DOES ETHNICITY IMPACT ACADEMIC SUCCESS?: EXAMINATION OF

ETHNIC IDENTITY MEDIATION ON ACADEMIC SELF-EFFICACY

AND ACADEMIC ACHIEVEMENT

by

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ABSTRACT

The current literature appears to have mixed results as to how ethnic identity (EI) impacts academic achievement. This study attempts to clarify EI's role by proposing it as a potential mediator for the relationship between academic self-efficacy (ASE) and academic achievement as measured by grade point average (GPA) and Math, Reading, and English/Language Arts Criterion Referenced Competency Tests (CRCTs). School level socioeconomic status (SES) and ethnic composition are also analyzed in conjunction with the aforementioned variables to determine the degree to which they impact the potential mediating relationships. Exploratory analyses examining ASE as a mediator and both ASE and EI as moderators were also undertaken.

Participants included 142 males and 137 females for a total of 279. Of these, 65.6% were African American (AA) 34.4% were Caucasian (EA). Results indicated that both ASE and EI statistically mediated the other respective variable's relation to GPA. With regard to the CRCTs, ASE mediated the relationship between EI and Reading while EI mediated the relationship between ASE and Math. No statistical moderation was found for either EI or ASE. Similarly, no moderation was found for either of the school level variables. Additionally, no significant differences between ethnicities were found for the relationships examined.

The statistical mediation results are explained through their potential associations to specific intelligences. It is thought that ASE may be more closely related to verbal-linguistic intelligence (VLI), thus explaining its stronger association with reading; while EI is thought to be more closely associated with logical-mathematical intelligence (LMI), thus explaining its stronger association with math. Limitations, lack of significant moderation, and implications for future research are also discussed.

LIST OF ABBREVIATIONS AND SYMBOLS

B Unstandardized regression coefficient

df Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data.

M Mean: The sum of a set of measurements divided by the number of measurements in the set.

p Probability associated with the occurrence under the null hypothesis of a value as extreme or more extreme than the observed value.

r Pearson product-moment correlation

R^2 Coefficient of determination: Details the proportion of variance explained.

SD Standard Deviation: The square root of the variance.

SE Standard Error: A measure of how spread out data values are around the mean, defined as the square root of the variance.

t Computed value of a t test.

z Computed value of a z test.

β Standardized regression coefficient

$<$ Less than

$=$ Equal to

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1. Introduction

The civil rights movement strove to provide an equal environment free from racial discrimination for all people. It is now 2008, White students are still outperforming Black students (Snyder, Dillow, & Hoffman, 2008). However, there is hope. Black students who do achieve may find strength and motivation in their ethnic identities and beliefs. The aim of this study is to evaluate the relations among academic self-efficacy, academic achievement, and ethnic identity taking into consideration the role of classroom ethnic composition and socioeconomic status (SES). A central part of this study is to determine whether ethnic identity mediates the relationship between academic self-efficacy and academic achievement in African American and Caucasian high school students. To understand why these variables were chosen for examination, a careful review of each of the variables must be taken into consideration.

Academic Motivation and Self-Efficacy

Many studies have consistently shown the positive impact of academic motivation and self-efficacy on students' academic achievement (Bandura, Barbarenelli, Caprara, & Pastorelli, 1996, 2001; Nicholls, 1984; Weiner, 1979; Zimmerman, 1998). The relationship between self-efficacy and motivation to academic achievement and future goals has also been studied specifically within adolescent populations. Nurmi (1991; 2005) found that adolescents' future orientation depends on how adolescents formulate their future goals. Nurmi (1995) stated that the formulation of future goals in adolescents is a result of how adolescents value their own motives and the degree of self-perceived confidence and ability to successfully attain those goals. In

other words, Nurmi posits that adolescents' future achievement is highly dependent on their motivations and perceived self-efficacy. In the more recent literature, this concept of academic motivation and self-perceived competence in regard to academics has been referred to as academic self-efficacy.

Academic self-efficacy's relation to academic achievement has been extensively researched in the literature across several age ranges. Hung and Yu (2008) and Liew, Mctigue, Barrois, and Hughes (2008) all studied kindergarteners and first graders below the median in literacy across three to four years. They found that academic self-efficacy was later correlated to achievement in math and reading. In the elementary and middle school years, review articles have positively linked academic self-efficacy to academic achievement (Pajares, 1996; Schunk & Zimmerman, 1996). With African American high school students, educational aspirations have been positively linked to academic self-efficacy, which in turn is linked to academic achievement (Uwah, McMahon, & Furlow, 2008). Even within college students, academic self-efficacy has been found to positively relate to students' predicted goals through their expectations and interests (Byars-Winston, Estrada, Howard, Davis, & Zalapia, 2010). Additionally, Gore (2006) found that academic self-efficacy predicted college outcomes. Some researchers have also suggested that academic self-efficacy is one of the stronger predictors of academic achievement, allows for more profound academic engagement, and is critical for success (Eccles, 1983; Ferla, Valcke, & Cai, 2009; Jonson-Reid, Davis, Saunders, Williams, & Williams, 2005; Wu, West, & Hughes, 2010). In his model, Martin (2002) indicated that a student's academic achievement and motivations are largely influenced by the student's beliefs in his or her own academic abilities (self-efficacy), and the amount of control the student has over his or her academic environment. Although it appears that much of the literature portrays a positive relationship between academic

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self-efficacy and academic achievement, academic self-efficacy's relation to other variables like ethnic identity, ethnic composition, and socioeconomic status with regard to achievement is less well known. To understand how academic self-efficacy may relate to these variables, these other variables must first be understood.

Ethnic Identity Development

Adolescence is a time during which one explores and develops one's identity. During this time in a youth's life there is a lot of inner soul-searching and experimentation that leads to the development of a mature self-identity (Phinney, 1993). Ethnic identity development is crucial to the healthy identity development of adolescents because it is thought that ethnic identity may influence goal selection and behavioral outcomes (Holmes & Lochman, 2009). Phinney (1993) describes a 3-stage model of ethnic identity development based on Erikson's theory of ego identity formation. Cross's (1991) five-stage model is similar to Phinney's, but adds details about the possible psychological processes that may be occurring within Black individuals. Earlier models relate ethnic identity (EI) only to connectedness with one's group, but recent studies have developed EI into multidimensional models. Sellers, Smith, Shelton, Rowley, and Chavous's (1998), model proposes that EI consists of racial identity salience (extent to which one's race is relevant to one's self-concept), race centrality (whether an individual normatively defines oneself with one's race), private and public regard (degree to which one feels positively or negatively about one's race, and the degree to which one believes that others view one's race positively or negatively, respectively). Other definitions consist of an array of ideologies (worldviews concerning one's race) which will be discussed later (Sellers, Rowley, Chavous, Shelton, & Smith, 1997; Sellers, et al., 1998). Oyserman, Bybee, and Terry (2003) developed a simpler multidimensional model defined by connectedness to group, awareness of racism, and

embedded achievement attitudes. There has yet to be consensus as to how to globally define EI, but researchers have attempted to study this construct using the previously mentioned models.

While there is a lack of consensus, several researchers have analyzed EI using the two constructs of exploration (willfully seeking out information about and experimenting with one's race) and centrality (connectedness or belonging) using the Multigroup Ethnic Identity Measure (MEIM; Abreu, Campos, & Newcomb, 2000; Breskin, 2009; Johnson & Arbona, 2006; Spencer, Icard, Catalano, & Oxford, 2000; Steen, 2009). The MEIM has been widely used and its constructs have been used to measure several outcomes. Studies analyzing psychological adjustment outcomes with regard to EI have consistently found that higher levels of EI are associated with higher levels of self-esteem, self-efficacy, sense of belonging, competency, and lower levels of depression (Akos & Ellis, 2008; Dutton, Singer, & Devlin, 1998; Hughes, Rodriguez, Smith, Johnson, Stevenson, Spicer, 2006; Miller & MacIntosh, 1999; Yasui, Durham, & Dishion, 2004). Unfortunately, the consistency shown for the relationship between psychological adjustment and EI is not seen between EI and academic achievement. The literature examining this relationship appears mixed (Oyserman, Kemmerlmeier, Fryberg, Brosh, & Hart-Johnson, 2003; Chavous, Bernat, Schmeelk-Cone, Caldwell, Kohn-Wood, & Zimmerman, 2003)

Ethnic Identity and Academic Performance

One of the prominent theories concerning African American (AA) academic achievement comes from the work by Ogbu and Simmons (1998). The authors state that academic performance is the direct result of AA students' internalization of perceived societal expectations. Ogbu and Simmons theorize that in order to preserve their identification to the Black community, AA students must remove themselves from any domain that is traditionally

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considered White. According to the authors, academic success is a domain typically associated with Whites, thereby forcing AAs to choose between academic success or their Black identity. The authors posit that AA students choose to maintain their Black identity at the cost of academic success.

Although there is some support for Ogbu and Simmon's theory in the literature (Arroyo & Zigler, 1995; Fordham, 1988; O'Connor,1999; Oyserman et. al., 2003; Sanders, 1997; Taylor, Flickinger, & Roberts, 1994), more recent literature has suggested that EI may actually be beneficial to academic performance and to positive psychosocial outcomes (Honora, 2003). Scott (2003) demonstrated that a higher awareness of discrimination in AA adolescents shielded them from distress and other negative outcomes. Similarly, Smith and colleagues' found that high EI was associated with higher levels of self-esteem and self-efficacy, which was suggested to lead to higher academic engagement (Smith, Walker, Fields, Brookins, & Seay, 1999). With regard to academics, Chavous and colleagues found that higher levels of private regard and centrality were associated with higher levels of perceived school relevance and school efficacy (Chavous et. al., 2003). This study also found that high school completion was predicted by higher levels of private regard and centrality. Higher centrality and private regard were also associated with higher rates of college attendance. In a more recent study, Chavous and colleagues' analyzed the role of perceived school discrimination and centrality on school adjustment (Chavous, Rivas-Drake, Smalls, Griffin, & Cogburn, 2008). Chavous et al.'s study found that higher achievement was associated with higher perceived racism, and that higher levels of centrality were associated with higher school importance. No relation, though, was found between centrality and GPA. Chavous and colleagues stated that although centrality did not impact academic performance, its role in academics may have a promoting function in AA adolescents.

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Relationships amongst EI & Self-Efficacy in the Literature

There are relatively few studies analyzing the relationships amongst EI and academic self-efficacy, and even fewer that directly link them to academic performance. Kerpelman and Mosher(2004) found that rural AA adolescents' future orientation (future goals and aspirations) was positively correlated with their identity development and academic self-efficacy. The authors also found that higher levels of EI, academic self-efficacy, and awareness of racial barriers predicted better future orientation outcomes. Similarly other studies have found that higher EI is associated with higher academic self-efficacy (Kerpelman, Erygit & Stephens, 2008; Rollins & Valdez, 2006; Smith, et. al., 1999). Contrary to these findings, Saunders, Davis, Williams, and Williams (2004) found that although academic self-efficacy and school importance within AA high school students was related to higher intentions to complete high school, academic self-efficacy was negatively associated with GPA. The researchers explained that these results may be due to a distancing of the students from school as a result of not seeing education making a difference in the types of opportunities available. A stronger contrary result was shown by Evans and Herr (1994) where no significant relationships were found among perceived discrimination, EI or self-efficacy and future career aspirations. Evans and Herr stated that these findings may result from not associating one's identity to career aspirations, and perhaps associating discrimination as a "way of life" thereby insinuating a form of learned helplessness. Similar results find negative results between EI and self-efficacy have also been found by other researchers (Gushue & Whitson, 2006; Herman, 2009). Thus, there is no clear relationship established relating self-efficacy to EI.

With regard to academic achievement, the literature too is mixed. A study conducted by Wong and colleagues analyzed the roles of EI-belonging and perceived discrimination on

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academic motivations (as measured by self-competence) and academic performance (GPA) (Wong, Eccles, & Sameroff, 2003). Wong et al.'s study found that academic motivations were associated with higher levels of belonging and lower levels of perceived discrimination. Another study conducted by Smalls and colleagues examines EI and perceived racial discrimination on academic engagement in AA adolescents slightly differently (Smalls, White, Chavous, & Sellers, 2007). Smalls and colleagues' measure EI through the racial ideological beliefs alluded to in the EI development section of this paper. The four ideological worldviews that participants can be grouped into are humanist (raceless perspective viewing equity amongst the races), assimilationist (adopting the mainstream values of US society), nationalist (unique acknowledgement and internalization of Black struggles and values), and minority (identification of Black struggles with those of other ethnic minorities in the US) worldviews. Academic engagement was measured by GPA, negative school behaviors, academic persistence, academic curiosity, and a public oppositional academic identity (POAI: Extent to which adolescents feel comfortable identifying with academics in their peer circles). This study found that higher grades and low POAI were endorsed by nationalist and minority ideologies. Academic persistence was found to be endorsed by the minority ideology, and lower levels of academic curiosity and negative school behaviors were associated with the assimilationist ideology. The findings suggest that embracing and acknowledging the values of one's ethnic group may lead to higher academic outcomes. Similar positive relationships among self-efficacy, academic achievement, and EI have also been found by other researchers (Cokley, 2008; Cokley & Chapman, 2008; Oyserman, 2008; Rollins & Valdez, 2006).

School-Level Ethnic Composition

The mixed relationships between academic self-efficacy, EI, and academic achievement may be due to the need for considering ethnic composition of classrooms as a potential moderator. The relatively little research that exists for ethnic composition reveals mixed results for all ages. Some studies suggest that even when controlling for other variables such as poverty and race, high schools with higher White student percentages have students who have greater aspirations to go to college (Yun & Kurlaender, 2004). Other studies examining populations across academic grades support this result through findings stating that schools with larger populations of ethnic students demonstrate lower levels of achievement (Machard, 1983; Fram, Miller Cribbs, & Horn, 2007; Herman, 2009; Lee, 2007; Taylor & Harris, 2003). Furthermore, for AA students, there is evidence to suggest that having a larger percentage of ethnic or AA peers in the classroom negatively affects their academic performance (Hanushek, Kain, & Rivkin, 2002; Taylor & Harris, 2003). In terms of White student achievement, most of the studies found indicated little to no effect of ethnic composition or peer group influence on academic achievement (Hanushek, Kain, & Rivkin, 2002; Taylor & Harris, 2003).

Although the aforementioned literature suggests that the more ethnic a school becomes, the more likely it is to perform below schools with higher Caucasian populations, there are several articles in the literature that have found the contrary across grades as well. In her study of over 12,000 high school seniors, Frost (2007) found that students attending schools with higher proportions of minority students were more likely to have greater aspirations to attend and graduate from four-year colleges. Additionally, students who attended such diverse schools also seemed to report more comfort with other racial groups (Kurlaender & Yun, 2007). In a similar study examining over 24,000 eighth graders, Goldsmith (2004) found that Black students in schools with higher percentages of Blacks students were more optimistic about school and had

more pro-school beliefs. There is also some evidence to suggest that students from racially diverse neighborhoods have better intelligence scores (IQs; Moore, 1987). Given such differences in the literature across ages and grades, it is important to determine how ethnic composition influences academic achievement in relation to other variables for specific student populations.

Lastly, there is some evidence to suggest that ethnic composition has no effect on academic achievement in White or Black students. In a study examining fourth and fifth graders, racial composition of the classroom was not directly related to academic achievement (Goddard, Salloum, & Berebitsky, 2009). Other reviews of the literature examining ethnic composition have found no evidence for its effect on academic achievement (Cook, 1984). It is also important to note that there is evidence for the ethnic makeup of a classroom affecting peer social relationships within classrooms (Jackson, Barth, Powell, & Lochman, 2006); which, in turn, may affect academic performance.

School-Level Socioeconomic Influences

According to the Survey of Income and Program Participation (SIPP), White families are worth 4.5 times more than Black families on average (Kaushal & Nepomnyaschy, 2009). Given this large disparity, it is important to consider how economic differences influence academic achievement. Some of the literature suggests that schools with lots of children living in poverty offer less education preparation, and thus perform below average because these students have less access to resources and informal networks for social mobility (Yun & Kurlaender, 2004). When SES is analyzed directly in relation to academics, greater wealth is associated with participation in gifted programs and extracurricular activities even after controlling for other factors (Kashual & Nepomnyaschy, 2009). Taylor and Harris (2003) found that for both Black

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and White children, there was a negative correlation between reduced/free lunch plan status and academic achievement. Other studies state that poor Black students do not perform at the same level as middle-class Whites, and that students with a higher SES status have higher expectations for themselves (Biddle & Berliner, 2003; Goldsmith, 2004; Moore 1987). This literature suggests that, in general, lower SES is associated with poorer academic performance.

When SES is observed with ethnic composition, there is no clear trend. In some lower SES schools with higher ethnic compositions, students have been shown to perform more poorly academically (Fram, et. al., 2007). Other researchers suggest that this is because high minority schools have more poor families with prior educational deficiencies, which lead to lower expectations for those students (Biddle & Berliner, 2003; Frost, 2007; Goldsmith, 2004). However, it has been shown that when ethnic identity is included in analyses, low SES students with high EI have positive relationships with academic achievement (Byrd, 2009). Given the contradictory findings in the literature, it is necessary to determine SES's role on academic achievement in the presence of other major factors like EI and ethnic composition.

Purposes and Hypotheses of the Study

The aim of the current study is to determine whether EI mediates the relationship between academic self-efficacy and academic achievement. Given the mixed results of EI with regard to academic achievement, it is possible that EI does not directly impact academic performance, but rather promotes it by mediating the influence of academic self-efficacy. In the face of the mixed findings regarding the relationships among these variables, the proposed mediation model may provide clarity into the directionality of these relationships. Considering some of the literature described, there is some support for EI's role as a mediator given the

findings that state that a high affinity and identification to one's ethnic group yields positive academic outcomes and beliefs.

The primary objective of this study is to add to the literature by examining whether EI as measured by the belonging and exploration subscales of the MEIM (Phinney, 1992) serves a mediating function between academic self-efficacy and academic achievement as measured by students' grades and standardized test scores. The second objective of this study is to extend the literature by examining the moderating roles of school-level ethnic composition and socioeconomic status on the relationship between EI and academic achievement. By examining these relationships, the study may clarify the mixed findings of academic self-efficacy and EI on academic achievement. Additionally, this study will provide further insight into the roles of school-level ethnic composition and SES on academic achievement. The third objective is to explore the possibility of academic self-efficacy as a mediator between EI and academic achievement, and the potential roles of EI and academic self-efficacy as moderators of the stated relationships.

The following hypotheses will also be investigated:

1. Ethnic identity will be positively correlated with academic achievement and academic self-efficacy for all students.

2. Academic self-efficacy will be positively correlated with academic achievement in for all students.

3. Ethnic identity will mediate the relationship between academic self-efficacy and academic achievement for AA students only.

4. School-level ethnic composition will significantly moderate the relationship between EI and academic achievement for AA students, but not for Caucasian students.

5. School-level socioeconomic status will moderate the relationship between EI and academic achievement for all students.

Given the dearth of academic self-efficacy's role on the relationship between EI and academic achievement, exploratory analyses observing it as both a moderator and a mediator will be conducted. Similar exploratory analyses will be conducted for EI.

2. Method

Design

The data for the study was gathered from a dataset compiled by Dr.. Gina M. Raineri with her permission. Dr. Raineri originally compiled this dataset for her dissertation project. Dr. Raineri obtained approval to collect the data from the Institutional Review Board at the University of Alabama on February 20, 2009. The IRB submission detailed the purpose and the procedures for data collection. Data was gathered using survey data, and no major risks were deemed to be involved. Additionally, participation was voluntary and clients received no personal benefits from their participation. Before data collection, Dr. Raineri also obtained permission to collect the data from the county in which the school district was located. Approval was obtained from the county on February 25, 2009.

The author obtained permission to use Dr. Raineri's database on April 5, 2010. The database was transferred thanks to Dr. Melissa F. Jackson, one of Dr. Raineri's dissertation committee members. The analyses in this study are separate from those of Ms. Raineri's dissertation in that they analyze the roles of ethnic composition, ethnic identity, and socioeconomic status in relation to academic self-efficacy and academic achievement. Dr. Raineri's dissertation primarily focuses on global self-evaluation (general efficacy and self-esteem) and motivational (mastery and performance approaches) differences between White and Black American students on academic achievement. University of Alabama IRB approval to use Dr. Raineri's database was granted to the author on September 20th, 2010.

Participants

Two hundred seventy nine ninth-grade student participants from Dr. Raineri's database were chosen for analysis. The only inclusion criterion was that participants be African American or Caucasian. Other ethnic minorities were excluded due to their small representation in the sample. Of the 279 students included, 51% (n = 142) were male and 49% (n = 137) were female. In terms of ethnicity, 65.6% were African American (n = 183) and 34.4% were Caucasian (n = 96). Students ranged in age from 12 to 19 with an average age of 15 (14.85).

Procedure

After acquiring the appropriate approval from the University of Alabama IRB and the school district's county, school administrators were contacted by Dr. Raineri for permission to collect data in their schools. Upon contact with administrators, a date was set to explain data collection procedures. If administrators agreed to participate, they were provided an administrator's informed consent form to sign. Administrators were then asked for the contact information of math and language arts teachers to directly communicate to them the consent and data collection procedures that would be taking place.

Ninth grade students from all participating schools were asked to participate. Of the county's ten schools, six chose to participate. Five of these schools were similar in ethnic composition to county estimates. All participating high schools, though, had smaller percentages of economically disadvantaged students when compared to the county. Some students from non-participating schools took part in the data collection through the sixth school's summer session. This summer session is intended for students to complete the credits necessary to pass failed classes.

Students were asked to participate by Dr. Raineri, their Language Arts teacher, or their Math teacher. The individual asking for participation varied by school according to principal preference. If teachers were soliciting participation, they were given a script to read detailing data collection procedures to their students. Students were informed that their participation was voluntary, that they could drop out of the study when they wished without penalty, and that in addition to the measures of interest, basic demographic information would be collected. Benefits and risks of the study were also explained. Students were then given a parental consent form detailing all the described information to take home and have signed if they wished to participate. Consent forms were returned to the students' teachers who then turned them over to Dr. Raineri. If the parental consent form was returned, teachers or Dr. Raineri provided students with an assent form to sign prior to administration of the measures. The project's measures were then administered in paper-pencil form. Of the 3,250 ninth grade population in the county, there was a 30% participation rate. Administration of the measures took no longer than thirty minutes. Completed measures were kept in a locked cabinet in Dr. Raineri's office, and all survey responses were kept confidential.

Measures

Information/Demographic questionnaire. This questionnaire assessed age, gender, parent and grandparent occupation, and ethnicity. Occupation information was gathered to determine participant social class.

Ethnic Identity measure. Ethnic identity was assessed using the Multigroup Ethnic Identity Measure (Phinney, 1992). This measure consists of 12 items and has been used across several ethnic groups including Asian Americans, Hispanics, African Americans, and Indians. This measure is comprised of two subscales. The *belonging* subscale (seven items) measures how

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closely an individual identifies with their ethnicity. The *exploration* subscale (five items) assesses how active the individual is in his ethnic traditions and beliefs. Items are rated on a 4-point scale (1= *strongly disagree* to 4 = *strongly agree*), with higher scores indicating stronger ethnic identities. In studies with high school and college students, the MEIM has reported Cronbach's alphas of 0.81 and 0.90 respectively (Phinney, 1992; Goodstein & Ponterotto, 1997; Roberts, Phinney, Masse, Chen, Roberts, & Romero, 1999). The exploration subscale's Cronbach's alpha has ranged from 0.40 to 0.80 in the literature, while the belonging subscale has ranged from 0.71 to 0.75 (Pegg & Plybon, 2005; Phinney, 1992; Roberts, et al., 1999; Yancey, Aneshensel, & Driscoll, 2001). In this study, the *exploration* subscale demonstrated a Cronbach's alpha 0.771 whereas the *belonging* subscale demonstrated one of 0.853 for the entire sample. Overall, the MEIM showed a Cronbach's alpha of 0.871 for the entire sample.

Academic Self-Efficacy measure. Academic self-efficacy was assessed using seven items from the Self-Efficacy for Self-Regulated Learning measure and six items from the Self-Efficacy for Academic Achievement scales (Zimmerman, Bandura, & Martinez-Pons, 1992). A total academic self-efficacy score was calculated by adding the scores of both measures together. Possible total scores range from 17 to 68 with higher scores indicating higher levels of academic self-efficacy. According to previous studies, both scales have demonstrated adequate internal reliabilities with Cronbach alphas of 0.87 and 0.70, respectively. The two scales have also been shown to be significantly correlated as indicated by their Pearson's correlation coefficient of 0.51 (Zimmerman, et. al, 1992). In this study, the 13 items demonstrated a Cronbach's alpha of 0.836 for the entire sample.

Academic achievement. Academic achievement was measured using the student's cumulative grade point average (GPA) at the end of the fall 2009 semester, and the English/Language Arts,

Reading, and Math standardized scores of the Georgia Criterion Referenced Competency Tests (CRCT) taken in the eighth grade (Georgia Department of Education, 2008). GPA was obtained by Dr. Raineri from the school district's data system containing all student information. CRCT scores were also obtained by Dr. Raineri through a secure data server containing student records.

The CRCT is administered by the state to assess the level of skills and knowledge required by the Georgia Performance Standards. The CRCT is measured on a scale ranging from 650 to 950. Scores are coded into three levels: Does not Meet Standards, Meets Standards, and Exceeds Standards. Scores of 800 meet standards and scores above 850 exceed standards. Scores of 800 are required to be promoted to the next grade.

Statistical Analyses

To test for moderation and mediation, the procedures outlined by Baron and Kenny (1986) were used. To test for moderation, the dependent variable is regressed on the predictor variable, the potential moderator variable, and the product of the moderator variable and the predictor variable. Moderation is achieved if the regression, including the product of the predictor and moderating variables, is significant when controlling for previous regressions. Separate analyses of moderation by the school-level variables on the relationship between EI and academic achievement were conducted for each of the academic achievement variables (GPA, Reading CRCT, Math CRCT, and English/LA CRCT). Separate moderation analyses for each academic achievement variable were also conducted when examining EI's moderating role on the ASE's impact of academic achievement, and ASE' moderating role on EI's impact of academic achievement.

Additionally, to determine whether the hypothesized statistical moderation analyses had been impacted by the nesting of students, hierarchical linear modeling (HLM) was conducted

using the statistical software *HLM 6.02* (Raudenbush, Bryk, & Congdon, 2004). Hierarchical linear modeling allows a researcher to conduct multi-level analyses, which allows for outcome variable variance to be examined at multiple hierarchical levels. Simple and multiple linear regressions only allow the outcome variable(s) effect(s) to be analyzed at a single level (Byrk & Raudenbush, 1992). Given that the sample has groups of students nested within different schools, multi-level analysis is appropriate to account for the influence thatstudents may have on each other within schools. For this study, two-level hierarchical linear models as described by Raudenbush and Byrk (2002) were conducted.

As with the previous regression analyses, one two-level hierarchical model for every academic outcome was conducted for each potential moderator. In these models, level 1 variables consist of participant individual characteristics. At level 2, the units used are organizations (group-level variables). When analyzed as a whole, the outcome variables can be conceived as dependent on specific organizational characteristics unique to the individual (Raudenbush & Byrk, 2002). At level 1, the regression coefficients denote how outcome is distributed in organization as a function of individual characteristics. At level 2, the effect of each organization as well as the effect of level 1 and 2 variable interactions can be assessed. For these analyses the academic outcome variables (GPA, Math CRCT, Reading CRCT, and English/LA CRCT) were the designated outcome variables, EI was a designated Level 1 variable, and school-level ethnic composition or school-level socioeconomic status was designated as the level 2 variable. For significant moderation, there must be a significant interaction between EI and the respective moderator. It is important to note that schools that contained only two participants were dropped from the HLM analyses. HLM is designed to measure how the variance within organizations impacts an outcome, and because in schools with

only two students represented there are no differences in variation, these students were dropped from the analysis.

To test for mediation a correlation matrix using the predictor, mediating, and dependent variable must be conducted to establish the prerequisites for mediation. The following conditions must be satisfied to prove mediation: (a) variations at the level of the predictor variable must significantly account for variations in the mediating variable (path a), (b) variations at the level of the mediating variable must significantly account for the variations in the predicted variable (path b), and (c) when paths a and b are controlled for, a previously significant relationship between the predictor and the predicted variable (path c) must no longer be significant. The following regression will then be conducted to establish mediation. First, the mediator variable must be regressed on the predictor variable to determine the magnitude of the correlation. Second, the predicted variable is regressed on the predictor variable. The magnitudes of the resulting correlations must be moderate or stronger to meet the conditions for mediation (Baron & Kenny, 1986). The third and final step involves regressing the predicted variable on the predictor and mediator variables. To meet mediation conditions, the mediating variable must be at least moderately correlated with the predicted variable. To prove mediation, the correlation between the predictor and predicted variable must be significantly less in this third step than in the second step. The Sobel test was also used to test for indirect effects (Sobel, 1982). Separate mediation analyses examining ASE's and EI's mediation of the other variables' impact on academic achievement were conducted for each academic achievement variable (GPA, Reading CRCT, Math CRCT, and English/LA CRCT).

It is important to note that several studies mention the importance of gender impacting the relationship between EI and academic achievement. Chavous et al., 2008; Eccles, 1984;

Honora, 2002; Oyserman, Harrison & Bybee, 2001; Saunders et al., 2004). Because sex is a

potential confounding variable, the impact of sex was also explored. Finally, effect size as

calculated by r^2 was used to determine practical significance.

3. Results

The hypothesized relationships among variables will only be reported for the entire sample. Although separate analyses by ethnicity were planned, it was found that the bivariate correlations among the variables were similar regardless of ethnicity. The direction of the relationships among variables did not change by race. Some of these relationships went from significance in the full sample to non-significance in separate ethnic analyses; however, these changes may result from having less power due to smaller sample sizes when participants were broken down by ethnicity. When testing the correlation coefficients by race for these same relationships, no significant differences were found. This result suggests that the variables of study are operating in the same manner for both Caucasians (EA) and African Americans (AA). Therefore, results will be presented as they relate to the full sample in order to improve sample size and power.

Hypothesis 1

The hypothesis that ethnic identity (EI) would be positively correlated with academic achievement and academic self-efficacy (ASE) is fully supported. ASE was found to be significantly correlated with EI below the $p = .01$ level. Similarly, all achievement variables (GPA, Math CRCT, Reading CRCT, and English/LA CRCT) were also significantly correlated to EI. These findings indicate that as EI increased, so did a student's ASE, GPA, and scores on Math, Reading and English/LA standardized tests. For specific figures regarding these correlations, please refer to Table 1.

Table 1

Means (M), standard deviations (SD), and intercorrelations among variables(N=279)

Variable	M	SD	2	3	4	5	6	7	8
1. SES	0.345	0.940	-0.356**	-.331**	-.352**	-.306**	-.292**	-0.021	-0.087
2. Ethnic Composition	-0.214	0.979	-	-.168**	-.132*	-.219**	-0.085	-0.031	0.085
3. GPA	78.092	9.713		-	.590**	.579**	.439**	.294**	.205**
4. Math CRCT	809.57	36.535			-	.669**	.673**	.179**	.227**
5. Reading CRCT	826.75	25.333				-	.784**	.185**	.166**
6. English/LA CRCT	825.9	48.093					-	0.112	.122*
7. Academic Self-Efficacy	56.92	12.623						-	.304**
8. Ethnic Identity	2.732	0.986							-

* *p* < .05. ** *p* < .001

Hypothesis 2

The prediction that ASE would positively relate to all academic achievement variables was also largely supported. ASE was positively related to all but one (English/LA CRCT) of the academic achievement variables below the *p*=.01 level. This finding indicates that as ASE increased, so did a student's GPA and standardized scores on Math and Reading. Please refer to Table 1 for specific correlation information.

Hypothesis 3

The prediction that EI would mediate the relationship between ASE and academic achievement was partially supported. Four analyses were run, one for each of the four academic outcomes (GPA, Reading CRCT achievement, Math CRCT achievement, and English/LA CRCT achievement). Referring to Table 2, it is evident that, according to the Baron and Kenny (1986) method, EI partially mediate this relationship when the academic variable in question was GPA.

Table 2

Results of significant mediation analyses (Hypothesis 3)

Baron and Kenny (1986) Steps	B	SE	β	t	R^2	p
Direct and total effects – GPA						
Step 1: GPA regressed on Academic Self-Efficacy (ASE) (*c* path)	0.226	0.043	0.294	5.208	0.086	<.001
Step 2: Ethnic Identity (EI) regressed on ASE (*a* path)	0.024	0.004	0.304	5.400	0.092	<.001
Step 3: GPA regressed on EI, controlling for ASE (*b* path)	2.009	0.569	0.205	3.534	0.042	<.001
Step 4: GPA regressed on ASE, controlling for EI (*c'* path)	0.197	0.045	0.257	4.354	0.095	<.001
Direct and total effects - Math CRCT						
Step 1: Math CRCT regressed on ASE (*c* path)	0.509	0.172	0.179	2.954	0.032	0.003
Step 2: EI regressed on ASE (*a* path)	0.024	0.004	0.304	5.400	0.092	<.001
Step 3: Math CRCT regressed on EI, controlling for ASE (*b* path)	8.321	2.201	0.227	3.781	0.048	<.001
Step 4: Math CRCT regressed on ASE, controlling for EI (*c'* path)	0.349	0.178	0.123	1.961	0.065	0.051

	z	SE	p
Indirect effects and significance (Sobel, 1982)			
EI mediating between ASE and GPA	2.018	0.015	0.044
EI mediating between ASE and Math CRCT	2.715	2.293	0.007

Note 1. All variables were mean centered, N = 279.
Note 2. R^2 are unique to the particular step.

This model was fully mediated when the academic variable was Math CRCT. Indirect mediation was also found for these two analyses using the Sobel (1982) method. These Sobel findings suggest that in order for ASE to significantly impact either grades or standardized Math scores, individuals must have high levels of ethnic identity. This indirect pathway is also true of standardized math scores according to the Baron and Kenny (1986) method. However, with regard to GPA, the Baron and Kenny procedure (1986) indicated that the presence of high EI does reduce ASE's impact on grades, but not to the point of non-significance; thus partially mediating the relationship statistically. No significant findings were found using Reading or English/LA as the academic achievement variable.

School-Level Variables

The school-level binary variables were originally split based on equal distribution of sample size when preliminary analyses were run. Believing that these splits may not have been reflective of actual low-high splits for the school-level socioeconomic (SES) and ethnic composition (EC), two other splits were analyzed for each of these variables. No significant differences were found among the analyses run for the different splits. Due to non-significant differences, the analyses run for the initial splits are presented. For more school-level and split information regarding these variables, please refer to Table 3.

Hypothesis 4

The prediction that school-level ethnic composition would significantly moderate the relationships between EI and academic achievement was not supported. The four analyses, one for each academic outcome, indicated that the interaction term between EC and EI was not significant when analyzing GPA or any of the three academic achievement variables independently. The four HLM analyses conducted for each academic outcome also found no

significant interaction terms. For specific findings, please refer to Table 4. For specific HLM interaction findings, please refer to Table 5.

Hypothesis 5

The prediction that school-level SES would significantly moderate the relationships between EI and academic achievement was not supported. The four analyses, one for each academic outcome, indicated that the interaction term between SES and EI was not significant when analyzing GPA or any of the three academic achievement variables independently. The four HLM analyses conducted for each academic outcome also found no significant interaction terms. For specific regression findings, please refer to Table 4. For specific HLM interaction findings, please refer to Table 5.

Exploratory Analyses – Academic Self-Efficacy mediation between Ethnic Identity and Academic Achievement

Significant results indicated that ASE did indeed mediate the relationship between EI and academic achievement on two of the four academic outcomes: student grades and reading standardized test scores. With regard to GPA, ASE reduced the impact of EI on GPA when using the Baron and Kenny (1986) procedure, but not to the point of non-significance; thus suggesting partial statistical mediation. With regard to Reading CRCT, ASE reduced the impact of EI to non-significance when using the same procedure, thus fully mediating the relationship statistically. Using the Sobel (1982) technique for indirect mediation, ASE was found to be a significant mediator in this model for both the GPA and Reading CRCT academic variables. This latter finding suggests that in order for an individual with high EI to obtain high grades or high Reading scores, he/she must also have a high sense of ASE. ASE did not statistically mediate the

Table 3

School-level SES and racial composition (N = 279)

% of students on Free/Reduced lunch in school	17	45	47	49	50	54	69	75	80	90
School	Davidson	Johnson	Westside	CCHS	HHS	ARC	Butler	GlenHills	Josey	Laney
N in research sample	34	3	58	134	8	41	6	2	2	2
% of African American population in school	44	59	60	63	74	75	87	93	96	97
School	Davidson	CCHS	HHS	Westside	Johnson	ARC	Butler	GlennHills	Josey	Laney
N in research sample	34	134	8	58	3	41	6	2	2	2

Note 1. The initial split for school-level SES is between Westside & CCHS. Exploratory splits are between CCHS & HHS, and Davidson & Johnson.

Note 2. The initial split for school-level racial composition is between HHS & Westside. Exploratory splits are between Westside & Johnson, and Davidson & CCHS.

Table 4

School-level variable moderation between ethnic identity and achievement (Hypotheses 4 & 5)

Model DV	Interaction term *B*	*SE*	β	*t*	*P*
School-Level Racial Composition					
GPA	-0.198	0.656	-0.02	-0.302	0.763
Math CRCT	-3.743	2.564	-0.102	-1.46	0.146
Reading CRCT	-1.013	1.781	-0.04	-0.569	0.57
English/LA CRCT	-1.382	3.486	-0.029	-0.396	0.692
School-Level SES					
GPA	-0.961	0.686	-0.098	-1.400	0.162
Math CRCT	-0.324	2.64	-0.009	-0.123	0.902
Reading CRCT	-0.374	1.884	-0.015	-0.198	0.843
English/LA CRCT	-0.696	3.609	-0.014	-0.193	0.847

Note. All variables were mean centered, N = 279.

Table 5

HLM Results: School-level moderation between ethnic identity and achievement (Hypotheses 4 & 5)

Academic Outcome	Coefficient	Standard Error	T-ratio	df	p-value
Interaction between EI and Ethnic Composition					
GPA	-0.010	0.021	-0.490	8	0.637
Math CRCT	-0.134	0.087	-1.538	8	0.162
Reading CRCT	0.056	0.064	0.864	8	0.413
English CRCT	0.036	0.141	0.255	8	0.805
Interaction between EI and School-Level SES					
GPA	-0.026	0.025	-1.031	8	0.333
Math CRCT	-0.150	0.147	-1.019	8	0.338
Reading CRCT	0.031	0.097	0.318	8	0.758
English CRCT	-0.100	0.229	-0.437	8	0.674

Note : All variables were mean centered. N = 273

the relationship between EI and Math CRCT, nor between EI and English/LA CRCT. For specific information regarding these analyses, please refer to Table 6.

Exploratory Analyses – ASE moderation between EI and Academic Achievement or EI moderation between ASE and Academic Achievement

No significant results were found when conducting these analyses. None of the interaction terms between ASE and EI were significant when analyzing each of the academic achievement variables independently.

Exploratory Analyses – Gender differences between Academic Achievement and EI

When correlations were examined by gender, some differences were noted. The relationships between EI and GPA, and EI and Reading CRCT were significant for males, but not females. Also, the relationship between EI and English/LA CRCT was significant for females, but not males. However, when testing the correlation coefficients by gender for these same relationships, no significant differences were found, suggesting that the changes in significance may have been due to power issues regarding sample size rather than actual gender differences.

Table 6

Results of significant exploratory ASE mediation analyses

Baron and Kenny (1986) Steps	B	SE	β	t	R^2	p
Direct and total effects – GPA						
Step 1: GPA regressed on Ethnic Identity (EI) (*c* path)	2.009	0.569	0.205	3.534	0.042	<.001
Step 2: Academic Self-Efficacy (ASE) regressed on EI (*a* path)	3.894	0.721	0.304	5.400	0.092	<.001
Step 3: GPA regressed on ASE, controlling for EI (*b* path)	0.226	0.043	0.294	5.208	0.086	<.001
Step 4: GPA regressed on EI, controlling for ASE (*c'* path)	1.241	0.579	0.126	2.143	0.095	0.033
Direct and total effects - Reading CRCT						
Step 1: Reading CRCT regressed on Ethnic Identity (EI) (*c* path)	4.227	1.551	0.166	2.724	0.028	0.007
Step 2: Academic Self-Efficacy (ASE) regressed on EI (*a* path)	3.894	0.721	0.304	5.400	0.092	<.001
Step 3: Reading CRCT regressed on ASE, controlling for EI (*b* path)	0.365	0.120	0.185	3.051	0.034	0.003
Step 4: Reading CRCT regressed on EI, controlling for ASE (*c'* path)	3.114	1.609	0.123	1.936	0.048	0.054

	Z	SE	p
Indirect effects and significance (Sobel, 1982)			
ASE mediating between EI and GPA	3.401	0.226	<.001
ASE mediating between EI and Reading CRCT	2.162	0.531	0.031

Note. All variables were mean centered, N = 279.
Note 2. R^2 are unique to the particular step.

4. Discussion

Bivariate Correlations to GPA

Overall, the results suggest that ethnic identity (EI) and academic self-efficacy (ASE) are significantly associated with a student's level of academic achievement. The significant bivariate relationships indicated that as ASE increased, so did a student's GPA and standardized test scores in math and reading. The same trend in academic achievement was found when analyzing EI's effect on these same variables. The magnitude of these relationships was similar, if not greater than those found in other studies, thereby lending support to the claim that both EI and ASE are associated with academic success. These statistical correlations may be indicative of a relationship in which EI and ASE may contribute to a student's academic functioning. In order to determine whether this is the case, the relationships among ASE, EI, and academic achievement would need to be examined longitudinally. (Byrd & Chavouz, 2009; Hejazi, Shahraray, Farsinejad, & Asgary, 2009; Keperlman, 2004, 2008; Wong, et. al., 2003).

EI and ASE mediation of GPA

With regard to mediating academic achievement, both ASE and EI were analyzed while having the other serve as the independent variable. Statistical mediation analyses were initially undertaken because the similar relationships between EI and ASE to achievement did not speak to the directionality of the relationships. .Using Baron and Kenny's (1986) meditation approach, both ASE and EI were found to partially mediate the relationship between the other respective variable and GPA. Sobel's (1982) technique testing for indirect mediation also found ASE and

EI to have significant indirect effects on GPA. The significant statistical mediation of both ASE and EI failed to provide evidence for directionality, as both were statistically significant mediators; but the lack in distinction between these two variables and GPA may be explained by other factors.

Statistical power may be one explanation for similar statistical findings. The sample size used was large enough to detect relatively small relationships among the variables that may not be of practical importance; however, other causes for similar relationships are possible. The similar statistical mediation for ASE and EI may stem from similarities in the two variables. If both variables are have important shared variance, they should both impact academic measures equally. The order in which the variables are analyzed (independent variable versus mediator) should be of no importance because, if similarly derived, ASE and EI should be pragmatically identical.

Alternately, the results may just be indicative of actual existing relationships. It may be that bidirectional relationships exist between EI and ASE in their relation to academic achievement. Although different constructs, EI and ASE may both be contributing significantly to different aspects of achievement. If true, it may explain why their order of mediation is unimportant in terms of statistical significance. In order to substantiate this finding, future studies should consider using alternate measures of cumulative achievement when analyzing it in conjunction with EI and ASE. Additionally, if these two variables significantly impact achievement differentially, when achievement is broken down into its components, distinctions in analysis should be evident.

Mediation of Math and Reading CRCT

When broken down by Math and Reading CRCT scores, differences in statistical mediation between ASE and EI were found. ASE was shown to be the only statistical mediator for the Reading CRCT while EI was the only statistical mediator for the Math CRCT using both the Baron and Kenny (1986) and Sobel (1982) techniques. The differences in effects suggest that there may be something fundamentally different in how ASE and EI associate with academic achievement. A search of the literature was first undertaken to explain these differences, but there appears to be a gap in the research when it comes to the differentiation of Math and Reading with regard to EI or ASE. Thus, a more fundamental approach was undertaken to determine the circumstances under which youth differentiate their learning using educational researcher Gardener's (1983, 1999) framework.

Gardener's Theory of Multiple Intelligences

As part of his research, Gardener sampled a variety of individuals with a range of cognitive functioning to determine if intelligence and learning were unitary constructs that developed linearly (Silver, Strong, & Perini, 2000). The variation in his research led Gardener to move away from the traditional reductionist definition of intelligence, in which human cognition is unitarily quantifiable, to one that defines intelligence as the ability to solve problems in real life, and the ability to generate new problems to solve (Silver, et. al., 2000). This new definition allowed Gardener to continue to research intelligence from an in-context framework; from which he developed 8 different intelligences (Silver, et. al., 2000). The two intelligences of note for this discussion are the Verbal-Linguistic Intelligence (VLI) and the Logical-Mathematical Intelligence (LMI).

The VLI is defined as the ability to manipulate words for a variety of purposes (e.g. debate, persuasion, instruction, prose-writing, etc.). Individuals with a more developed VLI tend

to have auditory skills that are highly developed, and tend to learn best when they can speak, listen, read, or write. As one might expect, individuals with a more developed VLI tend to perform better on reading and writing academic tasks (Gardener, 1983, 1999). Individuals with a more developed LMI, on the other hand, tend to do better on mathematical academic tasks because this intelligence emphasizes the rational. Individuals with a developed LMI tend to excel at finding patterns and establishing cause-and-effect relationships. These individuals tend to think in terms of concepts and questions, and tend to learn best when they are able to make calculations, experiment, and use both inductive and deductive reasoning to come to conclusions (Gardener, 1983, 1999). Individuals innately prone to the learning style of one of these intelligences are likely to achieve in that intelligence's academic strength. Taking this knowledge of intelligences into consideration, it is possible that the differences in effects by ASE and EI may be due to differences in the intelligences employed. Specifically, the statistical mediation results by academic subject suggest that ASE may be more associated with VLI while EI may be more associated with LMI. To understand the nature of these potential associations further insight into intelligence and educational theory is required.

According to the Dispositional Theory by Perkins Jay, and Tishman (1993), more developed thinkers have certain dispositions that influence their ability to process and make sense of information. These dispositions are defined as sensitivities for a particular type of intelligence, which lead to inclinations for using that intelligence (Perkins, et. al., 1993). Under the right circumstances, use of the particular intelligence is translated into an ability to use the intelligence in specific and/or variety of contexts (Silver, et. al., 2003). Using this theory, the potential associations between VLI and LMI to ASE and EI can be more clearly defined.

Translation of Intelligence Theory to EI and ASE

When reviewing the EI literature, EI has been traditionally measured with the exploration and centrality constructs on which the MEIM was designed. As previously explained, centrality measures the degree to which an individual feels a sense of belonging or connection to his or her ethnicity. Centrality is thought to be directly impacted by the degree of ethnic exploration that an individual engages in. Ethnic exploration is assessed by the degree to which an individual willfully seeks out information regarding his or her ethnicity. This seeking of information involves acquiring information in a variety of contexts, systematically testing it to determine its veracity, and, if deemed appropriate, incorporating it into one's ethnic schema (Abreu, Campos, & Newcomb, 2000; Breskin, 2009; Johnson & Arbona, 2006; Spencer, Icard, Catalano, & Oxford, 2000; Steen, 2009). In essence, centrality is impacted by the social use of the scientific experimental method in EI exploration. Following from dispositional theory, EI exploration can be seen as a disposition for LMI. In order to efficiently develop EI, an individual must systematically test the information he or she gathers from the environment. Gardener's intelligence theory suggests that in order for this kind of rational systematic thinking to occur, an individual must tap into his or her LMI and develop it. Therefore, it is posited that EI exploration may allow for the development of LMI. Following this line of logic, individuals with higher levels of EI are more likely to succeed on math tasks in academic settings because they are likely to have more developed LMIs. A more developed LMI, in turn, allows an individual to pick apart and reason through mathematical problems more easily. Thus, these individuals are likely to obtain better math scores. With regard to reading, EI is unlikely to mediate its relationship to ASE because it does not lend itself well to the use of VLI.

A developed VLI tends to carry with it sensitivities to sounds, meaning, structures, and the styles of language (Gardener, 1983, 1999). These sensitivities are not essential to EI

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development, but do appear to relate to ASE development. ASE is traditionally defined as an "individual's convictions to successfully perform academic tasks at designated levels" (Ferla, Valcke, & Cai, 2009, p. 499). These convictions initially develop from individual personal factors such as ability to goal set, attitudes towards school, etc. However, as a child develops, these personal factors are modified by situational factors such as rewards and teacher feedback (Schunk, 1991). Thus, ASE is theoretically impacted by a child's academic successes through these situational factors. Given VLI's sensitivities, it is likely that an inclination towards and the development of VLI would be essential towards academic success.

In traditional academic settings, assessment of children is primarily achieved through the use of paper and pencil methods (Abdallah, 2008). Therefore, it is likely that those most prone to learn through reading and writing are more likely to achieve. Thus, individuals with a more developed VLI are more likely to succeed in an academic setting. In turn, these individuals who have more developed VLIs and achieve academically are likely to foster a higher sense of ASE because their environment provides them with feedback supporting their academic skills. Consequently, those individuals who exhibit high levels of ASE are likely to have more developed VLIs.

If this VLI-ASE connection is the case, students with higher ASE should be outperforming students with lower ASE on subjects such as Reading and History that favor VLI sensitivities. The significant ASE effects between reading and EI, and not between math and EI lends support to this theory by demonstrating that youth with high levels of EI only exhibited high levels of reading achievement if their ASE was also high. Given that most subjects are traditionally measured through paper and pencil methods, it is logical to assume that students with higher ASE should also be outperforming students with lower ASE across all academic

areas. However, subjects that more heavily favor other intelligences (e.g. math to VLI) may not be as largely dependent on ASE if the VLI skills needed for the assessment are minimal.

Review of Results in Light of Theoretical Associations between Intelligence and ASE/EI

According the Georgia Department of Education (2008), the Math CRCT is presented in a style that allows for the direct assessment of grade-specific mathematical concepts. Given this description, it is assumed that the type of presentation on the Math CRCT minimizes the use of language and promotes the use of logical-mathematical thinking that is more reflective of the material being assessed. If the Math CRCT is indeed more likely to tap into LMI rather than VLI, ASE may not be as strong a predictor or mediator for this standardized test. In the literature, there is some evidence to support this math-reading differentiation. According to Swanson, (2009) differences in math and reading disabilities were moderated by working memory and visual-spatial processing. Deficits in visual-spatial processing were more associated with reading disabilities while deficits in working memory were more associated with math disabilities. Swanson's (2009) study shows that deficits in VLI and LMI characteristics are associated with deficits in reading and math, respectively.

Although subjects like Math and Science may rely more heavily on LMI, they are still likely to be assessed using paper and pencil methods. Therefore, as with all other subjects assessed in this manner, they are likely to tap into a subject's VLI even if it is to a smaller degree. If all academic subjects must tap into VLI, it is likely that when analyzing predictors of academic achievement using cumulative measures (e.g. GPA), individuals with higher VLI will demonstrate stronger relationships. Assuming a connection between VLI and ASE, ASE should consequently be a stronger predictor and statistical mediator of cumulative measures of academic achievement. The results of this study support this notion as ASE exhibited a stronger significant

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statistical association to GPA than did EI. EI's weaker, yet still significant statistical mediation to GPA may be explained by the more LMI driven academic subjects (i.e. math and science courses) that are also taken into consideration when calculating GPA. To determine whether this rationale is accurate, future studies should break down academic achievement into its component subjects, assess different student intelligences, and analyze these variables in relation to EI and ASE.

Lack of English/LA CRCT findings

The English/LA CRCT was not significant in any analysis beyond the bivariate correlations. According to the above stated theory, VLI could similarly impact English/LA, but it did not. One possible reason for this lack of findings could be due to the test itself. The English/LA CRCT demonstrated the lowest correlations with all variables in comparison to the other two subject CRCTs. These results suggest that the English/LA CRCT did not impact other variables of study to the same degree as it did the other CRCTs. The fact that English/LA CRCT's impact was not equitable to other CRCTs' impact suggests that there may have been something in its construction that was different from the other two CRCTs. According the Georgia Department of Education, the English/LA CRCT consists primarily of questions that assess for grammar and sentence construction skills, as well as the ability to determine correct transition elements between paragraphs, appropriate topic/concluding sentences, and clarity of writing (Georgia Department of Education, 2008). Success on this test, therefore, relies heavily on memorization and the rote application of the written English language rules. Although reading and writing are involved to understand the material, use of a developed VLI appears unnecessary for success as the test appears to rely more on the recognition of (in)correct English syntax rather than the manipulation of the written stimuli to solve a problem.

Other factors to consider when examining potential differences in English/LA achievement are the different languages or English dialects spoken regularly by the students that could be impacting their performance. Students who have verbal orthography, phonemic systems, and sentence construction that differs from that of Standard American English speakers have more difficulty grasping the structure of academic English grammar (Winter, 1993). Therefore, students who speak different American English dialects may have been subject to poorer performance on the English/LA CRCT. Considering the large AA sample size in this study, if these AA students spoke in African American Vernacular English (AAVE), which grammatically differs from Standard English, their scores on the English/LA CRCT may have been detrimentally impacted. There is research to suggest that AA students who phonologically construct their sentences using Standard English more of the time, perform better on English/LA assessments (Charity, Scarborough, & Griffin, 2004). Thus, the lack of findings for the English/LA CRCT may be in part due to the dialect spoken regularly by the students. However, AA student use of AAVE is unlikely to impact standardized Reading scores because the AAVE appears to be unrelated to the skills gained as one develops one's VLI.

In comparison, the Reading and Math CRCTs appear to require adequate use of the VLI and LMI respectively. The Reading CRCT requires a student to demonstrate several abilities including showing an understanding of contextual vocabulary, determining strategies for finding meanings to unfamiliar words, determining the differences between the concepts of a theme, analyzing character traits/emotions/motivation, drawing conclusions from structural written elements, tracing the development of the author's argument, and identifying the purpose behind an author's writing (Georgia Department of Education, 2008). The skills needed to effectively perform these tasks require the student to make use of his or her VLI as they necessitate the

student to manipulate the written stimuli in his or her head, analyze it using higher order thinking, and then produce an appropriate response. These skills do not appear to be influenced by the type of English that the student speaks. In fact, in some research AAVE has been used by students to positively manipulate written content (Sealey-Ruiz, 2005). Similarly, the Math CRCT requires a student to demonstrate several abilities including the ability to use and apply geometric properties in a multi-step format to plane figures, use different representations of numbers such as square roots, use linear algebra in a multi-step format to deduce correct responses, make use of the student's data analysis skills to determine the theoretical probability of different events, and make inferences from provided data (Georgia Department of Education, 2008). All these tasks require the student to make use of his or her LMI by necessitating the use of the student's deductive reasoning abilities. Therefore, the lack of mediation findings for the English/LA CRCT may be in part due to the physical construction of the test and the elementary skills needed to successfully complete it.

Other Possible Distinctions between CRCTs and GPA

Although the application of Gardener's multiple intelligences theory is logical, the different patterns of mediation findings between GPA and the Georgia Math and Reading CRCTs may be attributable to other factors. Specifically, the distinction in assessment environments between GPA and the Georgia CRCTs may have impacted student performance. GPA is typically assessed constantly throughout the year through the completion of homework, quizzes, and tests. These assessments are commonplace to most students, and as such, may not be as anxiety provoking as the standardized testing environment of the CRCTs. Standardized tests such as the Georgia CRCTs become part of a student's permanent academic file and may potentially impact future academic opportunities available to the student. As such, awareness of

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the potential impact of these standardized exams may increase the level of anxiety felt when compared to standard GPA assessments because the consequences of doing poorly are potentially greater in the long term. With regard to GPA, the requirements needed to advance to the next level are also less stringent, and thus, may produce less anxiety. However, the level of potential student anxiety may not be solely caused by assessment environment. Students' anxiety levels may also be influenced by stereotype threat.

According to Steele's (1992, 1997) stereotype threat hypothesis, students who perceive existing negative stereotypes about the intellectual or academic capabilities of their group may lead to higher levels of anxiety. Thus, if the students in this study perceived negative stereotypes regarding their performance on the standardized exam, anxiety may have been added to the potentially already existing anxiety resulting from the testing environment. This anxiety, in turn, may have differentially impacted the students' performance on the CRCTs in comparison to their performance on GPA. There is research in the literature to support this path of relationships. According to Osborne and Walker (2006), students of color who were more invested in school were more likely to withdraw from school than were their non-invested peers. However, given that the current study's findings did not find any significant differences between AA and EA students, stereotype threat's impact on academic performance may not have been as great of an issue for this sample.

Moderation Analyses

With regard to moderation, analyses indicated no significant relationships. The results of this study suggest that school-level variables (SES and ethnic composition) do not impact the relationship between EI and academic achievement as predicted even when accounting for the influence that students within school may have for each other. However, the non-significant

regression moderation results may be accounted for by how the variables were measured. Initially, school-level variables (i.e. moderators) were analyzed on a binary (high-low) scale in a manner that allowed for even distribution of the sample. The lack of results using this split prompted the researcher to use more reflective splits of SES and ethnic composition at the cost of uneven sample sizes in each group. This new split also failed to attain significant results. The researcher then measured the school-level variables dimensionally based on school levels of SES and ethnic composition in order to assess continuous rather than categorical variables. This third analysis also yielded no significant results. The lack of results in both regression and HML may be largely due to the uneven distribution of participants across these variables. By having the majority of the sample localized in two schools of similar SES and ethnic composition, the differences required to establish statistically significant differences are much larger. Thus, meaningful, yet statistically non-significant differences may have been overlooked.

Limitations

To further validate the results of this study, future researchers should take into account and improve upon its limitations. As previously stated, assessment of VLI and LMI levels as well as even sample distribution across school-level variables would strengthen the results found in this study. Additionally, researchers should also consider analysis of other academic subjects and/or standardized test scores to determine if they are truly differentiated by intelligence. An important limitation of note is the cross-sectional nature of the data.

Cross-sectional data inhibited the researcher from establishing temporal directionality when analyzing statistical mediation among the variables. Although the results and the little literature supported ASE as a statistical mediator with EI having significant, yet statistically weaker mediation, longitudinal data is essential to establish temporal directionality towards

academic achievement. As is, the data only allows the researcher to establish meaningful associations among the variables. The directionality established by longitudinal data would allow the researcher to infer causal links that can then be tested to determine the true nature of these relationships. Insight into causality would in turn allow individuals in the field of education to tailor interventions around the variable(s) that are likely to promote the best academic outcomes.

The ability to generalize the results of this study is another flaw. The sample is limited to African American and Caucasian students from one county in Georgia. Within this sample, African American students outnumbered Caucasian students about two to one. Therefore, the results of this study cannot be applied to the diverse makeup of high school students found in other states. The larger amount of AA students may have also accounted for the lack of significant ethnic differences that is otherwise found in some of the literature (Hanushek, Kain, & Rivkin, 2002; Taylor & Harris, 2003; Yun & Kurlaender, 2004). However, as the analyses stand, results suggest that either the variables of study operate universally across ethnic groups; or that there was a lack of power to detect these differences. Future studies should include equal numbers of diverse students to determine whether ethnic background truly has no impact.

Lastly, it is important to note the Georgia CRCT exams. These exams may not reflect the educational standards held in other states. These tests may be inflating or deflating achievement levels if they significantly differ from other states' standardized assessments of academic achievement. Future studies should assure that there are no significant differences in assessment between the CRCT tests and other commonly used standardized measures of achievement.

Summary

Despite the limitations noted, this study still demonstrated important relationships. This study provided evidence for both the statistically mediating roles of EI and ASE when looking at

a cumulative measure of academic achievement. Furthermore, it showed that when academic achievement was broken down, EI and ASE had different effects on math and reading. These outcomes suggest that although both impact academic achievement, they may do so through different trajectories. EI may impact academic achievement largely through an individual's LMI while ASE may impact academic achievement through an individual's VLI. Taking into account ASE's and EI's effects on academic achievement along with the significant correlations between these variables and most measures of academic achievement, ASE and EI development should promoted and encouraged when designing curriculums and other academic programs. Future studies should also focus on further analysis of the differentiation found between ASE and EI to determine where these variables would have the most beneficial impact in an academic setting.

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