A LONGITUDINAL EXAMINATION OF AFRICAN AMERICAN ADOLESCENTS' ATTRIBUTIONS ABOUT ACHIEVEMENT OUTCOMES

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ABSTRACT

AKILAH SWINTON: A Longitudinal Examination of African American Adolescents' Attributions about Achievement Outcomes
(Under the direction of Beth Kurtz-Costes)

Developmental, gender and academic domain differences in casual attributions and the influence of these attributions on classroom engagement were explored in 115 African American adolescents. Adolescents reported their attributions for success and failure in math, English/writing, and science, and their classroom engagement in eighth grade and eleventh grade. Ability attributions for math became more maladaptive from eighth to eleventh grade, and across grades, boys were generally more likely than girls to report adaptive math ability attributions. Compared to girls, boys were more likely to attribute English failure to low ability. Eighth grade success ability attributions were positively related to Grade 11 classroom engagement, whereas eighth and eleventh grade failure ability attributions were negatively related to engagement. Implications of the results in regard to the relationship between gender stereotypes and attributions are discussed.

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A Longitudinal Examination of African American Adolescents' Attributions about Achievement Outcomes

Despite significant gains in African American achievement in recent decades, African American students are still disproportionately achieving at lower levels than European Americans on indices such as standardized testing, grades, course taking, tracking, high school completion, and college completion (Kao & Thompson, 2003; Jencks & Phillips, 1998; National Center for Education Statistics [NCES], 2007). African American underachievement compared to European Americans is particularly pronounced in the domains of science and math (NCES, 2006, 2007). These race differences in achievement are further nuanced by gender differences: Overall, African American boys as compared to African American girls obtain lower grades, experience more grade retentions, and achieve lower graduation rates (Garibaldi, 1992; Jordan & Cooper, 2003; Mickelson & Green, 2006; Saunders, Davis, Williams, & Williams, 2004). However, gender disparities found among White youth are also evident among Blacks, with girls excelling in literacy but performing less well than boys in math and science (NCES, 2004, 2006, 2007). Girls are also less likely than boys to choose to major in math and science-related fields in college and to pursue careers in these domains (National Science Foundation [NSF] 2000, 2008).

Because of these racial and gender disparities and the complexity of the intersection of race and gender, there is great interest in understanding the achievement motivation of African American students as well as the how gender and domain differences may emerge among African American adolescents. The goal of the present study is to explore

developmental, gender and academic domain differences in casual attributions and the role of these attributions in shaping the achievement motivation of African American adolescents. Attribution theory aims to explain how individuals' interpretations of their successes and failures influence their subsequent motivation (Weiner, 1985). The attribution theory framework is comprehensive in nature, as it acknowledges the role of various environmental, personal, and situational factors that may influence how attributions impact outcomes. Graham (1988) has demonstrated the value of using attribution theory in examining the motivation of African Americans adolescents; however, little research has examined how African Americans' academic attributions change over time, how they differ by gender and domain, and how these attributions impact classroom engagement.

Attribution Theory

Attribution theory (Weiner, 1985, 1986) is a cognitive theory of motivation that assumes individuals try to master their environment by understanding the causal determinants of their behavior. The perceived causes of successes and failures (e.g., luck, low ability, high effort) are influenced by two types of antecedent conditions: environmental factors and personal factors. The three causal dimensions by which these beliefs are categorized are locus, stability and control. These dimensions are the heart of the general attributional model and determine the psychological and behavioral consequences of attributions (Weiner, 1985, 1986). The *locus* of causality refers to whether or not the cause of a success or failure is internal (e.g., ability) or external (e.g., task difficulty) to the individual. *Stability* refers to whether or not the cause of a success or failure is stable or unstable. For example, ability is posited to be internal and stable while luck is believed to be an external and unstable cause. Lastly, the cause of the success or failure may be either

controllable or uncontrollable. For instance, the amount of effort expended may be viewed as controllable to the individual, while luck is likely to be viewed as uncontrollable (Weiner, 1985, 1986).

According to attribution theory, when explaining success, it is more adaptive to make internal and stable attributions as there is a greater likelihood to expect future success than if success is attributed to an external, uncontrollable factor (Weiner, 1985, 1986). For example, high achieving adolescents emphasize the contribution of their own ability in shaping their academic successes, while low achievers emphasize how variables external to themselves, such as luck, are instrumental to their academic successes (O'Sullivan & Howe, 1996). When explaining failure, attributions to causes that are external and unstable are considered to be the most adaptive because attributing failure to an internal, uncontrollable factor such as low ability is posited to have detrimental effects on future behavior. Among the attributions made within the achievement domain, ability and effort are the most salient and dominant causes (Weiner, 1985). The present study will focus specifically on ability and effort attributions made in regard to achievement in math, English, and science.

Developmental Differences in Attributional Beliefs

The present study focuses on the period of adolescence, as this is a time when youth are developing an increasing ability to engage in more sophisticated and complex information-processing strategies and to reflect on the self (Keating, 1990). Because there are developmental differences in the ways in which individuals use informational cues, knowledge, and schemas, it is likely that there may be developmental differences in the attributional process (i.e., the ways in which attributions influence motivation). In addition, as discussed below, adolescence is a time when school characteristics change dramatically

and when achievement outcomes become far more salient as predictors of eventual adult employment and income.

Age differences in attributions may result from developmental differences in beliefs about effort and ability (Nicholls, 1990). Nicholls (1990) found that before the age of 6, children tend to equate effort with ability, but by adolescence, children believe that ability is stable and unchanging and thus can only be improved to a certain extent. Because the present study focuses on the attributions of adolescents, it is likely that, in accordance with Nicholls's model, the study's participants believe ability is stable. This perception of ability as fixed typically results in the belief that low ability limits the positive effect that high effort has on performance, whereas high ability increases this positive effect. Additionally, perceptions of task difficulty should influence the relationship between ability and effort, such that ability and effort are believed to be equally important in highly difficult tasks, while either high ability or high effort may be viewed as sufficient enough to perform in low difficulty tasks.

Because the present study follows students from middle school to high school, changes in the school environment may also influence developmental differences in the attributional process. Compared to middle schools, characteristics of high school environments such as academic tracking and the visibility of class rank result in more emphasis on social comparison and harsher grading practices (Eccles & Midgley, 1989; Lee & Bryk, 1989). Academic performance is also placed at a greater importance in high school than at prior school levels, as it is an important factor in college admissions (Berkner & Chavez, 1997; Manski & Wise, 1983). Additionally, by adolescence, students' perceptions of their lives may change, such that they may perceive current successes and failures as

predictors of future outcomes (Henderson & Dweck, 1990). Thus, early attributions should influence later motivation.

In addition to the changes in cognition and in the school environment that take place during adolescence, other changes are also occurring. By middle adolescence (ages 15-18), there is a dramatic increase in introspection, in which adolescents are often very preoccupied with how others perceive them (Harter, 1990). These preoccupations may result in pressure to conform to more traditional gender norms (Henderson & Dweck, 1990). Therefore, adolescents may become increasingly likely to endorse gender academic stereotypes when forming attributions.

Adolescence is also a time when the self undergoes differentiation, such that self-perceptions are more complex than in childhood. In other words, adolescents evaluate themselves globally and along several distinct dimensions (Harter, 1990; Marsh, 1986). It is likely then that adolescents' attributions will differ across domains. Because of the increasing influence of traditional gender norms as well as differentiation to self-perceptions, I do not expect general changes in students' attributions from Grade 8 to Grade 11 but expect that change in attributions that occur over time will be moderated by gender and subject domains.

Domain and Gender Differences

Robust evidence shows that students' beliefs and motivation vary across subject areas (e.g., Eccles, Wigfield, Harold, & Blumenfield, 1993; Meece, Wigfield, & Eccles, 1990). For instance, research has found that regardless of the moderate association found between math and verbal achievement, there is a surprising lack of correlation between math and verbal self-concept (Marsh, 1986). This lack of correlation has been explained by the Internal/External model, in which domain-specific self-concepts are posited to be formed in

relation to both external and internal comparisons. Students first compare their math and verbal abilities to other students and then compare their own math ability with their own verbal ability (or other academic domains) and use both comparisons as basis to form self-concepts in each domain (Marsh, 1986). For example, a student might have an average or above average self-concept in math in spite of low math ability compared to others because his math skills are superior to his verbal skills. The present study will further explore domain specificity by exploring differences in attributions for math, English, and science.

Previous research has found large domain differences in developmental change in students' motivation (Eccles et al., 1983). For example, students tend to experience motivational declines in mathematics and science, but not in English (Chouinard & Roy, 2008; Jacobs, 1991; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Meece et al., 1990; Osborne, Simon, & Collins, 2003). Many high-school students appear less optimistic about the likelihood of success in math and science than they are about success in English (Fredricks & Eccles, 2002; Jacobs et al., 2002; Osborne et al., 2003; Ma & Cartwright, 2003). Therefore, I expect declines in adaptive ability attributions for math and science and no change in English.

I also expect gender differences within each domain. According to attribution theory, environmental factors influence how individuals form attributions (Weiner, 1985). Therefore, information such as stereotypes and societal expectations may play a role in how girls and boys differentially form attributions for math, English, and science. Within the United States, there are traditional views that boys perform better than girls in science and math, while girls are viewed as more competent in verbal domains. It is likely that children are exposed to frequent messages about gender differences in skills and that these stereotypes

and societal expectations influence the attitudes boys and girls form about each domain (Eccles & Jacobs, 1986).

Research on perceptions of competence consistently shows gender differences within the domains of math, English and science. Boys tend to rate their math and science abilities more positively than girls, whereas girls rate their own ability in English higher than boys (Andre, Whigham, Hendrickson, & Chambers, 1999; Eccles & Jacobs, 1986; Jacobs, 1991; Jacobs & Bleeker, 2004; Jacobs et al. 2002; Meece, Wigfield, & Eccles, 1990; Simpson & Oliver, 1985; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991). This research, however, has been conducted with predominately European American samples and less is known about within-domain gender differences among African Americans.

Research on the achievement motivation of African American adolescents has shown that African American girls tend to report higher levels of academic self-efficacy and school valuing than boys (Saunders et al., 2004). However, few studies have explored these gender differences within domains. Stereotype endorsement research may be helpful in understanding these differences among African American adolescents. Although this research does not explore differences in achievement motivation, the results may help to inform how these differences play out in shaping students' motivation. For instance, parents of African American adolescents tend to endorse the traditional stereotypes that girls are better than boys in reading and also tend to rate girls as slightly more competent than boys in mathematics and science skills (Kizzie, Rowley, Kurtz-Costes, DeSousa, & Wachtel, 2008). In addition, both African American boys and girls rate girls more highly than boys in literacy and in math/science (Evans, Copping, Rowley, & Kurtz-Costes, 2009).

Stereotype studies conducted with mixed-raced samples have shown that adolescent girls and boys report verbal domain stereotypes favoring girls, and both adolescent boys and girls report egalitarian math/science stereotypes (Copping, Kurtz-Costes, & Rowley, 2009). However, math/science self-concepts tend to follow traditional gender stereotypes because boys tend to have higher math/science self-concepts whereas girls and boys have similar literacy self-ratings (Evans et al., 2009).

I expect that parallel gender differences will emerge for verbal domains in the present study, as girls will be more likely to endorse high ability in explaining English and writing success and less likely than boys to endorse low ability for failure in verbal domains. I also expect gender differences for math and science to fall in line with traditional gender stereotypes similar to previous research examining gender differences among majority European-American samples. Although the previous research done with African American adolescents has shown inconsistent findings, overall, these results would imply that Black youth are likely to view boys as relatively more competent in math and science and girls as more competent in literary domains. Therefore, I expect that boys will be more likely than girls to endorse high ability in explaining math and science success and less likely than girls to endorse low ability for math and science failures.

I do not have specific predictions about how effort attributions might change with time and domains. If youth view ability as fixed and assume that greater ability in a specific domain implies that less effort is needed, then an inverse relationship would be predicted between ability and effort attributions. In that case, girls would be more likely than boys to report that math and science successes are due to effort, and boys would be more likely than girls to report that English successes are due to effort. However, if adolescents are taking

challenging coursework in which effort is necessary for success, then the most capable students might be likely to report that success in a domain is due to both ability and effort. If so, no gender differences would be anticipated in effort attributions across domains. Because of this complexity and the fact that I do not account for perceptions of task difficulty and beliefs about ability in our analyses, no changes over time or gender differences are hypothesized in domain differences in effort attributions.

Attributions as a Predictor of Classroom Engagement

In addition to exploring developmental, domain, and gender differences in attributions, I will also examine the behavioral consequences of attributions by exploring their relationship to classroom engagement. The present study will focus on a type of behavioral engagement which concerns the student's involvement in learning and includes behaviors such as effort, persistence, attention, and asking questions (Skinner & Belmont, 1993). This engagement appears to be important for school success as high levels of this type of classroom engagement have been linked to positive achievement-related outcomes (Connell, Spencer, & Aber, 1994, Marks, 2000).

Most research has focused on the relationship of attributions to affect and expectancies (i.e., Graham & Long, 1986; Graham, 1994); however, little recent research has explored the relationship between attributions and achievement-related behaviors. The few older studies that have explored this relationship found that maladaptive attributions are linked to lower persistence and engagement (see Bar-Tal, 1978 for review). However, these studies typically assessed attributions using hypothetical situations rather than individual responses to real-life academic experiences. In addition, the studies were either conducted

with White college-aged students or early adolescents, and have often neglected older adolescents (i.e., high-schoolers).

One recent study examined the causes to which older adolescents attribute their own academic success and failure (Glasgow, Dornbusch, Troyer, Steinberg, & Ritter, 1997). In a sample of mostly White high school students, Glasgow and her colleagues found that attributing successes to external causes and failures to external causes and low ability was negatively related to classroom engagement one year later. However, when exploring the relationship between these same attributions and engagement within the subgroup of African Americans and Latinos, the relationship between maladaptive attributions and engagement was no longer significant. To our knowledge, Glasgow et al. (1997) is the only study in the last 15 years to examine the relationship between academic attributions and behavioral outcomes, and during that time no studies have been conducted examining the motivational role of causal attributions with an African American sample.

In the present study, African American adolescents' attributions about their own academic outcomes and their classroom engagement will be assessed when youth are in middle school and again in high school. I expect that adaptive attributions, such as attributing success to high ability and effort and failure to low effort will be positively related to engagement at both time points, and that attributing failure to low ability will be negatively related to engagement at both time points.

The Present Study

The attribution research conducted with African Americans is very limited. Prior research has typically not been longitudinal, has not addressed how academic attributions vary by domain and gender, or how these attributions influence African American

adolescents' classroom motivation. These gaps will be addressed through a longitudinal assessment of how African American adolescents' attributions about personal successes and failures change from middle school to late high school. Gender and domain differences in attributions will also be examined, as well as how attributions are related to classroom engagement. I predict that:

1) Students will have less adaptive ability attributions (i.e. decrease in success ability and an increase in failure ability) for math and science over time, with English attributions staying stable.
2) In regard to attributions for success, I expect to find gender differences within each domain, with boys more likely than girls to attribute math and science success to high ability and girls more likely than boys to attribute English success to ability. In addition, I expect girls to endorse high ability for success in English more than they endorse ability for math or science, whereas boys will endorse high ability for math success more than for English.
3) In regard to attributions for failure, I expect that girls will be more likely than boys to have maladaptive ability attributions (i.e. failure due to low ability) in math and science whereas boys will more likely than girls to attribute English failure to low ability. In addition, I expect girls will be less likely to attribute English failure (in comparison to math and science failure) to low ability, whereas boys will endorse low ability for math failure less than for English and science.
4) Across academic domains, adaptive attributions (i.e., success ability; success effort; failure effort) in eighth grade will be positively related to eighth grade engagement, while maladaptive attributions (failure to lack of ability) in eighth

grade will be negatively related to classroom engagement in eighth grade. Adaptive attributions as reported in both Grades 8 and 11 will be positively related to classroom engagement in eleventh grade, and maladaptive attributions in Grades 8 and 11 will be negatively related to classroom engagement in eleventh grade.

Method

Participants

Participants were 115 (49 boys and 66 girls) African American adolescents in one rural and one urban school district in the southeastern United States who participated in the study when they were in eighth grade, and again in eleventh grade. The students all attended schools in which the majority of the students were African American. At Time 1, when students were in Grade 8, the mean age of these students was 13.8 years (*SD* = 0.67). At Time 2, when students were in Grade 11, the mean age of these students was 17.1 years (*SD* = 0.51). Parent income and education data were available for 80% of the sample. Among families with complete data, approximately 50% of parents reported an annual income of less than $30,000, 29% reported an income between $30,000 and $59,000, and 20% reported an annual income of $60,000 or more. Approximately 6% of parents reported their education as some high school, while about 20% of parents reported their education as high school graduate or GED. Forty-six percent attended some college, 21% had completed a 2-year or 4-year college degree, and 4% had a post-graduate degree.

These data were drawn from a larger study examining the development of achievement-related beliefs in adolescents. The original sample at Time 1 consisted of 357 participants (165 boys and 192 girls). Those participants who were not included in the

current study were either not recruited in Time 2 because they were not African American (n = 108), were not recruited because they were seventh graders at Time 1 (n =74), could not be relocated (n = 25), or declined to participate at Time 2 (n = 35). Comparisons between the participants in the current study and those excluded African American participants revealed that the excluded African American participants had significantly higher household income and significantly lower failure ability scores in English/writing, $F(1, 183) = 4.51$, $p < .05$ and $F(1, 245) = 6.51$, $p < .05$, respectively. However, the two groups did not differ in regard to parental education, the remaining Grade 8 attributions, or Grade 8 classroom engagement, all F's < 2.0.

School records obtained at Time 2 indicated that, at the time of data collection, 95% of the students were enrolled in a math course, 100% were enrolled in an English course, and 93% were enrolled in a science course. Of these students, 15% (10% of boys; 19% of girls) were enrolled in an Honors or Advanced Placement math course. Fifty-four percent (35% of boys; 69% of girls) were enrolled in an Honors or Advanced Placement English course and 41% (25% of boys; 55% of girls) were enrolled in an Honors or Advanced Placement science course.

Procedure

At Time 1, the participants were recruited by distributing letters to all the youth who qualified for participation at the middle schools within each school district. The letter contained information about the study and an invitation for the parent/guardian and the youth to participate, along with a return-addressed, pre-paid return envelope. Reminder phone calls and repeat school visits were used to increase the response rate. Of the families who responded, 95% agreed to participate.

The students were administered self-report questionnaires in small groups at their school in a single session. At each session, trained undergraduate and graduate research assistants were available to instruct students on how to complete each measure and to answer questions. At the end of each session, the research assistant thanked the participants and gave each participant a small incentive. Students' grades were obtained from school records at the close of the academic year. Surveys were mailed to parents, who returned them by mail and received a monetary incentive for their participation.

Similar procedures were used at Time 2. Written parental-informed consent was obtained for each study participant. Research assistants reminded the students of their participation in Time 1 of the study and provided them with information about Time 2. The students were administered self-report questionnaires in groups of two to fifteen participants at their school in a single session by trained undergraduate and graduate research assistants. As an incentive for completing the questionnaires, students were given the opportunity to travel to a nearby state university, where they took a tour, met with admissions representatives, and were entertained by various student performing groups. Those students who did not attend the college visit were given small incentives in the form of $10 gift cards. Students' grades were obtained from school records at the close of the academic year. Time 1 data were collected in 2004-2005; Time 2 data were collected in 2007-2008.

Measures

Personal Attributions. Students' attributions were assessed in both eighth and eleventh grade with 24 items. Students were asked to rate the reasons underlying their success and failure in four domains: math, science, writing, and language arts. Each item had two attribution possibilities (success/failure due to effort and ability), and the student rated

the importance on a 4-point Likert scale of each of the two in explaining success/failure. Sample items are: “When I do well in math, it is because I am really good at math” and “When I get a poor grade in science, it is because I didn’t work hard enough.” English and writing items were combined to create a verbal domain, which is referred to below as “English.” To explore the relationship between classroom engagement and attributions, four subscale scores were created by separately averaging all of the success attributions and the failure attributions across the four academic domains. The subscales were as follows: success due to high ability, success due to high effort, failure due to low ability, failure due to low effort. The alpha reliability for the scales ranged from .47 to .73.

Classroom Engagement. Classroom engagement was measured with 15 items that Skinner and Belmont (1993) developed to assess classroom engagement and re-engagement after failure. On a 4-point Likert scale, participants rated the extent to which each statement was true (e.g., “If I can’t get a problem right the first time, I just keep trying” and “I work hard when we start something new in class”). Scale reliabilities were $\alpha = 0.86$ for eighth grade and 0.87 for eleventh grade. This measure has shown excellent test-retest reliability for a sample of African American adolescents (Brown, Kurtz-Costes, & Okeke, 2009).

Achievement. Students’ end of the year grades for math, English, and science were obtained from school records at Time 1 and Time 2.

Results

A preliminary 2(Gender) x 2(Time) x 3(Domain) ANOVA on school grades showed a significant main effect of Time and Domain, $F(1, 74) = 6.87$, $p < .01$ and $F(1, 148) = 4.46$, $p < .05$, respectively. These main effects were qualified by a significant Time x Domain interaction, $F(1, 148) = 11.66$, $p < .001$. Across domains, grades decreased from eighth grade

and eleventh grade. In eighth grade, grades for math, English, and science were not significantly different from one another; however, in eleventh grade, English and science grades were both significantly higher than math grades. Additionally, from eighth grade to eleventh grade, math grades decreased significantly. Neither the main effect of gender nor any interactions involving gender were significant in these analyses.

To analyze developmental, gender, and domain differences in adolescents' reports of their academic attributions, a repeated-measures analysis of covariance (ANCOVA) was conducted. Gender (girl, boy) was entered as a between-subjects variable and Time (8^{th} grade, 11^{th} grade), Attribution (effort, ability), Outcome (success, failure) and Domain (math, English, science) were entered as within-subjects variables, resulting in a 2(Gender) x 2(Time) x 2(Attribution) x 2(Outcome) x 3(Domain) repeated-measures ANCOVA design. Students' average grades in math, English, and science classes from eighth grade were added as a covariate. To interpret the ANOVA results, I considered estimated marginal means, which may be different from the descriptive statistic means, and based group mean comparisons on 95% confidence intervals.

To analyze the relationship between adolescents' attributions and their classroom engagement, two hierarchical regression analyses were conducted. The first regression examined the concurrent relationships between eighth grade attributions and eighth classroom engagement with eighth grade achievement as a control variable. The second regression examined the influence of eighth and eleventh grade attributions on eleventh grade classroom engagement with eighth grade classroom engagement and achievement as control variables. Because the classroom engagement measure is not domain-specific, the attribution scores for each domain were averaged to create aggregate scores for success ability, failure

ability, success effort, and failure effort attributions. Means and standard deviations of eighth grade and eleventh grade attributions, classroom engagement, and achievement appear in Tables 1 and 2. Correlations among the major variables appear in Table 3.

Developmental, Domain, and Gender Differences in Adolescents' Attributions

An alpha level of .05 was used in interpreting results from the 2(Gender) x 2(Time) x 2(Attribution) x 2 (Outcome) x 3(Domain) repeated-measures ANOVA. The main effect of Attribution was significant, $F(1, 110) = 22.01$, and was qualified by a significant Attribution x Gender interaction suggesting that girls attributed successes and failure to effort more than boys, while boys attributed successes and failures to ability more than girls, $F(1, 110) = 16.97$. There were also significant Outcome x Domain, Outcome x Domain x Gender, Time x Outcome x Gender, and Time x Domain x Gender interactions, $F(2, 220) = 4.04$, $F(2, 220) = 3.04$, $F(1, 110) = 7.11$, and $F(2, 220) = 4.18$, respectively.

The lower-order interactions discussed above were all qualified by significant Time x Attribution x Outcome x Domain and Attribution x Outcome x Domain x Gender interactions, $F(2, 220) = 4.71$ and 6.25, respectively. To interpret these interactions, I will first discuss change over time in domain-specific attributions and then discuss gender differences for each attribution. The results will be summarized separately for success attributions and failure attributions.

Change in Attributions from Middle School to High School

No change in English attributions was hypothesized, but I expected that students would have less adaptive ability attributions for math and science in Grade 11 than in Grade 8. The Time x Attribution x Outcome x Domain interaction provided partial support for this hypothesis, $F(2, 220) = 4.71$. Adolescents attributed math success to high ability less in

eleventh grade than in eighth grade, and math failure ability attributions increased across the three years. Ability attributions for science and English did not change across the three years. Success effort attributions did not change over time, but failure effort attributions increased for math and English. Although the Time x Attribution x Outcome x Domain x Gender interaction was nonsignificant, some Gender effects did emerge, as reported below.

Domain and Gender Differences in Success Attributions

In regard to attributions for success, I expected gender differences within each domain with boys more likely than girls to attribute math and science success to high ability and girls more likely than boys to attribute English success to high ability. I also expected girls to endorse high ability for English success more than for math and science success, while boys would endorse high ability for math success more than English success. Figures 1 and 2 display boys' and girls' scores for success ability and success effort attributions, respectively. The Gender x Attribution x Outcome x Domain interaction provided partial support for the hypotheses, as boys were more likely than girls to endorse high ability when explaining math success, $F(2, 220) = 6.25$. However, attributions of English and science success to ability did not differ by gender. In addition, girls were more likely than boys to attribute their math success to high effort, and success effort attributions for science and English did not differ by gender.

Examination of the same interaction within gender yielded the following results: As predicted, girls reported stronger success ability attributions in English than they did for math and science, with science success least likely to be attributed to ability. Also consistent with predictions, boys attributed success in math to ability more than they did English success. In addition, both boys and girls attributed success in science to effort more than English and

math, with effort given the least importance in explaining math success. Lastly, girls endorsed ability and effort equally in explaining math success, while boys endorsed ability more than effort in regard to math success. Both boys and girls endorsed effort more than ability when explaining English and science success.

Domain and Gender Differences in Failure Attributions

For students' failure attributions, I expected gender differences within each domain, such that girls would be more likely than boys to attribute math and science failure to low ability, and boys would be more likely than girls to attribute English failure to low ability. In addition, I expected girls to endorse low ability for math failure more than for English and science failure, and boys to endorse low ability for English failure more than for math and science failure. Figures 3 and 4 display boys' and girls' scores for failure ability and failure effort attributions, respectively.

The Gender x Attribution x Outcome x Domain interaction, $F(2, 220) = 6.25$, provided partial support for these hypotheses, as boys were more likely than girls to attribute English failure to low ability. However; contrary to our predictions, failure ability attributions for math did not differ by gender, and boys were more likely than girls to attribute science failure to low ability. There were no gender differences in failure effort attributions for math and English, and girls were more likely than boys to attribute science failure to lack of effort.

A comparison of these same means within gender revealed that, as predicted, boys were less likely to attribute math failure to a lack of ability than science and English failures. No domain differences appeared in girls' failure to ability scores. There were also no domain differences in boys' failure effort attributions. Girls attributed failure in science and math to

lack of effort more than they did English failures. Lastly, both boys and girls endorsed effort more than ability in explaining their failure in all domains.

To broadly summarize these results, as predicted, some gender differences were found for all three academic domains when controlling for achievement. Compared to girls, boys were more likely to attribute math success to high ability, while there were no gender differences in success ability attributions in English and science. Girls were also more likely than boys to attribute their math success to high effort; no gender differences emerged in success effort attributions for science and English.

In regard to failure attributions, boys were more likely than girls to attribute English and science failure to low ability, and were less likely than girls to attribute science failure to lack of effort. Gender differences in failure ability attributions for math and in failure effort attributions for math and English were nonsignificant. In addition, both boys and girls experienced a change in ability attributions for math, as they were more likely in Grade 11 than in Grade 8 to attribute math failure to low ability and less likely to attribute math success to high ability. Conversely, failure effort attributions increased for math and English across the three years.

Attributions and Classroom Engagement

As noted above, hierarchical regression analyses were used to examine the relationships between attributions and classroom engagement. For the first regression analysis, concurrent relations between attributions and classroom engagement in Grade 8 were examined with eighth grade classroom achievement entered in Step 1 as a control variable. In Step 2, eighth grade success ability, failure ability, success effort, and failure effort scores were entered. Adaptive personal attributions were expected to be positively

related to classroom engagement in eighth grade, while maladaptive attributions were expected to be negatively related to classroom engagement in eighth grade. Results of the analyses can be found in Table 4.

The results partially supported the hypotheses. The first block accounted for 2% of the variance in eleventh grade classroom engagement, $F(1, 112) = 2.36$, $p > .10$. Eighth grade achievement was not significantly related to eighth grade engagement. Adding the eighth grade attributions to the model increased the explained variance in eleventh grade engagement by 24%, $F(5, 108) = 7.79$, $p < .001$. As predicted, attributing academic success to high effort was positively related to classroom engagement among eighth graders, $\beta = .43$, $p < .001$; however, unexpectedly, those eighth graders who attributed failure to low effort had lower engagement, $\beta = -.27$, $p < .01$. Contrary to expectations, eighth grade success ability attributions and eighth grade failure ability were not related to engagement.

For the second regression analysis, the relationships between eighth grade and eleventh grade attributions and eleventh grade engagement were explored, with eighth grade classroom achievement and engagement entered in Step 1 as control variables. In Step 2, eighth grade success ability, failure ability, success effort, and failure effort scores were entered. In Step 3, eleventh grade success ability, failure ability, success effort, and failure effort scores were entered. Adaptive personal attributions from both Grade 8 and Grade 11 were expected to be positively related to classroom engagement in eleventh grade, while attributions of failure to lack of ability in both grades were expected to be negatively related to classroom engagement in eleventh grade. Results of the analyses appear in Table 5.

The results partially supported the hypotheses. The first block accounted for 15% of the variance in eleventh grade classroom engagement, $F(2, 111) = 9.70$, $p < .001$. Eighth

grade classroom engagement was positively related to eleventh grade engagement, $\beta = .34$, $p < .001$. Adding the eighth grade attributions to the model increased the explained variance in eleventh grade engagement by 12%, $F(6, 107) = 5.85$, $p < .001$. As predicted, those eighth graders who endorsed high ability in explaining their academic success had higher engagement in the eleventh grade, $\beta = .28$, $p < .01$; while those eighth graders who attributed failure to low ability had lower engagement in the eleventh grade, $\beta = -.21$, $p < .05$. Eighth grade success and failure effort scores were not related to eleventh grade classroom engagement.

Adding the eleventh grade attributions to the model increased the explained variance in eleventh grade engagement by 12%, $F(10, 103) = 5.70$, $p < .001$. As predicted, those eleventh graders who endorsed low ability in explaining their academic failure had lower engagement, $\beta = -.38$, $p < .001$. In addition, eighth grade success ability attributions were positively related to eleventh grade engagement, $\beta = .20$, $p < .05$. Eighth grade success effort, failure ability, failure effort and eleventh grade success ability, success effort, and failure effort scores were not related to eleventh grade classroom engagement.

To summarize these results, the results were partially consistent with predictions. Eighth graders who endorsed high effort in explaining their success had a tendency to have higher engagement, while unexpectedly; those eighth graders who endorsed low effort in explaining their failure had a tendency to have lower engagement. In addition, eighth graders who endorsed high ability for success had a tendency to have higher engagement in the eleventh grade, while those eighth graders and eleventh graders who endorsed low ability to explain academic failure had a tendency to have lower engagement in eleventh grade. These results were found while controlling for actual achievement as measured by class grades.

Discussion

The purpose of this study was to explore gender and domain differences in the academic attributions of African American adolescents. In addition to exploring within-group differences, the longitudinal nature of the study also permitted an examination of developmental change in attributions and the relation between earlier attributions and later motivation. The results may give us deeper knowledge about the achievement motivation of African American students by providing insight on how race and gender interact to influence attributions and achievement-related behaviors.

Gender Differences in Attributions for Math, English, and Science

As would be expected from traditional academic gender stereotypes, boys were more likely than girls to endorse high ability when explaining math success and were more likely than girls to attribute English failure to low ability. In addition, girls endorsed high ability most strongly and low ability the least when explaining their English success and failure, while boys endorsed high ability most strongly and low ability the least when explaining their math success and failure. However, there were no gender differences in science, a finding that falls more in line with the previous research conducted on African American adolescents' perceptions of group competence and stereotype endorsement (Copping et al., 2009; Evans et al., 2009). The results are important as racial academic stereotypes are typically the focus in research with African Americans, whereas, the impact of academic gender stereotypes is often overlooked.

By exploring the gender differences in ability attributions in an African-American sample, we were able to examine whether or not Black boys and Black girls differed in their perceptions of how their ability shapes their academic successes and failures in math,

English, and science. Our results provide some support that boys and girls differ in these perceptions within these three domains and illustrate the influence of gender stereotypes for African American adolescents. The gender differences found within the math, English, and science domains also have implications for career choices because youth are more likely to make career decisions based on their competence perceptions within a certain domain. Consequently, the endorsement of low ability in explaining failure may limit the career aspirations of these adolescents.

The racial composition of the school may have had an influence on these results. The adolescents in the present sample attended schools that were majority African-American, thus it could be argued that these gender differences would be more likely to emerge in the present study as opposed to if adolescents attended more racially diverse schools. Since the students attend schools in which the majority of the student body is African American, race may be less salient and gender may have emerged as a more dominant identity.

Individual differences in effort attributions were not as easily interpretable as the gender differences in ability attributions. We did not have specific predictions about effort attributions, and no clear pattern emerged in students' endorsement of effort. As mentioned before, it could be that in certain situations, such as when a task is perceived as easy, ability and effort will have an inverse relationship, such that endorsing ability in success would make one less likely to endorse effort. On the other hand, when a task is perceived as more difficult, ability and effort may be positively related. In the present study, for example, boys endorsed ability more than effort in regard to math success while girls endorsed ability and effort equally in explaining their math success. This difference in how boys and girls are endorsing effort and ability in math might indicate that girls view math as more difficult than

boys because they are more likely to believe that both ability and effort are equally instrumental in their math performance.

Furthermore, beliefs about ability would also influence how individuals perceive the contribution of effort in their academic performance. For instance, if a student believes that his or her ability can be improved with effort, he or she may be likely to endorse the contribution of both ability and effort in influencing academic performance. On the other hand, the belief that ability is fixed might result in a student endorsing either only effort or only ability in explaining academic performance. If these factors do have an influence within this sample, it would explain the lack of consistency within the effort attribution results because perceptions of task difficulty and beliefs about ability were not assessed.

Change in Attributions over Time

Both boys and girls had more maladaptive math ability attributions in the eleventh grade than in the eighth grade, as they were more likely to endorse low ability in explaining math failure and less likely to endorse high ability in explaining math success. Thus, although there were gender differences in endorsement of ability in explaining math performance, both boys and girls experienced a general decline in adaptive math ability attributions. However, ability attributions for English and science did not change across the three years, suggesting that these attributions may be more stable even with the change from middle school to high school. This decline in math and not in English and science is telling of students' attitudes towards math. It is also consistent with previous research which finds that students perceive mathematics as a difficult subject that becomes more difficult throughout high school (Stodolsky, 1985).

Attributions and Classroom Engagement

Consistent with attribution theory, I expected that adaptive attributions in both grades would be related to higher classroom engagement, while maladaptive attributions in both grades would be related to lower classroom engagement. When concurrent relations were examined between eighth grade attributions and eighth grade engagement, attributing success to high effort was related to higher engagement. On the other hand, attributing failure to low effort was related to lower engagement. This result was surprising because attribution theory posits that it is adaptive to attribute failure to low effort (Weiner, 1985, 1986). According to attribution theory, a student who attributes his or her failure to low effort should be more motivated in the future because effort is perceived as an internal, controllable factor. Perhaps this result reflects more than the students' beliefs about temporary effort expenditure, and instead reflects a stable lack of effort that is characteristic of those students' academic behavior. In other words, students who attributed failure to lack of effort might have made those attributions because they were generally not working hard in school.

When explaining engagement over time, effort attributions were neither adaptive nor maladaptive. This result was unanticipated because according to attribution theory, causal attributions involving effort and ability have the most positive effects on achievement behavior (Weiner, 1985). I expected that both adaptive ability and effort attributions would be related to eleventh grade engagement; however, effort attributions did not predict classroom engagement in eleventh grade. Perhaps effort was not as powerful in predicting classroom engagement because effort is not sufficiently stable. Because they are variable, unstable causes promote weaker expectancies (Weiner, 1985).

The most influential attributions were ability attributions: Attributing successes and failures to ability were the strongest predictors of classroom engagement. Eighth graders who attributed success to high ability had a tendency to have higher classroom engagement in eleventh grade, while those eighth graders and eleventh graders who attributed failure to low ability tended to have lower classroom engagement in eleventh grade. These relationships were significant above and beyond previous achievement and classroom engagement. Therefore, it is just not that high achievers and highly engaged students simply form more adaptive attributions, while low achievers do not. The results indicate that attributions are influential motivational beliefs for students regardless of achievement and engagement level.

The results also illustrate the importance of ability attributions because eighth graders' attributions of ability were related to their engagement three years later. This result is consistent with research that shows students who enter high school with positive achievement motivation tend to experience either no declines or small declines in achievement motivation compared to those students who enter high school with more negative outcomes (Roeser et al., 1999). Our results add to existing literature given the paucity of longitudinal studies that have examined changes in attributions from middle school to high school. The results are also unique as they explore the influence of attributions within an African American sample.

Limitations, Suggestions for Future Research, and Study Implications

Although a central goal of the study was to examine how attributions influence classroom engagement, a limitation of the study is that only student reports of engagement were available. Though there tends to be a consistent association between teacher and student

reports of classroom engagement (Fredericks & Bumenfield, 2004), only having student reports still may be problematic. Because students reported both their classroom engagement and their attributional beliefs, our results may be due partly to single-reporter variability. Including teachers' reports in addition to student reports would provide additional information and perspective about how attributions shape achievement motivation.

In addition, the classroom engagement measure was not domain-specific, preventing a comparison of domain-specific attributions and domain-specific engagement. While the composite measures of attributions and engagement were able to provide a general idea of how attributions influence engagement, examining the relationship between attributions and engagement within domains would provide much more nuanced information about the relationship between the two.

Though significant relations were found between attributions and engagement, the correlational nature of the study precludes conclusions about causality. It could be that highly engaged children are more likely to form more adaptive ability attributions and not that students who form adaptive attributions are more likely to be more engaged. The relationship could also be bidirectional such that engagement and attributions are constantly influencing one another. Therefore, definitive claims about the direction of the relationship cannot be made, only that it exists. In addition, it would be useful to investigate these questions with a larger sample. Though many relationships were found within this smaller sample, statistical power was not strong for detection of hypothesized interactions, particularly those involving gender.

It is also important to further investigate the relationship between ability and effort attributions by exploring the contribution of factors such as task difficulty and beliefs about

ability. If a student perceives a task as more difficult or believes ability is plastic, then he or she may be more likely to endorse the contribution of both ability and effort in explaining his or her performance. It would also be of interest to investigate how perceptions of group competence and stereotype endorsement influence attribution formation. For instance, a student who believes his or her in-group fares worse than other groups in a certain domain may be more likely to form maladaptive attributions for that same domain.

The results of this study also illustrate the importance of attributions, particularly attributions of ability, in high school classroom engagement. Moreover, the investigation of within-sample differences in an all-African American sample suggests that gender stereotypes might be as significant as racial stereotypes in shaping African American adolescents' motivational beliefs. It is also apparent that the endorsement of low ability may influence students to be less persistent and engaged as they may believe that their low ability will limit the positive effects of their effort. These ability attributions appear to be very influential because early attributions were related to later classroom engagement above and beyond achievement level and previous classroom engagement. Therefore, measures should be taken to modify students' negative beliefs about their academic abilities, such as through special programming or through modified classroom instruction. For example, interventions that encourage minority students to view intelligence as malleable or to attribute failure to external temporary factors have increased the academic performance of those students (Aronson, Fried, & Good, 2002; Good, Aronson, & Inzlicht, 2003). Helping students to view their academic abilities in more positive ways would be very advantageous.

Table 1

Means and Standard Deviations for Domain-Specific Attributions, by Gender and Grade

	8th Grade			11th Grade		
	Boys	Girls	Total	Boys	Girls	Total
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Mathematics						
Success Ability [a,b]	3.41(.81)	2.91(.91)	3.12(.90)	3.10(.65)	2.60(1.00)	2.81(.91)
Failure Ability [a,b]	1.53(.96)	1.74(1.10)	1.65(1.04)	1.84(.94)	2.05(1.14)	1.95(1.06)
Success Effort [b]	2.65(.83)	2.78(.84)	2.72(.83)	2.59(.93)	2.91(.95)	2.77(.95)
Failure Effort [a]	2.39(1.11)	2.82(.99)	2.64(1.06)	2.82(.94)	2.77(1.07)	2.79(1.02)
English/Writing						
Success Ability [a]	3.11(.72)	2.88(.71)	2.98(.72)	2.86(.72)	3.03(.67)	2.96(.70)
Failure Ability [a]	2.05(.77)	1.76(.66)	1.88(.72)	2.01(.81)	1.86(.54)	1.92(.58)
Success Effort [b]	3.41(.64)	3.26(.75)	3.32(.70)	3.17(.59)	3.48(.78)	3.35(.80)
Failure Effort	2.23(.84)	2.26(.90)	2.25(.88)	2.51(.73)	2.60(.85)	2.56(.80)

Table 1. continued

	8th Grade			11th Grade		
	Boys	Girls	Total	Boys	Girls	Total
	Mean (SD)	Mean (SD)	Mean(SD)	Mean (SD)	Mean (SD)	Mean(SD)
Science						
Success Ability [a]	2.86(.91)	2.36(.95)	2.57(.96)	2.76(.99)	2.77(.89)	2.77(.93)
Failure Ability [b]	2.10(.94)	1.88(.96)	1.97(.96)	2.17(.95)	1.88(.95)	2.00(.96)
Success Effort	3.55(.77)	3.61(.68)	3.58(.71)	3.60(.64)	3.71(.55)	3.66(.59)
Failure Effort [a]	2.41(.98)	2.92(.99)	2.70(1.01)	2.67(.88)	2.80(1.04)	2.75(.95)
	n =66	*n* =49	*n* =115	*n* =66	*n* =49	*n* =115

[a] Scores for boys and girls in Grade 8 differed at $p < .05$.

[b] Scores for boys and girls in Grade 11 differed at $p < 05$.

Table 2

Means and Standard Deviations for Total Attributions, Engagement, & Achievement, by Gender and Grade

	8th Grade			11th Grade		
	Boys	Girls	Total	Boys	Girls	Total
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Total Attribution						
Success Ability [a]	3.12(.46)	2.76(.58)	2.91(.56)	2.90(.56)	2.86(.59)	2.87(.57)
Failure Ability	1.93(.65)	1.78(.52)	1.85(.58)	2.01(.62)	1.91(.61)	1.95(.62)
Success Effort [b]	3.26(.53)	3.22(.61)	3.24(.57)	3.14(.50)	3.39(.47)	3.28(.50)
Failure Effort	2.32(.76)	2.57(.74)	2.46(.76)	2.63(.62)	2.69(.79)	2.66(.72)
Outcomes/Controls						
Class Engagement	3.27(.46)	3.36(.49)	3.32(.48)	3.36(.43)	3.44(.4)	3.41(.43)
Math Achievement	3.37(1.16)	3.52(1.05)	3.45(1.10)	2.51(1.01)	2.83(1.10)	2.71(1.08)
English Achievement [a]	3.19(1.14)	3.47(1.21)	3.34(1.19)	3.00(.99)	3.20(1.01)	3.11(1.00)
Science Achievement	3.42(1.25)	3.68(1.17)	3.57(1.21)	3.08(1.15)	3.50(1.16)	3.33(1.17)
	n =66	*n* =49	*n* =115	*n* =66	*n* =49	*n* =115

[a] Scores for boys and girls in Grade 8 differed at $p < .05$.

[b] Scores for boys and girls in Grade 11 differed at $p < .05$.

Table 3

Bivariate Correlations among the Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. 8th Grade Success Ability	–									
2. 8th Grade Success Effort	.41**	–								
3. 8th Grade Failure Ability	-.09	.05	–							
4. 8th Grade Failure Effort	-.15	-.02	.19*	–						
5. 8th Grade Classroom Engagement	.09	.36**	-.22	-.32**	–					
6. 11th Grade Success Ability	.23*	.02	.00	-.02	-.02	–				
7. 11th Grade Success Effort	.02	.33**	-.08	.12	.30**	.22*	–			
8. 11th Grade Failure Ability	-.17	.05	.40**	.19*	-.08	.02	.01	–		
9. 11th Grade Failure Effort	-.12	.02	.20*	.29**	-.01	.01	.19*	.29**	–	
10. 11th Grade Classroom Engagement	.17	-.03	-.28**	-.22*	.36**	.13	.22*	-.42**	-.08	–

Note. *p<.05, **p<.01

Table 4

Summary of Hierarchical Regression Analysis for 8th Grade Attributions Predicting 8th Grade Classroom Engagement (*N* =115)

	8th Grade Classroom Engagement		
Variable (grade)	*B*	SE_b	β
1. Achievement(8)	.07	.05	.15
2. Achievement(8)	.05	.05	.11
Success Ability (8)	-.15	.08	-.17
Failure Ability (8)	-.14	.07	-.17
Success Effort (8)	.37	.08	.43***
Failure Effort (8)	-.17	.05	-.27**

Note. R^2 =.02 for Step 1; ΔR^2 =..24 for Step 2

**p< .01, *** p< .001

Table 5

Summary of Hierarchical Regression Analysis for 8th and 11th Grade Personal Attributions Predicting 11th Grade Classroom Engagement (*N* =115)

	11th Grade Classroom Engagement		
Variable (grade)	*B*	SE_b	β
1. Achievement(8)	.07	.04	.15
Class Engagement (8)	.31	.08	.34***
2. Achievement(8)	-.01	.04	-.01
Class Engagement (8)	.30	.09	.35***
Success Ability (8)	.23	.07	.28**
Failure Ability (8)	-.15	.07	-.21*
Success Effort (8)	-.14	.08	-.18
Failure Effort (8)	-.02	.05	-.03
3. Achievement (8)	-.01	.04	-.02
Class Engagement (8)	.30	.09	.32***
Success Ability (8)	.15	.07	.20*
Failure Ability (8)	-.04	.07	-.05
Success Effort (8)	-.13	.08	-.16
Failure Effort (8)	-.16	.05	-.03
Success Ability (11)	.07	.06	.10
Failure Ability (11)	-.25	.06	-.38***
Success Effort(11)	.07	.08	.08
Failure Effort (11)	.03	.05	.04

Note. R^2 = .15 for Step 1; ΔR^2 = .12 for Step 2; ΔR^2 = .12 for Step 3

*p<.05, **p<.01, ***p<.001

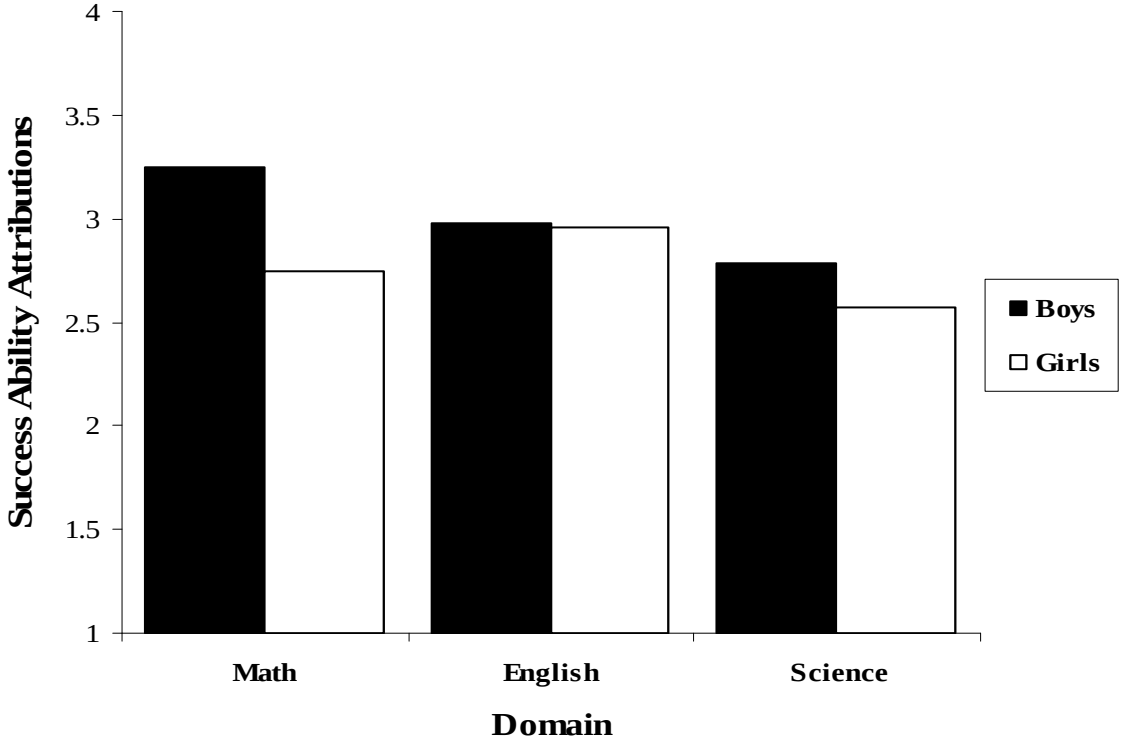
Figure Captions

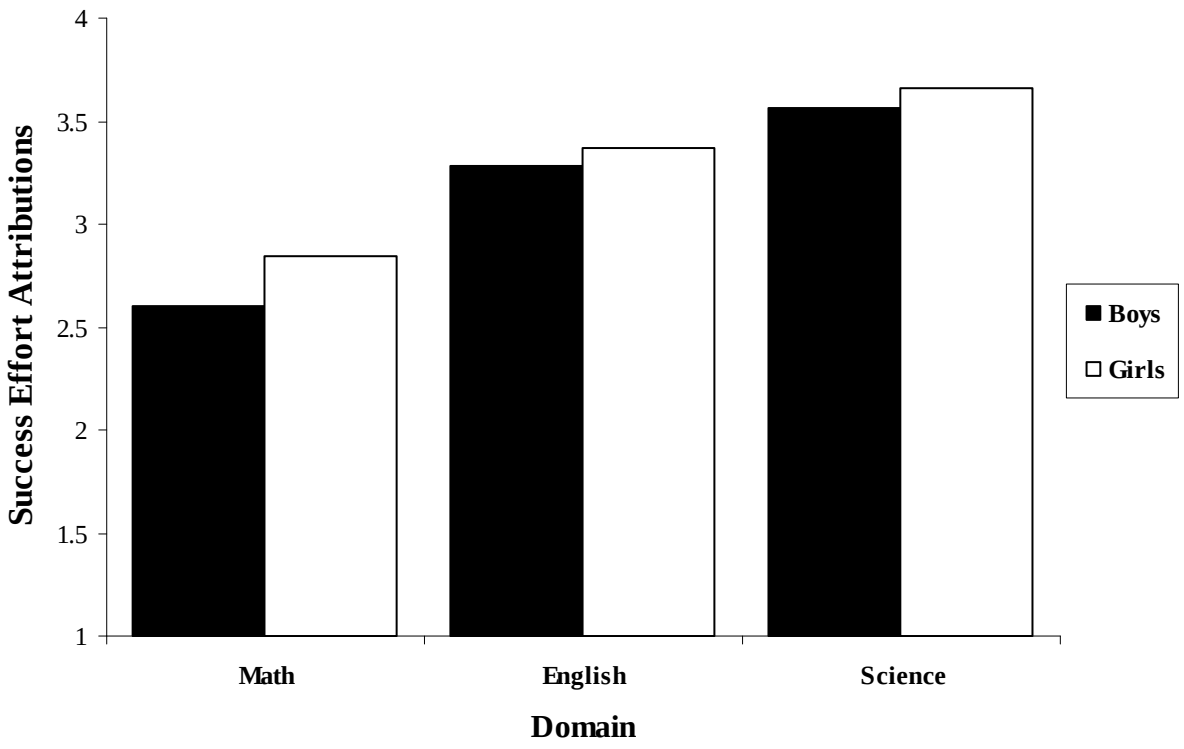
Figure 1. Mean Success Ability Attribution Scores by Gender and Domain

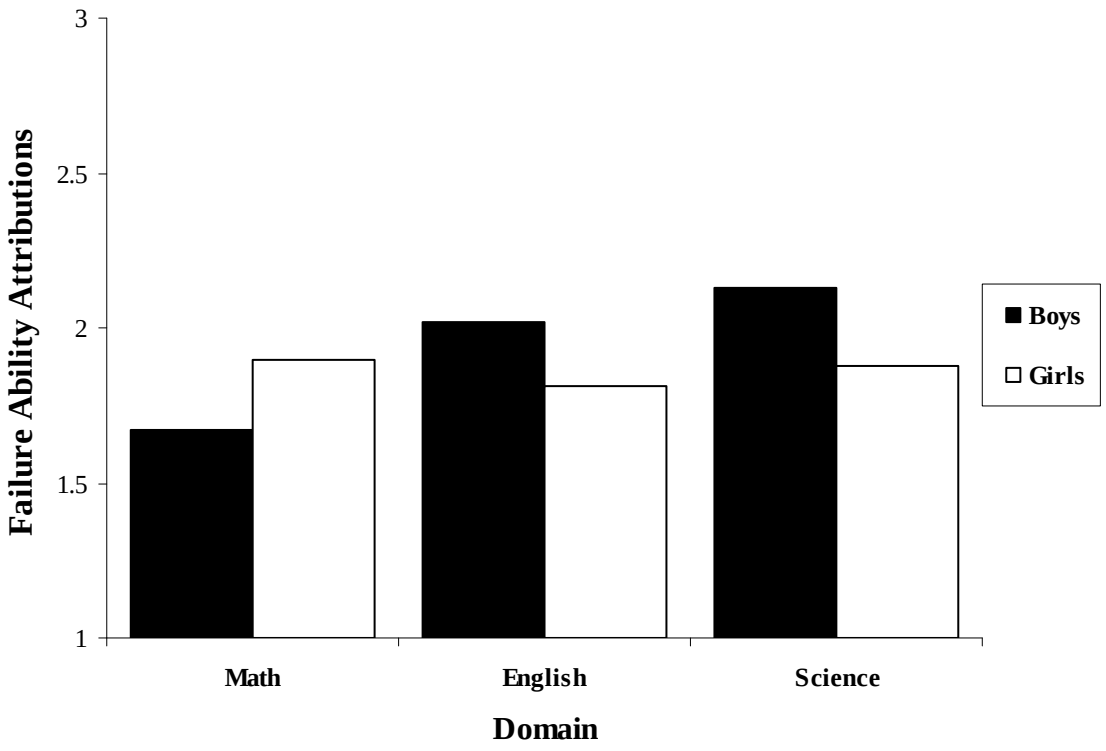
Figure 2. Mean Success Effort Attribution Scores by Gender and Domain

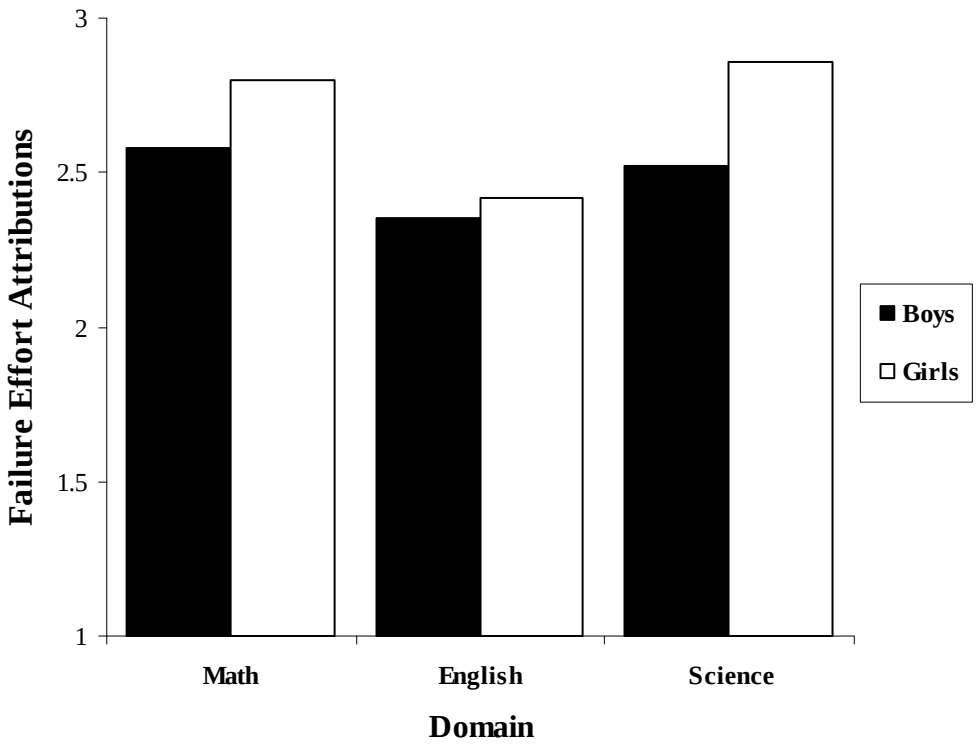
Figure 3. Mean Failure Ability Attribution Scores by Gender and Domain

Figure 4. Mean Failure Effort Attribution Scores by Gender and Domain


Success Ability Attributions
4
3.5
3
2.5
2
1.5
1
Math
English
Science
Domain
Boys
Girls


Success Effort Attributions
4
3.5
3
2.5
2
1.5
1
Math
English
Science
Domain
Boys
Girls


Failure Ability Attributions
3
2.5
2
1.5
1
Math
English
Science
Domain
Boys
Girls


Failure Effort Attributions
3
2.5
2
1.5
1
Math
English
Science
Domain
Boys
Girls

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