 1997). Phillips (1997) tested this theory with longitudinal data on three cohorts of middle school students and found academic climate was positively related to math achievement and attendance. In a study of 143 Latinx adolescents, Wilkins and Kuperminc (2009) found perceptions of academic climate increased as students entered high school and positively influenced student's academic achievement. The curriculum rigor component of academic climate is particularly relevant to the achievement gap: there are substantial disparities in participation in Advanced Placement courses among Black students, which are crucial for gaining acceptance to colleges and universities (Barton & Coley, 2009; Howard, 2010). In addition, supporting earlier findings, Roderick, Coca, and Nagaoaka (2011) found among urban high school students, those who attend schools where: (a) there is a pattern of attending four-year colleges, (b) teachers set high expectations, and (c) teachers provide strong supports for college attendance, students are more likely to plan for, apply to, be accepted to, and enroll in a four-year college. Given the apparent importance of academic climate to student achievement, it will be examined as a school-level protective factor.

School problems. Problems within the school environment, however, can have negative effects on student achievement. School problems can range from tardiness, truancy, and vandalism, to bullying, harassment of school staff, and use or sale of illicit substances. Issues such as truancy, peer harassment, and fighting are associated with chronic disciplinary problems, lower GPA, poorer school attendance, not graduating on time, and dropping out (Rumberger,

1987; Tobin & Sugai, 1999). Poor student-teacher relations are also associated with diminished academic achievement and more disciplinary problems (Crosnoe, Johnson, & Elder Jr, 2004). In addition, more severe issues, such as possession of weapons, gang activity, and robbery are problems at some schools and affect perceptions of school safety. Experiences of fear and safety at school, which are more likely to be reported by minority students, contribute negatively to cognitive development and academic achievement (Barton & Coley, 2009).

On the contrary, an orderly school environment is associated with less dropping out among disadvantaged and at-risk youth (Bryk & Thum, 1989). Positive relationships between students and school faculty support feelings of school connectedness and belonging, which predict greater motivation, academic self-efficacy, and school engagement; less violence; and better grades (Anderman, 2002; Battistich, Solomon, Kim, Watson, & Schaps, 1995; Cohen et al., 2009; McMahon et al., 2008; McMahon, Wernsman, & Rose, 2009; Roeser, Midgley, & Urdan, 1996). Unfortunately, Black youth have lower perceptions of school belonging than their White peers (Anderman, 2002), and feeling disconnected from school is associated with greater likelihood of many of the same school problems that precede it, including student delinquency, drug use, truancy, and dropping out (Bonny, Britto, Klostermann, Hornung, & Slap, 2000; Finn, 1989). Therefore, an orderly school environment, as evidenced by fewer school problems, is crucial to the academic success and general well being of all students, including Black students. However, the particular influence of school-level variables on the academic achievement of Black high school students has not been extensively studied. The present study will look at the effect of school problems on academic achievement as a school-level risk factor.

Rationale

The purpose of the present study is to gain a better understanding of risk and protective factors that contribute to Black high school students' resilience and long-term achievement. Based on the extant literature, the independent variables to be examined include protective and risk factors at multiple levels of analysis: the individual level (academic self-efficacy and behavior problems), family level (parent involvement and lack of college planning), and school level (academic climate and school problems). Much research on the academic achievement of Black youth examines only low-SES, urban, and disadvantaged youth; this focus lends itself to a deficit-based perspective and leaves researchers with limited knowledge of normative, typically-developing Black youth (Brown & Jones, 2004; Howard, 1996). In addition, achievement gap literature emphasizes young children, and not enough attention is paid to Black adolescents and young adults. In the resilience literature on Black youth, there is a great need for longitudinal research and examination of moderation and mediation models to better understand underlying resilience processes (Fergus & Zimmerman, 2005; Grant et al., 2006; Luthar et al., 2000). In addition, much of the resilience literature focuses on individual and personal attributes, which can lead to victim-blaming and interventions overly focused on changing the individual (Zimmerman & Arunkumar, 1994). Further, there is a dearth of research looking simultaneously at multiple levels of analysis (particularly school and community level variables) among Black youth (Fergus & Zimmerman, 2005; Li et al., 2007). This study aims to build upon prior literature examining achievement gaps and Black youths' resilience by: (a) using a large, nationally-representative sample of Black tenth-grade students, (b) examining achievement outcomes across three time points, (c) studying risk and protective factors at the individual, family, and school levels, (d) testing moderation and mediation models of resilience, and (e) taking a strengths-based perspective. Identifying processes of resilience among Black teens at the

individual, family, and school levels is an important step towards closing achievement gaps, as psychologists can then work towards promoting these protective factors in interventions and policy-making (Luthar & Cicchetti, 2000).

Statement of Hypotheses

Hypothesis 1. The compensatory model of resilience will be supported (see Figure 1):

- a. Each risk variable (behavior problems, lack of college planning, and school problems) will have a negative main effect on *12th grade GPA* at Wave 2, taking into account control variables (10th grade GPA; SES and gender will be examined and taken into account if related to the outcome here and in subsequent analyses).
- b. Each risk variable (behavior problems, lack of college planning, and school problems) will have a negative main effect on *educational attainment* at Wave 4, taking into account control variables.
- c. Each protective variable (academic self-efficacy, parent involvement, and academic climate) will have a positive main effect on *12th grade GPA* at Wave 2, taking into account control variables.
- d. Each protective variable (academic self-efficacy, parent involvement, and academic climate) will have a positive main effect on *educational attainment* at Wave 4, taking into account control variables.

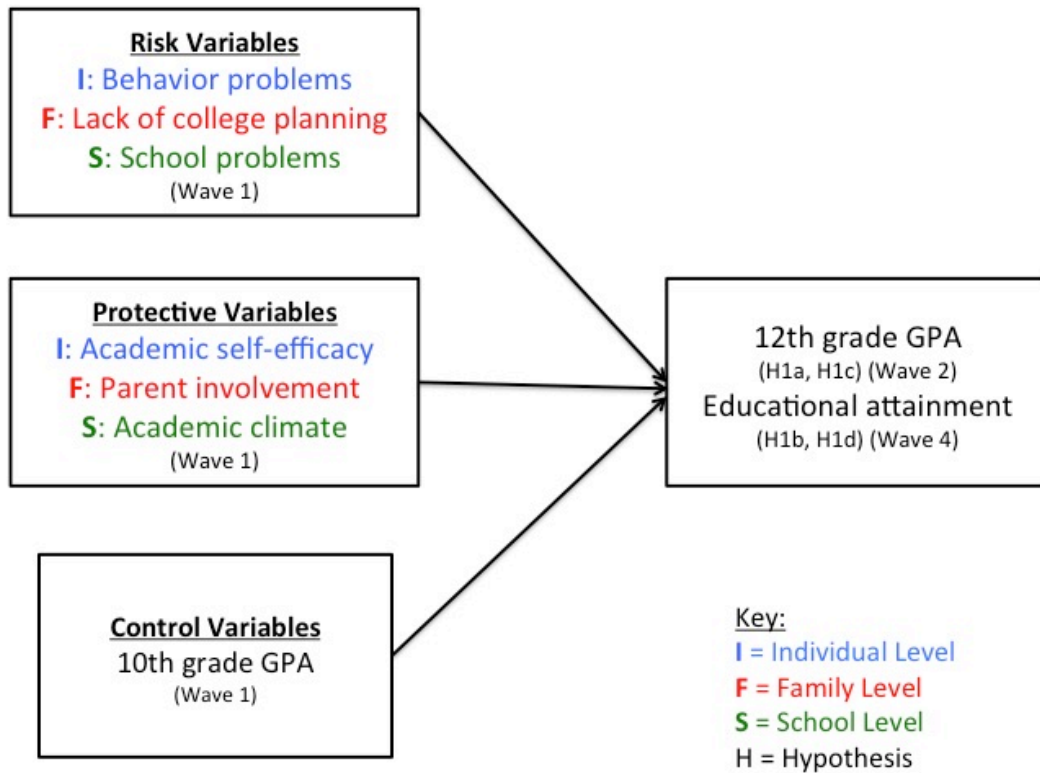


Figure 1. Compensatory (Main Effects) Model

Hypothesis 2. The risk-protective mechanism of the protective factor model of resilience will be supported, such that interaction terms examined by level will yield significant results, taking into account all other predictors (risk, protective, and control variables):

- a. There will be an interaction between behavior problems and academic self-efficacy, such that students with higher levels of risk will experience stronger effects from the protective variable. More specifically, for students who have higher levels of behavior problems, higher academic self-efficacy will have a stronger protective effect than for those with lower levels of behavior problems; this protective effect will result in higher *12th grade GPA* at Wave 2. See Figure 2.

- b. There will be an interaction between behavior problems and academic self-efficacy, such that students with higher levels of risk will experience stronger effects from the protective variable. More specifically, for students who have higher levels of behavior problems, higher academic self-efficacy will have a stronger protective effect than for those with lower levels of behavior problems; this protective effect will result in greater *educational attainment* at Wave 4. See Figure 2.

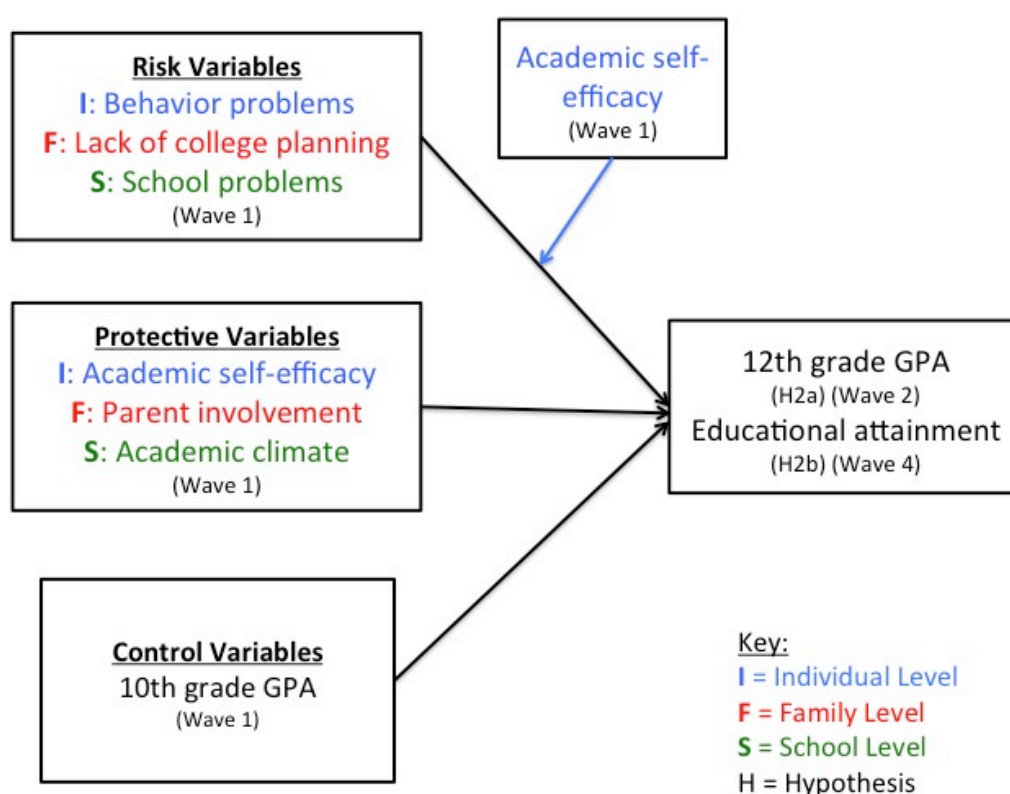


Figure 2. Protective Factor Model with Individual Level Interaction

- c. There will be an interaction between lack of college planning and parent involvement, such that students with higher levels of risk will experience stronger effects from the protective variable. More specifically, for students whose parents engaged in less college planning with them, greater parent involvement will have a stronger protective effect than

for those whose parents engaged in more college planning; this protective effect will result in higher *12th grade GPA* at Wave 2. See Figure 3.

- d. There will be an interaction between lack of college planning and parent involvement, such that students with higher levels of risk will experience stronger effects from the protective variable. More specifically, for students whose parents engaged in less college planning with them, greater parent involvement will have a stronger protective effect than for those whose parents engaged in more college planning; this protective effect will result in greater *educational attainment* at Wave 4 See Figure 3.

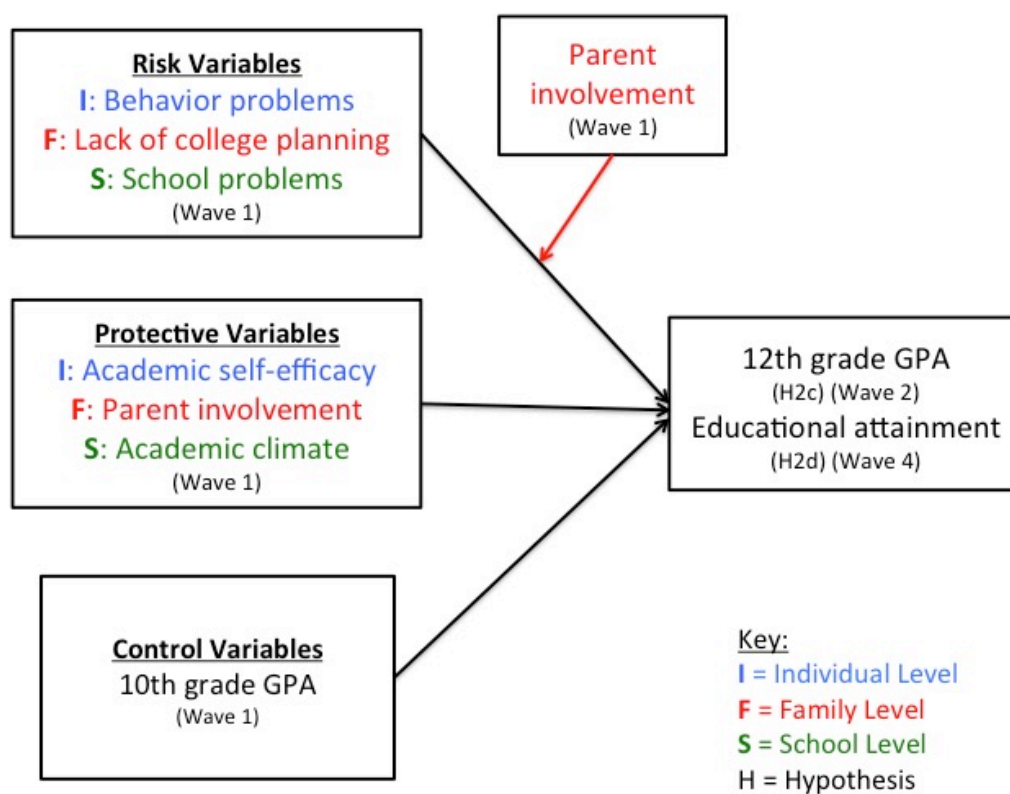


Figure 3. Protective Factor Model with Family Level Interaction

- e. There will be an interaction between school problems and academic climate, such that students with higher levels of risk will experience stronger effects from the protective

variable. More specifically, for students who attend schools with more school problems, higher levels of positive academic climate will have a stronger protective effect than for those who attend schools with fewer school problems; this protective effect will result in higher *12th grade GPA* at Wave 2. See Figure 4.

- f. There will be an interaction between school problems and academic climate, such that students with higher levels of risk will experience stronger effects from the protective variable. More specifically, for students who attend schools with more school problems, higher levels of positive academic climate will have a stronger protective effect than for those who attend schools with fewer school problems; this protective effect will result in greater *educational attainment* at Wave 4. See Figure 4.

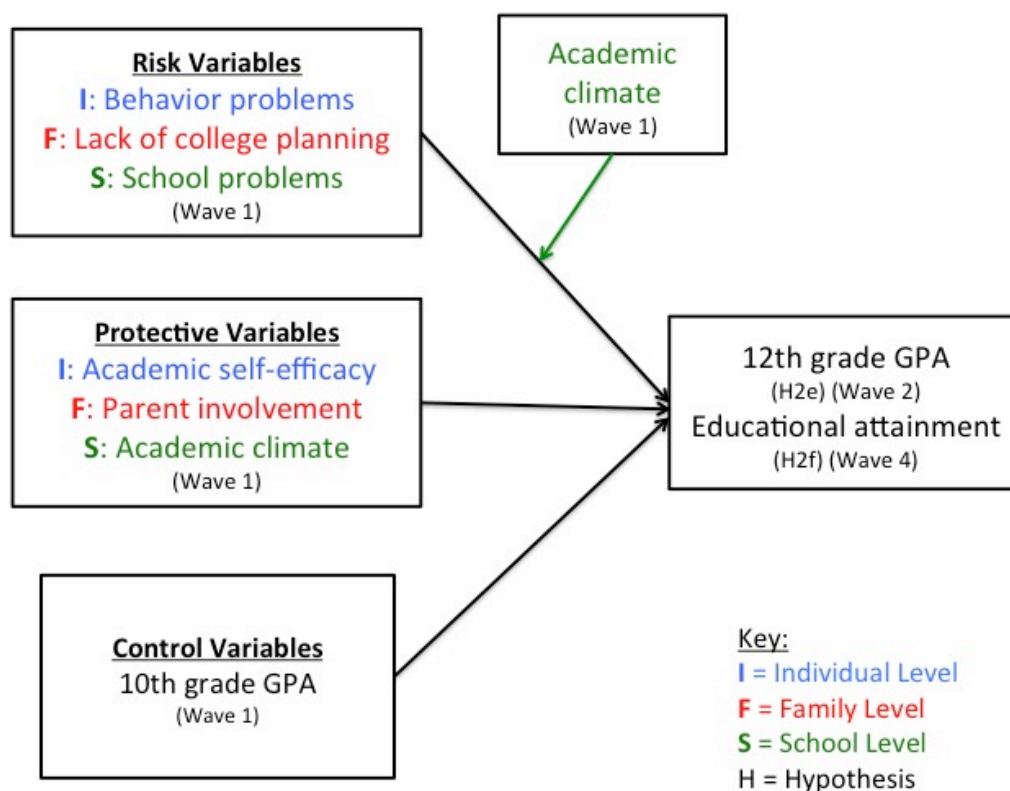


Figure 4. Protective Factor Model with School Level Interaction

Hypothesis 3. The effects of all of the risk and protective variables on educational attainment at Wave 4 will be mediated by 12th grade GPA (see Figure 5), taking into account control variables.

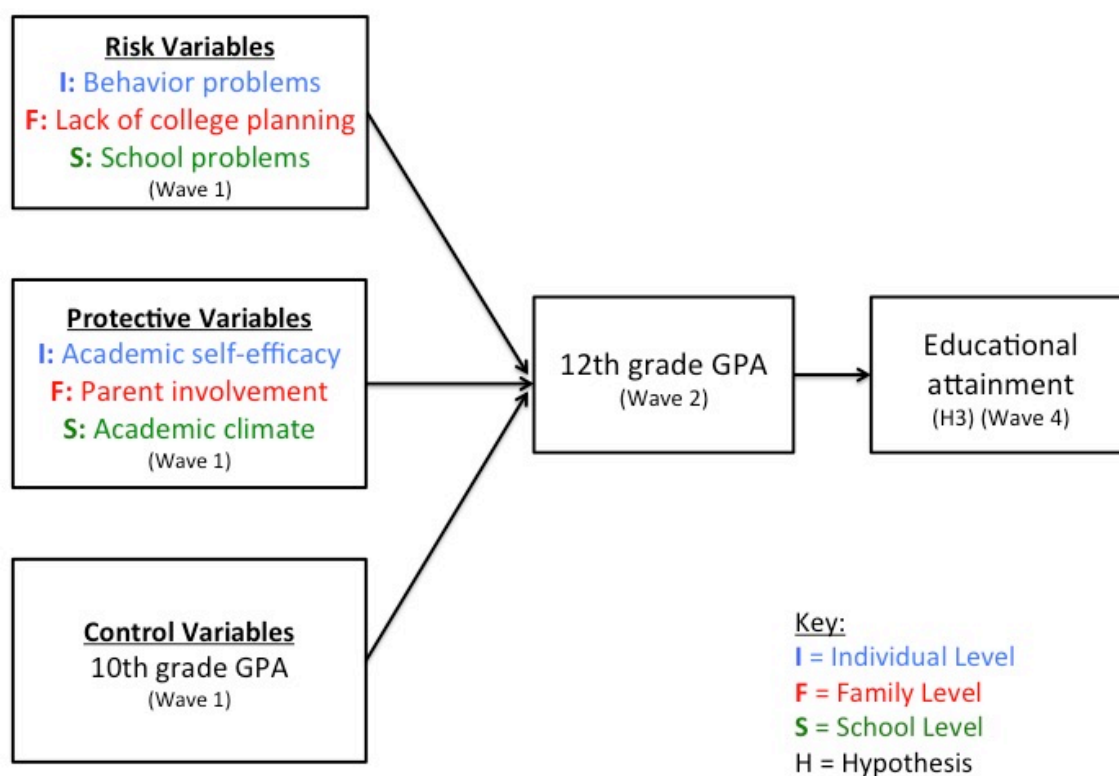


Figure 5. Mediation Model with 12th Grade GPA Mediating the Effects of the Risk and Protective Predictors on Educational Attainment

Method

Data Source and Participants

The proposed study will use data from the Education Longitudinal Study of 2002 (ELS:2002), a study sponsored by the National Center for Education Statistics (NCES) of the Institute of Education Sciences, U.S. Department of Education. The ELS:2002 is a multi-site, longitudinal study examining the educational, vocational, and personal development of a nationally-representative sample of American high school students over the course of 10 years.

The study focused on students' transition from high school into either postsecondary education or the work force and collected data from students, parents, teachers, school administrators, and school records. Base year data collection began in 2002 (Wave 1) when participants were enrolled in 10th grade.

The study began with 15,362 students from 752 schools. Follow-up data collection took place in 2004 (Wave 2), 2006 (Wave 3), and 2012 (Wave 4). NCES research staff collected the majority of the student data (96.5%) in person at schools. A small percentage of students (3.5%) were surveyed outside of school over the phone. Parents and school administrators were mailed their respective surveys at each time point, which could be completed on paper and returned, or completed over the phone. Full procedures from ELS:2002 have been described elsewhere by Ingels et al. (2005, 2004) and Lauff and Ingels (2014). The current study draws on a subsample of 2,427 participants from ELS:2002 who self-identified as Black or African-American. Because this study seeks to examine the relationship between risk and protective factors experienced in 10th grade and long-term educational outcomes, only participants from this subset who participated for the duration of the ELS:2002 study will be retained.

Measures

The current study will use data from student, parent, and administrator surveys at Wave 1, school records from Wave 2, and student surveys at Wave 4. Participants were in 10th grade at Wave 1, 12th grade at Wave 2, and approximately 26 years of age at Wave 4. Risk and protective factors drawn from the student, parent, and administrator Wave 1 surveys will be examined as predictors. Outcome variables measuring academic achievement (12th grade GPA and educational attainment) are drawn from participants' high school transcripts at Wave 2 and participant surveys at Wave 4.

Risk factors. Risk factors to be assessed at the individual, family, and school levels will include behavior problems, lack of college planning, and school problems, respectively. The mean will be used for all variables which are composed of multiple survey items.

Behavior problems. Seven items from the student Wave 1 survey will measure students' behavior problems. Students were asked how often certain indicators of school behavior problems had happened to them in the first semester of the year. Problems range from more minor infractions (e.g. being late to or absent from school) to moderate (e.g. getting in trouble for not following school rules) and severe problems (e.g. being suspended). Item response options were coded by NCES as: 1 = *never*, 2 = *1-2 times*, 3 = *3-6 times*, and 4 = *7-9 times*, 5 = *10 or more times*. Higher scores indicate greater frequency of behavior problems in school. In another study using ELS:2002 data, Peguero and colleagues (2011) used five out of these seven items, plus one additional item measured on a different scale, to assess behavior problems; the researchers found good internal consistency for this measure ($\alpha=.83$). Lucio, Hunt, and Bornovalova (2012) used six of these items to measure behavior problems and found acceptable internal consistency ($\alpha=.65$).

Lack of college planning. Three items from the parent Wave 1 survey will measure lack of college planning. These items ask how often the parent or his/her spouse/partner has provided information to the 10th-grader over the past year about (a) selecting courses and programs at school, (b) plans and preparation for college entrance exams, and (c) applying to college or other schools since the start of the school year. Response options were coded by NCES as: 1 = *never*, 2 = *sometimes*, and 3 = *often*. These items will be reverse recoded so that higher scores indicate a lack of college planning: 1 = *often*, 2 = *sometimes*, 3 = *never*. Benner et al. (2016) found acceptable internal consistency ($\alpha=.74$) using two of these three items to assess college planning

in a previous study. It is expected that adding a third item (i.e. frequency of discussing applying to college) will strengthen the reliability of this measure.

School problems. A series of 19 items from the Wave 1 administrator survey measure school problems. The school principal was asked: “To the best of your knowledge, how often do the following types of problems occur at your school?” Some of the problems assessed included tardiness, absenteeism, physical conflicts, theft, vandalism, use or sale of alcohol or drugs, weapon possession, and gang activity. Each item was rated on a five-point scale (1 = *happens daily*, 5 = *never happens*). These items will be reverse recoded so that higher values indicate a greater magnitude of school problems (1 = *never happens*, 5 = *happens daily*). This scale has shown strong internal consistency ($\alpha=.88$) (National Center for Education Statistics (NCES), n.d.). Urick and Bowers (2014) also demonstrated good internal consistency with this measure using a subset of the ELS:2002 sample ($\alpha=.87$).

Protective factors. Protective factors to be assessed at the individual, family, and school levels include academic self-efficacy, parent involvement, and academic climate, respectively.

Academic self-efficacy. Participant’s academic self-efficacy will be measured by taking the mean of two Wave 1 composite variables created by NCES: mathematics self-efficacy and English self-efficacy. Each self-efficacy composite variable was created by combining responses to five items rated by the participant on a four-point scale (1 = *almost never*, 4 = *almost always*). Items included statements such as “I’m certain I can master the skills being taught in my math/English class” and “I’m confident I can do an excellent job on my math/English assignments.” The math and English self-efficacy composite variables were standardized to z-scores with a mean of zero and a standard deviation of one. Each self-efficacy composite variable has shown strong internal consistency individually ($\alpha=.93$ for both math self-efficacy

and English self-efficacy) (NCES, n.d.). In addition, in a previous study using ELS:2002 data, Peguero and Shaffer (2015) summed math and English self-efficacy composite scores to measure academic self-efficacy overall and also found strong reliability for this measure ($\alpha=.91$). Higher composite values indicate greater academic self-efficacy.

Parent involvement. Four items assessing home-based educational involvement and monitoring from the parent Wave 1 survey will measure parent involvement. Parents were asked to rate how often they perform certain actions on a four-point scale (1 = *never*, 4 = *always*). The items assess involvement and monitoring activities such as checking that the child has completed all his/her homework, discussing the child's report card, and making and enforcing curfews for the child on school nights. Higher values indicate greater parent involvement. This measure was created for the purposes of this study and the sample of interest; no previous data was found on its reliability and/or validity.

Academic climate. NCES created a composite variable through principal factor analysis from five items on the base year administrator survey to measure academic climate. The school principal was asked to indicate how much each statement described his/her school's climate on a five-point scale (1 = *not accurate at all*, 5 = *very accurate*). The statements assessed included: "Teachers press students to achieve," "learning is high priority for students," and "students are expected to do homework." This scale has shown strong internal consistency ($\alpha=.86$) (NCES, n.d.). Urick and Bowers (2014) also found good internal consistency using this measure with a subset of the ELS:2002 sample ($\alpha=.85$). Higher values indicate a more academically-oriented school climate.

Academic achievement. The outcome of interest, academic achievement, will be measured proximally via students' 12th grade GPA at Wave 2 and distally via highest level of education attained at Wave 4.

12th grade GPA. Participants' proximal academic achievement will be measured by their 12th grade GPA. This data was drawn from students' school transcripts at Wave 2. GPA is based on a four-point scale (A = 4.0, F = 0.0). The GPA variable is unweighted, as a weighted GPA for each individual grade level (e.g. weighted 12th grade GPA) was not available in the dataset.

Educational attainment. Participants' distal academic achievement will be measured by their educational attainment as of Wave 4. NCES asked participants what their "highest level of education earned" was at Wave 4 and organized the responses into 10 categories (1 = *no high school credential and no postsecondary attendance*, 10 = *doctoral degree*). Given that participants were approximately 26 years of age at Wave 4, they may have been in the process of completing advanced degrees; however, this measure only accounts for highest degree completed.

Control variables. Preliminary analyses will be conducted to assess whether SES and gender are significantly related to the two outcome variables. If so, they will be included in all of the statistical models as control variables. It is expected 10th grade GPA (Wave 1) will have a strong correlation with 12th grade GPA (Wave 2), so this variable will be controlled for in all models.

SES. Given the known aforementioned effects of SES on academic outcomes (Anyon, 2014; Barton & Coley, 2009; Howard, 2010 #108; MacLeod, 2008), it is likely that analyses will need to control for students' SES at Wave 1. SES will be measured by a composite variable created by NCES from parent questionnaire data. The SES composite variable is based on five

equally-weighted, standardized components: family income, mother/guardian's education and occupation, and father/guardian's education and occupation. Family income ranged from 1 (*none*) to 13 (*\$200,001 or more*). The parent Wave 1 survey asked parents to indicate their own, as well as their spouse's/partner's highest level of education. Response options range from 1 (*did not finish high school*) to 8 (*completed PhD, MD, or other advanced degree*). Parents were asked which of 16 options best described their own and their spouse's/partner's occupations. Sample response options included "clerical," "homemaker," "laborer," "manager," "professional," "sales," and "service." The 1961 Duncan Index was used to determine occupational prestige. SES scores were standardized to z-scores with a mean of zero and a standard deviation of one.

Gender. Some studies have found differential gender effects related to resilience outcomes (Erdem & Slesnick, 2010; Evans et al., 2010; Hollister-Wagner et al., 2001; McLaren, Gomez, Bailey, & Van Der Horst, 2007); thus, the preliminary analyses will assess whether to control for gender. Gender was assessed via one item on the Wave 1 student survey with response options of either "male" or "female." Other expressions of gender were not accounted for within the present data.

10th Grade GPA. Analyses will control for students' GPA from all 10th grade courses, as participants were in 10th grade at the start of ELS:2002. Controlling for this variable will account for its contribution to the total variance when examining the 12th grade GPA outcome variable, as we expect these variables to be positively correlated. This data was drawn from students' school transcripts. GPA is based on a four-point scale (A = 4.0, F = 0.0). The GPA variable is unweighted, as a weighted GPA for each individual grade level (e.g. weighted 10th grade GPA) was not available in the dataset. The 10th grade GPA variable will be kept as a control predictor

in models examining educational attainment at Wave 4 as the outcome to maintain consistency in predictors across models.

Analyses

All analyses will be conducted using RStudio statistical software. Hierarchical multiple regression will be used to test the compensatory model of resilience and the risk-protective mechanism of the protective factor model of resilience model. This method is useful when there is a logical or temporal reason to enter predictors into a regression equation in a certain order and provides the unique contribution of each predictor to the total variance when included as a separate step (Cohen & Cohen, 1975). For these reasons, hierarchical multiple regression is useful for examining the contribution of different risk and protective factors to the academic achievement outcomes. Garmezy, Masten, and Tellegen (1984) applied this methodology to examine the compensatory and protective factor models specifically, and numerous other resilience researchers have found this to be an effective means to examine risk and protective effects and resilience models (Christiansen & Evans, 2005; Erdem & Slesnick, 2010; Evans et al., 2010; Gomez & McLaren, 2006; Hollister-Wagner et al., 2001; McLaren et al., 2007).

The experimenter will also test a mediation model with 12th grade GPA as the mediator to assess the extent to which the effects of the risk and protective predictors on educational attainment are transmitted through 12th grade GPA as an interim outcome. The bootstrapping method will be used for this analysis. This method selects a random sample with replacement from the data, estimates the indirect effect of this sample, and then repeats this process approximately 1,000 times. The mean of all of these estimates is considered to be a strong approximation of the actual indirect effect (MacKinnon, Fairchild, & Fritz, 2007). The bootstrapping method has several advantages; for example, it is non-parametric and therefore

makes no assumptions of a normal distribution, and it uses the raw data (MacKinnon et al., 2007).

Compensatory models. Following the analytic method outlined by Garnezy, Masten, and Tellegen (1984), the independent variables will be entered into hierarchical regression models in the following blocks and order to predict 12th grade GPA (see Figure 1):

1. Control variables: 10th grade GPA; if SES and/or gender are significant in preliminary analyses, they will be entered here.
2. Risk variables: Behavior problems, lack of college planning, school problems
3. Protective variables: Academic self-efficacy, parent involvement, academic climate

The difference in R^2 between models will be analyzed via ANOVA to determine if the addition of each block contributes significantly to the amount of variance explained by the predictors.

After the addition of Block 3, the experimenter will assess whether the compensatory model is supported. This same models and process will then be repeated to predict educational attainment.

Protective factor models. The risk-protective mechanism of the protective factor model will also be assessed following the analytic method of Garnezy, Masten, and Tellegen (1984). However, moderation will be assessed individually at each of the ecological levels of interest: individual, family, and school. For instance, for the individual level, the independent variables will be entered into hierarchical regression models in the following blocks and order to predict 12th grade GPA (see Figure 2):

1. Control variables: 10th grade GPA; if SES and/or gender are significant in preliminary analyses, they will be entered here.
2. Risk variables: Behavior problems, lack of college planning, school problems
3. Protective variables: Academic self-efficacy, parent involvement, academic climate

4. Interaction variable: Behavior problems x academic self-efficacy

The difference in R^2 between models will be analyzed via ANOVA to determine if the addition of the interaction term contributes significantly to the amount of variance explained by the predictors. After the addition of Block 4, the experimenter will assess whether the level-specific protective factor moderates the relationship between the level-specific risk factor and the outcome variable and whether the model is supported. This process will then be repeated with the family- and school-level interaction terms (lack of college planning x parent involvement and school problems x academic climate, respectively) replacing the individual-level interaction term (see Figures 3 and 4). Finally, these same models and process will then be repeated to predict educational attainment (see Figures 2, 3, and 4).

Mediation model. Lastly, a mediation model where 12th grade GPA mediates the effects of the predictors on educational attainment will be tested (see Figure 5). The bootstrapping method will be used to estimate the indirect effect and determine 95% confidence intervals. The experimenter will then determine whether complete, partial, or no mediation exists.

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