

## Literature Review

### *Understanding the Influences that Contribute to African American Males Pursuing STEM Majors at Post-Secondary Institutions*

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#### INTRODUCTION

As the United States battles to understand how to maintain its position as an economic powerhouse and be competitive in the global economy, the answer seems to lie with STEM education (Chen, 2009, p. 1). Although there is an increase in the number of STEM jobs and a growing popularity of the discipline, there remains a shortage of minorities in the field, particularly African American males. African American males are pursuing STEM, but at a much lower rate than their White and Asian/Pacific Islander male counterparts (U.S. Department of Education, 2010). This article provides an overview of the literature on African American males' perseverance in STEM and an examination of the reasons they are outperformed by their White male and Black female counterparts (Moore, Smith, & Madison-Colmore, 2003). The intention is to assist other practitioners and researchers who wish to address this deficit and encourage African American males to pursue STEM.

Three primary themes can be associated with African American males' persistence in STEM majors. These themes include having a strong family influence, overcoming stereotypes, and demonstrating high aptitudes in science and math (Moore, Smith, Madison-Colmore, 2003; Moore, 2006). The literature reviewed here highlights the three common influences and helps explain why they have an effect on African American male persistence in STEM. These resources also provide recommendations to practitioners and researchers regarding how to assist African American males who pursue STEM majors at the post-secondary level.

#### STRONG FAMILY INFLUENCE

Charleston posited (2012) that African Americans who pursued computing science

degrees, a major within the STEM discipline, at the post-secondary level were found to have parents who invested in their learning during their primary years and encouraged their engagement with STEM disciplines.

Researchers have also found that verbal affirmation and active involvement are key ways that African American parents influence their sons to be persistent in STEM disciplines, and academic achievement in general. Parents also set expectations for their sons. "The more parents reinforce their expectations, the more African American males are likely to commit themselves to school—studying, learning, and making 'good' grades" (Moore, 2006, p. 262).

As parental influence seems to be a powerful recurring theme in the persistence of African American males in STEM at the post-secondary level, it is important to expand investigations around this topic. In order to do this, it will be essential for practitioners and researchers to establish and maintain meaningful relationships with the parents of African American males who are pursuing STEM at the post-secondary level (Moore, 2006, p. 262).

#### OVERCOMING STEREOTYPES

African American males have had to withstand negative experiences from the broader society in regard to academic achievement. These experiences tend to cement a "tempered Blackness," which allows them to focus on meaningful activities (Reid, 2013, p. 78). After undergoing an initial identity re-structure, most African American males utilize the anti-Black attitude and racial marginalization to galvanize their development (Reid, 2013). After possibly experiencing negativity or racial marginalization in STEM classrooms, those African American males can use those negative experiences to be a driving force to help them persist in STEM disciplines.

Stereotypes can often be masked by racial “micro-aggressions.” According to McGee and Martin (2011) (as cited in Berry, Hughes, & Ellis, 2014) one student utilized a teacher’s low expectations to serve as a motivating catalyst to success. Subtle, non-verbal implications often affect African American males in negative ways, however, some redirect the experience to make it work for their benefit. Acting in accordance with the *prove-them-wrong* syndrome, African American male participants in a research study expressed wanting to work twice as hard to overcome what professors, students, and administrators thought about their pursuit of engineering and rise to the occasion to accomplish their goals (Moore, Smith, & Madison-Colmore, 2003).

Although negative stereotypes can be hurtful, understanding that African American males sometimes use these to propel themselves to success will help researchers develop new theories and constructs as to why certain African American males persist in STEM majors at the collegiate level.

### **DEMONSTRATING HIGH APTITUDES IN SCIENCE AND MATH**

Charleston (2012) discussed the implications of African Americans pursuing computing science degrees, stating that students who were exposed to computers at an early age began to explore advanced computing functions. Computing can serve as one form of exposure to STEM related topics. In addition to exposure, participation in advanced courses and strong preparation in high school can be a major influence on African American males pursuing STEM at the post-secondary level (Dancy, Palmer, & Maramba, 2011, p. 498). The specific groups of African American males who showcased strong aptitudes in science and math were further cultivated. Whereas, students found to be unfamiliar with STEM were less likely to perform well or pursue STEM majors (Osborne, Dewitt, & Archer, 2015, p. 220).

When students perform at a high level, it increases their level of self-efficacy. The self-efficacy theory as recorded by Maddux (1995) suggests that persistent behaviors and courses of action are likely to occur if people feel they

are able to cope successfully with demands and challenges (p. 4). If African American males have a high self-efficacy due to their perception that they can perform well in STEM disciplines, this increases the likelihood of their pursuit of STEM at the post-secondary level. This theme may prove useful to educators who can further validate the self-efficacy of African American males, and encourage those students to pursue STEM due to their strong performance in the discipline.

### **CONCLUSION**

To continue to position itself as a globally competitive country, the United States has to diversify the STEM workforce (Bidwell, 2015). African American females outperform African American males in science and mathematics in high school (St. Rose, Hill, & Corbett, 2010). In addition to their female counterparts, African American males are outperformed by their White male and Asian Pacific Islander male counterparts. This further points to the need for educators to assist African American males in their performance in STEM and encourage them in their pursuit of STEM disciplines.

The National Science Foundation (2015) reported in 2012 that only 2,356 black males were awarded engineering degrees in comparison to the 41,165 black males who were awarded non-science and engineering degrees. It is important to note that African American males are earning degrees in disciplines other than STEM. However, in order to diversify the STEM workforce and grow the education-to-workforce pipeline, more African American male STEM graduates are needed.

This literature review points to some of the reasons that African American males decide to pursue STEM. However, this research base is not definitive and further work that examines the findings presented here, as well as efforts to identify additional themes of influence, are needed.

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