Cross-Cultural Study of the Predictors of Learning in Children Ages 11-15 Years Old

Nadina Melina Williams

University of North Florida
CROSS-CULTURAL STUDY OF THE PREDICTORS OF LEARNING IN CHILDREN AGES 11-15-YEARS OLD

by

Nadina Williams

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Unpublished work c Nadina Williams
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Abstract

Academic achievement is deemed a significant indicator for a successful future. Cognitive ability, home environment, and metacognition are among the many factors research has posited to contribute to academic achievement and later success (Alloway & Alloway, 2010; Bradley & Caldwell, 1984, Veenman, Wilhelm, & Beishuizen, 2004). The present study examines the relation between cognitive ability (working memory (WM) and nonverbal ability), metacognitive awareness, implicit theories of IQ, home environment (socioeconomic status (SES), home life, and parental involvement in homework), and learning outcomes (grades) in two distinct sample populations. The study used a sample of 11-15-year-olds and their parents from two high schools in Carriacou, Grenada (n=50) and Lakeshore Middle School in Florida (n=38). A stepwise regression revealed that cognitive ability, implicit theories of IQ, and home environment predicted overall grades of the Grenada sample. Several differences between the two cultures emerged including what predicted their implicit theories of IQ. The present study will benefit the educational community, as the findings could provide new insight into how students’ cognitive ability, implicit theories of IQ, and home life influence learning outcomes in a developed and developing population. The practical implications suggest more effective culturally responsive educational programs for students based on their learning style and learning needs. The present study has significance with reference to Grenada, in that because of little to no research available investigating this topic it will provide a basis for subsequent research to occur.

Keywords: academic achievement, metacognitive awareness, cognitive ability, home environment, cross-cultural.
Introduction

In the words of Nelson Mandela, “Education is the most powerful weapon which you can use to change the world.” Education influences all aspects of life. Education is the passport to living an enriching and fulfilling life. As described by the National Human Development Report (UHDR) 2001, it is a critical instrument for facilitating social, economic and political inclusion of people, as well as a prerequisite for sustained economic growth, in both developed and developing countries.

Researchers have reported a positive association exists between a country’s wealth (gross domestic product per capita) and expenditures per full-time-equivalent (FTE) on student education at the elementary/secondary level, and postsecondary level (National Center for Education Statistics, 2017). Wealthier countries are disposed to fostering higher student achievement directly through educational spending on books, teachers’ development, etc., and indirectly through better nutritional standards or health care (Heyneman & Loxley, 1983; Baker, Goesling, & Letendre, 2002; UNICEF, 2001). In countries that have more of an equal distribution of resources, students also score higher on achievement measures than those in less equal countries because of diminishing marginal returns or homophily (Chui, in press; Chiu & Khoo, 2005). Poorer students appreciate and benefit from an extra book, and with greater equality, they learn more and perform better when more resources are available to them (Chiu & Khoo, 2005; Chiu, Chow, & Mcbride-Chang, 2007). Additionally, with homophily (interacting with similar others), greater equality within a country encourages more cooperation among students, also resulting in higher overall academic performance (Chiu, in press).
However, studies have shown that allocating substantial amounts of money to education does not always yield impressive results, or educational success. In other words, big spenders sometimes do not receive the returns that they anticipate. For instance, students in the U.S. are reported to fare considerably worse than many of their counterparts across the world (such as Asian countries) in terms of knowledge gained (Investopedia, 2015). Data from the Programme for International Student Assessment, showed that 15-year old’s in the U.S. ranked 31st on Organization for Economic Cooperation and Development (OECD) standardized mathematics tests, with test scores far below average in reading and science. These results indicate that there is more to attaining academic achievement than the wealth of a country, such as individual level associations or learning characteristics.

Apart from wealth and degree of equality, a country’s cultural values and individual level associations of learning (cognitive, metacognitive processes) all provide a broad context in which students learn (Chiu, Chow, Mcbride-Chang, 2007). Consequently, learning and achievement may differ significantly across countries. The present study aims at investigating the environmental and biological processes that contribute to these differences, if any. A cross-cultural examination of the relation between cognitive ability, metacognitive awareness, implicit theories of intelligence, home environment, and learning outcomes in children ages 11 to 15 years old from two countries was conducted.

Factors that Influence Learning

A. Cross-cultural

In recent years, there has been a dramatic increase in the number of students studying abroad or migrating in search for a better life. This means that students are bringing with them a
long history of schooling and practices from their home country. The patterns of cognitive and metacognitive processes of these children have been constructed from their interaction with their social and educational environments. Studies investigating cross-cultural differences are essential in helping to inform educators on being culturally sensitive and responsive in the classroom – ultimately, allowing each child the opportunity of academic success.

A seminal definition of culture, by Tylor (1871) that is still applicable today is “that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society” (CARTA, n.d, para. 1). From a cognitive perspective, Ross (2014) describes it as an occurrence evolving out of “shared cognitions” that is as the result of individual interactions within their social and physical environments. Every country is a product of years of cultivated history of socially acquired values, beliefs, rules of conduct and civilization of its people. Consequently, every culture is expected to yield different approaches and influences when it comes to educating its young (Salili, Chui, & Lai, 2001).

Studies have revealed that culture influences individual processes of thought, reasoning and perception (Nisbett & Masuda, 2013; Segall, Campbell, & Herskovits, 1963; Zajonc, 1984). Several theories have been proposed to explain the existence of cultural differences in cognition. In one theoretical framework, culture is described as acclimatizing perception and cognition through what is called “cultural conditioning” (Kastanakis & Benjamin, 2014). A second is the theory of cultural schemas, models and scripts that make up the meaning system of a cultural group, and governs the ways by which the group perceive their experiences and guide their actions (D’Andrade, 1981). A third, Vygotsky’s (1997) cultural-historical theory of learning, describes how cognitive and metacognitive processes are socially constructed through
interactions with others. These interactions are then internalized as individual psychological processes (Cozza & Oreshkina, 2013). Fourthly, there is the theory of linguistic relativity, and situated cognition (Lave & Wenger, 1991; Whorf, 1956). Linguistic relativity explains how the language people speak affects their thoughts, whereas situated cognition theorizes that cognitive structures emerge as individuals interact with “tools” or “artifacts” in everyday activities. Cross-cultural studies investigating the cognitive and environmental variables of interest for this present study have reported both similarities and differences.

**Working memory.** When looking at working memory in adolescence from two countries (Russian and Kyrgyzstan), researchers found no significant difference, concluding that there was no effect of culture on working memory measures (Ismatullina, Voronin, Shelemetieva, & Malykh, 2014). However, they did observe a significant gender-by-country interaction: Kyrgyz males outperformed their female counterparts on the spatial working memory task. The researchers however did not provide an explanation for this pattern of results. Lan, Legare, Ponitz, Li and Morrison (2010) also reported finding working memory performance comparable across two groups of preschool students from China and America. Their study further revealed that working memory performance predicted all aspects of achievement for the Chinese students, but only predicted two of the three achievement outcomes (counting and calculation, not reading) for the American students. Additionally, Lan and colleagues found that all components of executive functioning were related to each other across the two cultures, and that the Chinese students outperformed the Americans on attentional control and inhibition tasks. They attributed their findings to the strong neurological basis for developing executive functioning skills.

**Metacognition.** When comparing cognitive and metacognitive processes during math problem-solving discourse among 10-year-old students in Russia, Spain, Hungary and the U.S.,
similar patterns emerged (Cozza & Oreshkina, 2013). Students from all four sites engaged in exploration (asking questions) and implementation (counting shapes) metacognitive processes, and verification cognitive processes (comparing their sketches with the answer keys). Cozza and Oreshkina (2013) also observed differences among the students in all four counties: students from Russia and Spain were the only two countries to use implementation cognitive processes (i.e. giving labels to newly constructed shapes). They attributed this finding to variability in teacher-student interactions in those countries.

**Learning strategies.** Differences are also observed to exist in the types of learning strategies exerted, and their effects on academic achievement. Learning strategies are significantly related to academic achievement and are influenced by cultural and educational context. A large study done by Chui, Chow, and McBride-Chang (2007) examined whether strategies of memorization, elaboration, and metacognition were associated with reading, math and science achievement across 34 countries. They demonstrated that some countries reported using more memorization strategies than others and use of this strategy was associated with lower scores in all subjects. Additionally, they found that students reporting greater use of metacognitive strategies had higher scores, an indication of its importance in learning. However, there was a stronger link between self-reported (own use) metacognition and achievement for students from individualist cultures, and a stronger link between schoolmates’ self-reported (use of others metacognitive strategies) metacognition and achievement for those from collectivist cultures. According to the authors, their results underscore how cultural context can moderate the links between adolescents’ learning strategies and academic achievement.

A recent study by Lee, Lee, Makara, Fishman and Teasley (2017) compared four other types of learning strategies: motivation-related, assignment/ task-related, planning/ time-related
and cognition-related strategies as predictors of students’ grade point average (GPA) of college students from South Korea and the USA. The results revealed that all four types of learning strategies were significant predictors of GPA for Korean students. However, motivation-related and assignment/task-related strategies were the only predictors for US students’ GPA (Lee, 2017). These findings were attributed to the differing cultural practices of westerners (US) versus easterners (Asian), where westerners are higher on self-esteem and are more task oriented.

**Parental influence.** Cultural differences among parents have also been identified in several studies. Parents are known to be the conduit by which cultural differences exist among students. Parents are mediators of the socialization process, filtering cultural and psychological beliefs before transferring them on to their children (Kozulin, 2003). In a study of parents’ academic expectations, belief of ability and involvement as predictors of child achievement in Chinese and British international preschoolers, several differences were found. Parents differed in socio-economic status, parental perception of child’s memory and their involvement in school. This study is said to confirm variances in academic standard as a function of culture (Phillipson & Phillipson, 2007).

Dumont and colleagues (2012) examined Swiss versus non-Swiss parental homework involvement as mediating the relationship between family background and educational outcomes. They found that students’ perception of parental interference was negatively related to immigrant background. This pattern indicated that Swiss parents were perceived by their adolescent children as being more interfering than were parents born elsewhere. Additionally, perceived parental support showed a strong negative relationship with immigrant background. Children of Swiss parents reported higher levels of both perceived interference and support versus those with immigrant status.
B. Cognitive Ability: IQ and Working Memory

Though different from each other, metacognitive strategies and cognitive strategies are often used together and enhance each other (Kang, 2007). Cognition is the “collective use of mental processes and activities involved in perceiving, remembering, thinking, and understanding” (Radvansky & Ashcraft, 2014, p.6). Cognitive development lays the foundation for our ability to learn and understand, otherwise known as our intellectual ability (Wilks, 2010). The complex trait of cognitive functioning is the result of multiple genes or polygenic inheritance, and the combination of genetic and environmental factors though multifactorial transmission (Papalia & Feldman, 2003). From birth to adolescence, there are intraindividual changes that occur in one’s cognitive and intellectual development both quantitatively (e.g. brain maturation) and qualitatively (e.g. engaging in formal operational thinking) due to gene-environment interactions, and its plasticity nature (Baltes, 1987; Learner, Lewin-Bizan & Warren, 2011; Steinberg, 2013).

Several studies have revealed that measures of cognitive ability are strongly associated with learning and academic achievement, including IQ (Deary, Strand, Smith, & Fernandes, 2007), working memory (Alloway & Alloway, 2010), and verbal ability (Marks, 2016). A perspective derived from these studies assume that students’ cognitive ability accounts for high correlations and variance of student performance. In support of this perspective, Marks (2016) in his longitudinal study of over 4000 students, ranging in ages 4 to 15, reported that student cognitive ability is the most dominant or influential predictor of student academic performance. Consequently, a topic of discussion of educational researchers has been the relation between intellectual ability and learning. It is believed that knowledge of these relations will facilitate the design of effective instructional practices (Clark & Harrelson, 2002).
Working Memory

Working memory (WM) refers to our ability to sustain and use information over short periods of time, while engaging in other cognitive processes (Alloway, Gathercole, & Pickering, 2006). In Baddeley’s theoretical model of working memory, WM is thought of as a temporary storage and processing system that consists of a central executive and two ‘working’ components: the verbal working memory (VWM) and the visuospatial working memory (VSWM) (Baddeley, 1986; Baddeley & Hitch, 1974). The two working components according to this model, serve different purposes: VWM keeps phonological information (written and spoken material) active under the control of an articulated process, whereas VSWM maintains spatial and visual information while ensuring the formation and manipulation of mental images. Working memory is found to develop gradually (linearly increasing from ages 4 to 14) and requires its two components – the verbal storage system (phonological loop) and the visuospatial storage system (visuospatial sketchpad) – working together with the central executive in a variety of cognitive activities (Best & Miller, 2006; Ismatullina, Voronin, Schelemetieva, & Malykh, 2014).

Working memory in recent years has been showing up to be the most dominant predictor of learning and not IQ (which has been deemed the most dominant for many years; Alloway & Alloway, 2010). Though IQ is a significant predictor in school achievement, one would expect children with normal intelligence to excel in school, and those with intelligence deficits to meet learning problems and to some extent failure. However, contrary to these expectations, there are groups of children who do not perform according to these predictions. In their study, Maehler and Schuchardt (2016) examined three groups of primary school children. The first group included children with learning disabilities and normal IQ, the second children with learning
disabilities and low IQ, and the final/control group consisted of typical developing children with regular school achievement levels and normal IQ. Their results revealed a deficit in WM of the first two groups compared to the control group. Their working memory function did not differ because of variation in intelligence. Their results also yielded no difference between the two groups of children with disabilities. In other words, no differences were found in cognitive functions because of differences in intelligence of the two groups. In the words of the authors, “working memory deficits might be so dominant in causing learning disorders that intelligence does no longer make a difference when working memory functioning falls below a certain threshold” (p. 9).

According to Alloway and Alloway (2010), working memory is better at predicting academic achievement than IQ, suggesting that the traditional belief of IQ as a marker for student success is misguided. These researchers arrived at this conclusion after investigating students’ working memory and IQ in predicting reading, spelling, and math skills. After measuring students at two-time periods (at age 5 and then at age 11), it was observed that working memory at the start of formal education is a more dominant predictor of later academic success. Additionally, they reported that unlike IQ, working memory is not related to parents’ educational and socio-economic background (Alloway, Alloway, Wootan, 2014). This pattern indicates that irrespective of a child’s environmental influences they have the same opportunity to fulfil their academic pursuits if working memory is assessed and any problems addressed. Given their findings, Alloway and Alloway (2010) suggest that schools focus on assessing and addressing issues of working memory in students, especially in the early stages of their lives.

Recent research has suggested that executive functions may be antecedents to metacognitive skills. Bryce, Whitebread, and Szűcs (2015) in their study aimed at finding out the
relationship among metacognitive skills and two executive functions (inhibitory control and WM) in young children found a developmental pattern with results that suggest that executive functions are not the same as metacognitive skills. Furthermore, they discovered that executive functions are necessary for the development of metacognition and that the relationship of these two changes with age. The authors posited that when executive functions are immature their absence restricts the child metacognitively. In other words, early development of working memory leads to metacognitive skills development, thus suggesting WM as having an indirect relationship to academic achievement.

C. Metacognition

The term metacognition refers to our covert awareness, knowledge, and control of our cognition (Conner & Gunstone, 2004; Pintrich, Smith, Gracia, and McKeachie, 1991). Prins, Veenman and Elshout (2006) define it to include both the knowledge about one’s own cognitive processes and the skills to regulate these processes. The knowledge aspect of metacognition involves understanding one’s memory and learning, whereas the regulation aspect refers to the control and manipulation of one’s cognition (Chui, Chow, & McBride-Chang, 2007). Metacognitive strategies such as planning and self-evaluation during learning are assumed to help students identify specific learning goals, filter new information, retrieve, and apply relevant information to fill in the knowledge gaps (Pichert & Anderson, 1977). This very process of thinking about one’s own thinking, like working memory, has also been argued to be an important predictor of learning in school-aged children. The goal of education is presumed to promote and develop self-regulated learners (Sperling, Howard, Miller & Murphy, 2006). To foster this goal, investigations on the influence of metacognition on intellectual ability and academia are of high importance. According to Sperling, Howard, Miller & Murphy (2006),
metacognitive training programs are effective for teaching reading and problem-solving strategies irrespective of one’s learning ability and achievement.

Support for metacognition as a key factor in learning was found in a study conducted by Veenman, Wilhelm and Beishuizen (2004), using fourth, sixth, eighth-graders, and university students. The results of the study demonstrated that metacognition contribution to learning performance was independent of intellectual ability. The authors also reported that the variance uniquely accounted for by intellectual ability was lower (2.4%) than the unique variance accounted for by metacognition (14.4%). However, variance shared by both was 40.8%. This finding indicates that though both IQ and metacognition share similar features, they still make distinct contributions to learning.

Further examination of metacognition by Prins, Veenman and Elshout (2006) revealed that the pattern of correlations between intellectual ability, metacognitive skillfulness, and learning outcomes differed for novice and advanced learners. For novice learners (students who received physics education for 3 or less years of their 6 years of secondary education), metacognitive skillfulness was the main determinant for learning outcomes, whereas for advanced learners (students who received 4 years or more of physics education) it was the main determinant only in the immediate phase. They concluded that metacognition rather than intellectual ability is vital for learning when learners operate at the boundary of their knowledge. In other words, if tasks exceed difficulty level, one turns to their metacognitive resources to assist. This study highlights that metacognition and intellectual ability have independent influence on learning for first year college students.

Further support for the relevance of metacognition was observed by Meijer, Veenman, and Hout-Wolters (2012) who found that metacognition and intelligence were negatively related.
The authors suggested two things about this pattern: it meant that less intelligent individuals display more metacognitive activity and it can be due to them encountering more difficulties while reading the comparatively complex text. Therefore, the less intelligent the person, the more he or she will have to use metacognitive activity to solve problems, causing a negative relation between IQ and metacognition. They also observed that application of metacognitive activities by students in the history task were also evident in the physics task. This finding indicated that metacognitive activity is domain general, rather than domain specific.

However, other research suggests that metacognition may not be so strongly related to academic achievement and IQ. For instance, Pressley and Ghatala (1989) after administering a vocabulary test to children from grades one to seven, found metacognition to be unrelated to verbal ability. Similarly, Allon, Gutkin, and Bruning (1999) found that metacognition was unrelated to IQ in a ninth-grade sample, while Sperling, Howard, Miller, and Murphy (2002) revealed a weak relation between metacognition and learning, and intelligence. Chiaburu, Cho and Gardner (2015) also found IQ and metacognition not significantly related. These findings support what is later described as the “independency model,” which assumes that both metacognition and IQ are independent or separate toolboxes (Veenman & Elshout, 1991; Veenman, Elshout, & Meijer, 1997).

Research supporting metacognition as predicting learning seem to outweigh studies that claim otherwise. As underscored by Meijer, Veenman, and Van Hout-Wolters (2012) a plausible reason for the latter is metacognition’s long-standing problem of operationalization and measurement. The definition of metacognition tends to vary from study to study. Additionally, the use of mono-method designs in examining metacognition is not the best given its implicit (e.g. awareness) and explicit (e.g. study behaviors) aspects. Whether metacognition is related to
IQ or not it had proven to be important and helpful in academic settings. Metacognitive training programs have been found effective in teaching reading and problem-solving strategies regardless of intellectual aptitude or academic achievement (Delclos & Harrington, 1991; Jacobs & Paris, 1987), and metacognitive skills assist children of lower intellectual ability to compensate on problem-solving tasks (Swanson, 1990).

D. Implicit Theories of Intelligence (Academic Mindsets)

Adolescence is a period filled with difficult transitions to middle and high school and is evidenced with decline in academic performance (Blackwell, Trzesniewski, & Dweck, 2007; Hill & Tyson, 2009; Yeager & Dweck, 2012). To assist with these developmental changes and challenging time of transitioning, Dweck and Yeager (2012) propose interventions for changing students’ mindset or implicit theories about the malleability of human characteristics. According to the authors, implicit theories are our core assumptions or beliefs about the malleability of personal qualities or attributes. It is a person’s commonsense explanation for everyday events (Molden & Dweck, 2006).

Focusing on implicit theories relevant to education, Yeager and Dweck (2012) highlight two kinds: implicit theories of intelligence and implicit theories of personality. According to the authors, students vary in their implicit theories: some have a more fixed or entity theory (view intellectual ability as something of which people have a fixed, unchangeable amount), whereas others have a more malleable or incremental theory (view intellectual ability as grown or developed over time). Several studies have revealed that students who possess an entity theory of intelligence interpret academic challenges as an indication that they lack intelligence or are “dumb”, consequently compromising resilience in academic contexts, even among high achieving students (Blackwell, Trzesniewski, & Dweck, 2007; Hong, Chiu, Dweck, Lin, & Wan,
In contrast, students who possess an incremental theory of intelligence are more accepting of and overcome challenges, viewing them as being helpful to learn and grow (Yeager & Dweck, 2012).

Students’ implicit theories of intelligence predict their academic performance over time, even with increased difficulty of task (Blackwell, Trzesniewski, & Dweck, 2007). Additionally, these theories shape students’ goals (of being eager to learn or preserving a “smart” image), their beliefs about effort (the key to success or an indication of their lack of talent), their attributions for hindrances (whether it means they need to work harder or it means they are “dumb”), and their learning strategies in the face of challenges (whether they keep trying or give up and/or become defensive; Yeager & Dweck, 2012).

Research has shown that students’ mindsets (implicit theories of mindsets) can be changed to promote resilience in the face of academic and social challenges and affect academic behavior over time. Arson, Fried, and Good (2002) changed college students’ theories of intelligence to promote an incremental view through providing scientific information about the brains’ functioning and potential as malleable. As a result, they observed that these students compared to a control group showed a significant increase in overall grade point average (.23 grade points) at the end of the year. Good, Aronson, and Inzlicht (2003) found equivalent results for seventh graders amid a difficult adolescent transition to middle school. Unlike the students in Arson et al. study (2002), students received a series of weekly mentoring emails over one year explaining how an incremental theory would improve performance on their statewide achievement tests. The results revealed that the incremental group as compared to a control group obtained significantly higher math and verbal achievement scores.
Studies such as these reveal that implicit theories of intelligence affect student achievement and that an incremental theory of intelligence is more favorable than an entity theory. Development of an incremental mindset can be taught in the home and school settings, through subtle messages or utterances communicated by the adults within the environment (Mueller & Dweck, 1998). Mueller and Dweck (1998) in their study of fifth-grade students described how the type of praise had a substantial effect of students. For instance, praising students on their ability or for being “smart” contributes to students’ development of an entity theory, and in turn less resilience following academic setbacks. Contrastingly, praising students on the process (their effort, strategies, persistence) instead of their ability led to the development of an incremental view that demonstrated more resilience, ultimately leading to better academic performance.

Yeager and Dweck (2012) argue that apart from school reform attempts to address structural factors (such as size of school and quality of teaching), educators should implement implicit theories (incremental) interventions that will significantly improve adolescents’ functioning over time and buffer against the many challenges that accompany adolescents transitioning. In addition, they suggest that incremental theory interventions should be customized to address the mindsets of students of a given age and context. The authors emphasize how mindsets can contribute to two of the most prominent issues faced by educators today: academic underachievement, and peer exclusion/victimization. Teaching adolescents intellectual or social skills necessary for being resilient is not sufficient. Unless a child has the mindset that facilitates the idea that his/her academic and social adversities have the potential to be improved or changed, they will not use the intellectual or social skills effectively.
E. Home Environment

The home environment is one of the most appropriate and influential places for impacting mindsets and academic achievement (Bronfenbrenner, 2000; Dweck & Yeager, 2012). To foster academic success, it is strongly recommended that parents provide in-home learning opportunities to stimulate their children’s cognitive development (Child Trends, 2004). MeenuDev (2016) also proposed that home life has a profound influence on the students’ psychological, emotional, social and economic state. The author further claimed that the state of the home affects the individual most especially through parents’ interactions, given the fact that they are the first socializing agents in their life. His claim was strengthened when he found that home environment was positively correlated with academic achievement of students. In other words, a stimulating environment and strong family support help with increasing a child’s academic achievement. Another finding of MeenuDev (2016) worth mentioning is that children’s IQ were observed to having significant direct effects on parental expectations and parental involvement. For instance, a parent will have high expectations and become involved in his or her child’s school life if that child has a high IQ.

In early childhood, the growth a child experiences and the cognitive and intellectual skills that he/she acquires are necessary for school life and later academic achievement (Biedinger, 2011). These cognitive and intellectual skills are posited to be shaped by child and family characteristics, child care, and early classroom experiences (Downer & Pianta, 2006). The goal during these early years is for every child to attain positive cognitive outcomes and one way to ensure this is occurs by creating a stimulating home environment (Biedinger, 2011; Rock, Pollack, Weiss, 2004).
Most at risk for cognitive and intellectual decline are socioeconomically disadvantaged children who often have poorer home environments. Burchinal, Lee and Ramey (1989) underscore how children born into impoverished families are significantly more likely to display intellectual underachievement than their middle-class counterparts. The authors further described how negative effects of poverty on preschool intellectual development diminish and are positively impacted when children attend quality day-care centers. A stimulating school environment may compensate for disadvantages in home environments by leveling out the playing field for children from less privileged backgrounds (Anderson et al., 2003). This pattern can be attributed to what many life-span scholars call plasticity.

According to Baltes (1987), plasticity can be defined as intraindividual variation experienced during development. Plasticity, he claims, designates the potential that individuals possess for various forms of development. It is the reason why underprivileged children, or any children for that matter, develop differently when environmental conditions differ. He identified three aspects of plasticity that can be distinguished in intellectual functioning. The first aspect, a measure in the present study, is called baseline performance. Baseline performance is an individual’s initial level of performance, without intervention on a given task. The second aspect, baseline reserve capacity, is the top range of an individual’s performance potential when resources are relied upon to optimize his/ her performance. The final aspect, developmental reserve capacity, is when interventions and/or training are provided to an individual to strengthen his/ her baseline reserve capacity. In the present study, formal education is the intervention introduced to our sample to strengthen their baseline reserve capacity.

Theoretical explanations for these findings of an association between home environment and cognitive ability include both discontinuous theories such as Piaget’s theory of cognitive
development and Erikson's theory of psychosocial development, and continuous theories such as social learning theories, and behaviorists’ theories (Bradley & Caldwell, 1984; Sternberg, 1992). For example, Piaget (1952) has shown that conceptual thinking and simple problem-solving skills start to develop by the age of two (i.e. during the preoperational stage). According to Piaget, it is the intellectual challenge provided to the child within the home, such as availability of toys and games, which contributes to the development of higher cognitive processes and mental skills (Caudle, 1991).

Unlike Piaget, social learning theorists (like Bandura) theorize that a child’s cognitive and social development is nurtured not only by his/her own behavioral or cognitive attributes, but also by interaction with significant others within his/her social environment, which increases and decreases the likelihood of behaviors (Helm, 2017). Bronfenbrenner (1994) in his bioecological models emphasizes the interplay and importance of both nature and nurture in child intellectual development. According to Bronfenbrenner’s bioecological model the “person” or in this case the “child” brings to the table the innate predispositions (neurological and genetic) to learn and socialize, however, it takes evoking the behavior of others to shape their development (Bronfenbrenner & Morris, 2006; Scarr & McCartney, 1983).

Home environmental factors postulated to be associated with positive cognitive outcomes include availability of stimulating toys and objects, responsivity and emotional support from parents, organization and safety within the home setting, and a variety of intellectual external experiences (Bradley & Tedesco, 1982; Denton, Reany & West, 2001; Ramey, Mills, Campbell, & O'Brien, 1975; Wulbert, Inglis, Kriegsmann, & Mills, 1975). Provision of such an intellectual climate at the onset of a child’s life is pivotal for academic success in later years (Bayley & Schaefer, 1964; McCall, Appelbaum & Hogarty, 1973). Bradley and Caldwell (1984), for
instance, reported that the presence of a stimulating home environment in the early years preceding first grade was correlated $r = .60$ with children’s reading, language arts and mathematics achievement scores. Additionally, prolonged environmental experiences throughout childhood play an even greater role in later academic achievement (Kagan, 1979).

Using their Home Observation for Measurement of the Environment Inventory, Bradley and Caldwell (1976) have found that HOME scores are strongly related to children IQ scores and achievement with subscales having varying relationship with IQ and achievement for different age groups (Bradley & Caldwell, 1984; Elardo, Bradely & Caldwell, 1975). For example, maternal responsivity showed a weaker relation to achievement than IQ in first graders than at fifty-four months. Their findings provided evidence of a significant relationship between the quality of stimulation made available to a child within their home environment and their IQ scores in later years. The authors also found that decreases in mental test performance of children in early childhood were associated with parents’ failure to adequately organize the environment and provide stimulation. Thus, making available developmentally stimulating materials and experience is associated with the children’s mental and achievement test performance (Bradley & Caldwell, 1984).

**Parental Homework Involvement**

Parental involvement (PI) in the education of children has been long regarded as an important and valuable element of effective education. Research shows that effective PI, including that of home-based PI (e.g. listening to children read and supervision of homework) and school-based PI (e.g. attending parent education workshops and parent–teacher meetings) is beneficial to children of all ages, and facilitates academic achievement. Other benefits of PI that have also emerged include: improved parent–teacher relationships, teacher morale and school
climate; improved school attendance, attitudes, behavior and mental health of children; and, increased parental confidence, satisfaction and interest in their own education (Hornby & Rayleen, 2011).

Parents often become involved in their children’s education through homework. Homework involvement can be a powerful tool for parents/guardians to get to know what their children are learning, to talk to their child about what’s going on at school and communicate with teachers about their child is learning (Walker & Hoover-Dempsey, 2004). Arguments about why parents choose to become involved in homework include: a belief that they should be involved (responsibility), that their involvement will have a positive impact in their child’s learning (involvement influences), and that their involvement is invited and warranted (Hoover-Dempsey & Sandler, 1995, 1997). According to Pomerantz, Moorman, and Litwack (2007) involvement that is process focused (importance of effort is emphasized) versus person focused (importance of stable attributes is emphasized) is much more beneficial to children. For example, the authors underscored that while assisting children with homework, parents who direct children’s attention to the process of learning instead of their attributes provide them with the opportunity to enhance and develop skills.

Hoover-Dempsey and colleagues (2001), in their quest to understand what activities, and strategies parents employ in the course of their involvement, found that parents’ involvement activities take many forms, including establishing structures for homework performance, teaching for understanding and developing student learning strategies. In examining how homework involvement influences student outcomes, and which student outcomes are influenced by parents’ involvement, researchers have found that through utilizing strategies of modeling, reinforcement, and instruction, parents’ homework involvement appear to influence student
success (Hoover & Sandler, 1995). Consequently, researchers advocate for development and bolstering of student characteristics related to achievement (e.g., positive attitudes about homework, perceptions of personal competence, and self-regulatory skills). After all, observations of parents’ involvement behaviors result in their child learning these behaviors and later producing related behaviors (Bandura, 1997).

Zellman and Waterman (1998) suggest that such involvement appears to be effective because of the manifestation of two constructs: parental enthusiasm and positive parenting style. In their study examining the relationship between parental involvement and child outcomes of 193 2nd- and 5th-grade children and their mothers, they found that overall level of parent involvement were lower among single parents and African American and Latino mothers. Parenting enthusiasm contributed significantly to the prediction of involvement at school and overall prediction of school-site involvement while positive parenting style significantly predicted child outcomes. These findings have led the authors to suggest that parent-involvement programs might be more effective if the focus is on the two underlying constructs identified above (non-school involvement), rather than other school site parental involvement practices.

Studies have demonstrated that the strength of the relation between parental involvement and academic achievement declines between elementary and middle school (e.g. Singh, et al., 1995), and that some aspects of PI in education may decline in amount or in effectiveness during such time (Hill & Tyson, 2009). Parental involvement is posited to being positively correlated with achievement, however, the type of involvement parents engages in matters and some are proven more effective for varying age groups. For instance, Hill and Tyson (2009) found that for middle schoolers home based PI did not correlate with achievement, school-based
PI moderately correlated, and involvement that reflected academic socialization had the strongest positive association with their achievement. The authors attributed their findings to the bureaucratic structure of middle school, and the developmental stage of adolescence. According to Dauber and Epstein (1993), many parents feel less inclined to assist with homework or provide events that may increase their adolescents’ knowledge or achievement. Besides dramatic cognitive development, adolescence is also a time marked with development of efficacious and autonomous conceptualization of self (Erikson, 1994; Lerner & Steinberg, 2004). Adolescents’ increased cognitive ability allows for them to set goals, solve problems, consider consequences and anticipate results, consequently leading to them playing a more active role in their education and having a sense of efficacy (Byrnes, Miller, & Reynolds, 1999; Halpern-Felsher & Cauffman, 2001; Hill & Tyson, 2009).

Research on parental homework involvement’s influence on achievement has generated contradictory findings. A compilation of both positive links (e.g., Callahan, Rademacher, & Hildreth, 1998; Fehrman, Keith, & Reimers, 1987; Reynolds, 1992) and negative relationships (e.g., Muller, 1995; Natriello & McDill, 1986; Voelkl, 1993) has been discovered. Reasons for such disparities include confounding variables that influences the relationship. A possible confounding variable may include student-perception and/or and the actual involvement experience (whether it was positive or negative). As stated by Dumont and colleagues (2012), perceived parental homework intrusion and homework-related conflict were negatively associated to students’ academic progress, while perceived parental support and competence to assist with homework were positively related to academic outcomes. Another confounding factor can be that of those outside of parents’ control such as classroom instruction, and student decisions to use skills.
As Hill and Tyson (2009) have observed, parental socialization is an important variable with regards to academic achievement, since parents play a significant role in the formulating their child’s perception on academic education. Albeit many are the parental involvement practices, research has revealed that socialization is one of the most powerful contributor to achievement (Fan & Chen, 2001; Hill & Tyson, 2009; Jeynes, 2007). Among the many types of socialization practices that help a child value academia are communication of expectations and aspirations, helping with schoolwork and accentuating the role of putting in the effort to achieve. As it pertains to putting in the effort, as cited earlier, research has shown that students who possess an effort-oriented approach to achievement versus an innate (fixed) intelligence-oriented approach, tend to be more academically persistent and have higher academic performance (Dweck, 1999; Dweck, 2002).

Parental involvement has been linked to effective student work habits, positive student homework behaviors, development of self-regulation, student persistence through time spent on homework, increased student attention to homework, increased likelihood of homework completion, better homework performance, positive student behavior at school, and several other student attitudes, skills, and behaviors important to school learning and achievement. Most of the studies are correlational in nature which suggests that student skills, attitudes, and behaviors may influence parents’ involvement decisions and behaviors. Additionally, age and school grade level should be considered when parents decide to be involved. As seen with middle school, school context and adolescent development impact the types of involvement, and how parents maintain involvement and effectiveness (Hill & Chao, 2009). Though parental involvement influences and leads to student learning and success, the type of involvement matters for the given age (Hill & Tyson, 2009; Hoover-Dempsey et al., 2001).
Family Background/Socio-economic Status

Dumont and colleagues (2012) in their examination of parental homework involvement as a mediator between family background and students’ academic achievement of eight grade students, observed associations between aspects of parental homework involvement and family background variables. Additionally, they observed that parental homework involvement did not mediate the relationship between family background and educational outcomes. Their findings are in line with the work of Green, Hoover-Dempsey and Sandler (2007), and Hoover-Dempsey and Sandler (1997), who posited that social context variables (e.g., children’s invitation of parental involvement and parents’ time and energy) or personal variables (e.g., parents’ self-efficacy beliefs or role construction) may be better predictors of parental involvement than family background variables.

Hoover-Dempsey and Sandler’s model (1995, 1997) suggests that components of parents’ life context function as the third major motivator of their decisions about involvement. To understanding parents’ involvement decisions, components of life context that are of most importance are the knowledge, skills, time, and energy that they bring to the possibilities of involvement Hoover-Dempsey et al (2005). Observations on the life-context variable, family socioeconomic status (SES) in relation to parental involvement, have found significant differences in involvement practices among SES groups, while other findings suggest that SES is not related to involvement (Hoover-Dempsey, 2005).

Parents’ educational level is also a factor regarded as having an association with student achievement. It is said to significantly predict both parental involvement and parental expectations (Englund, Luckner, Whaley, Egeland, 2004). In addition, mothers’ educational level at their child’s birth significantly predicted mothers’ quality of instruction in teaching a task and
their child’s IQ (Englund, Luckner, Whaley, Egeland, 2004). According to Children Trends (2004), the level of education attained by parents strongly affects their children’s social, emotional, and intellectual development, economic well-being, and physical health. Higher levels of parental education are associated with better school readiness among children, more parental involvement in both their children’s home and school lives, and spending more time reading to their children and carrying them on educational outings. In sum, what parents do before having children, and during childrearing matters and influences their academic achievement. Moreover, the benefits of parents’ involvement are contingent on what the children themselves bring to their interactions with parents and how they respond (Pomerantz, Moorman, & Litwack, 2007).

The Present Study

The present study is a comparison study examining the relation between cognitive ability, metacognitive awareness, implicit theories of intelligence, home environment, and learning outcomes (grades) of 11-15-year-old students and their families from Jacksonville, Florida and Carriacou, Grenada. The Caribbean island Grenada was chosen because research is undervalued and underutilized in this part of the world. Decisions are being made, and policies implemented with no empirical support causing programs and systems to fail, and wastage of time and resources. To determine the significant contributions that all these variables make to successful learning, measures of these factors must be collected within one study. Substantiated by theoretical and empirical evidence it can be hypothesized that cognitive ability, metacognitive awareness, implicit theories of intelligence, and home environment are all important for academic achievement, thus the reason for the exploration of this relationship. The present study
examines three models that represent the relationships between intellectual ability, metacognition and learning (Veenman & Elshout, 1991; Veenman, Elshout, & Meijer, 1997).

Models of the Relation between Intelligence, Metacognition, and Learning

Model 1, known as the mixed model, is based on Veenman, Wilhelm & Beishuizen (2004), which regards metacognition as a manifestation of IQ as a vital part of the “cognitive toolbox.” According to this model, metacognition is related to IQ to some extent, but is also highly predictive of learning in addition to intellectual ability. Further empirical support can be obtained in Elshout & Veenman (1992), and Veenman (1999). In the present study, this model will be adapted to explore the idea that cognitive ability, metacognitive awareness, implicit theories of intelligence, and home environment are all related and predict learning, with metacognitive awareness having the highest predictive value for learning.

![Fig. 1. Mixed model illustrating the relation between cognitive ability, metacognitive awareness, implicit theories of intelligence, home environment and learning.](image)

In contrast, Model 2, the intelligence model, assumes that metacognition is a manifestation of intellectual ability, and thus cannot have predictive value of learning independent of intellectual ability. Only intelligence has an influence on learning. Empirical support of this model can be found in Meijer, Veenman, & Hout-Wolters (2012) who observed
that metacognition and intelligence were negatively related, with intelligence being the only predictor of pretest performance. In the present study, this model will be adapted to suggest that metacognitive awareness, implicit theories of intelligence, and home environment are all a manifestation of cognitive ability, and only cognitive ability will predict learning.

Fig. 2. Model 2, Intelligence model, illustrating the relation between cognitive ability, metacognitive awareness, implicit theories of intelligence, home environment and learning.

In a third model, known as the independency model, it is assumed that intellectual ability and metacognition are unrelated with each having an independent influence on learning. Empirical support of this model is found in Swanson (1990) study of children performing two Piagetian tasks. This adapted model will suggest that cognitive ability, metacognitive awareness, implicit theories of intelligence and home environment are unrelated and independently predict learning.
Fig. 3. Model 3, Independency model, illustrating the relation between cognitive ability, metacognitive awareness, implicit theories of intelligence, home environment and learning.

The present study will benefit the educational community as the findings could provide new insight into how students’ cognitive ability, metacognitive awareness, implicit theories of intelligence, and the home environment influence learning outcomes in an urban and rural population. The practical implications suggest more effective study habits for students based on their learning style and learning needs. In addition, the present study has significance with reference to Grenada, because of little to no literature are available that investigate this topic. Thus, conducting this research will not only add to literature, but it will also provide a basis for subsequent research to take place. To achieve the objectives, the following research questions were formulated using a cross-sectional design:

**Research Questions & Hypotheses**

1. Which of the factors – cognitive ability, metacognitive awareness, implicit theories of intelligence and the home environment – predict student overall grades for both samples?

   Hypothesis: Given their innate characteristics and significance in shaping human development, it is expected that all four variables will predict student overall grades.

2. Do the predictors vary across cultural context?

   Hypothesis: As the literature suggest, due to a country’s wealth and cultural values’ influence on learning and academic achievement, it is expected that the predictors will vary across the two cultures. This research question is exploratory in nature.
Methodology

Participants

**Grenada.** Participants were high school students in Carriacou, Grenada (n = 50). Females accounted for 72% of this sample, with males accounting for the remaining 28%. Participants were between the ages of 11 to 15 years ($M = 13.58; SD = .82$). Their parents/guardians (n = 50) provided information on their educational level, socio-economic status, and demographic information of participants. With regards educational level 8% of the US parents had no schooling, 60% received a high school diploma or lower, and 32% received some college credit to doctorates degree. Income per household as reported by parents revealed that 78% earned below $40,000 per year with 22% earning $41,000 and above. The currency expressed here is not US currency but Eastern Caribbean Dollars (EC). The equivalence of US dollars to EC dollars is $2.70 (EC) to every $1.00 (US).

It must be noted that in the Caribbean students within this age range are at high school level versus the US students who were middle schoolers. In Grenada, education is modeled on the British system and is free and compulsory. There are four school levels: Preschool (ages 3-5), primary school (ages 5-11), Secondary school (ages 11-16), and tertiary education (college/university). The US, on the other hand, the four stages are: elementary school (ages 5-10), middle school (ages 11-13), high school (ages 14-18), and tertiary education (college/university).

Grenada Sample background information-The only two high schools on the island of Carriacou, Grenada (Bishop’s College & Hillsborough Secondary School) were recruited to participate in the study. Each of the high schools has a population of approximately 300 students,
with a student-teacher ratio of 12:1. They consist of forms (grades) 1-5 (ages 11-16). Both schools are also government funded. The standardized test that students undergo is the Caribbean Secondary Education Certificate (CSEC) that examines for certification at general (28 subjects) and technical (5 subjects) proficiencies and provide students with the foundation for higher educational pursuit and entry to the workplace. Bishops’ College and Hillsborough Secondary were selected to ensure that it was a representative sample of the population.

**USA.** Participants were middle school students in Florida (n = 38). Males accounted for most of the population sample (60.5 %), with the remaining 39.5 % being females. Participants were between the ages of 11 to 15 years old ($M = 13.32; SD = .89$). The ethnicity of the participants was as followed: 22% were African/American, 10% white/Caucasian, 4% Hispanic/Latino, 2% other. Information on participants’ ethnic background were only collected for the US and not for the Grenada sample. The reason for such is because the people of Grenada are not identified or grouped based on ethnicity but more so social class (rich or poor). Their parents/guardians (n = 38) provided information on their educational level, socio-economic status, and demographic information of participants. With regards educational level 6% of the US parents had no schooling, 35% received a high school diploma or lower, and 59% received some college credit to doctorates degree. Income per household as reported by parents revealed that 73% earned below $40,000 per year with 27% earning $41, 000 and above.

US Sample background information- Lakeshore Middle School in Jacksonville Florida was recruited to participate in the study. Lakeshore Middle, a culturally diverse school consist of grades 6-8 (ages 11-15) and has a population of 1, 164 students with a 16:1 teacher-student ratio. It is deemed a Title I, Part A school a component of Elementary and Secondary Education Act (ESEA), previously called the No Child Left Behind (NCLB). Being categorized a Title I school
means that Lakeshore receives financial assistance because of its high proportion of children from low-income families in attendance at the school. These federal funds help to ensure that all children meet challenging state academic standards. The standardized test that students undergo is the Florida Standards Assessments (FSA) in English Language Arts (ELA), Mathematics, and end-of-course (EOC) subjects (Algebra 1 and Geometry) that measures students educational gains and academic progress. Lakeshore Middle was an excellent choice to explore a multifactor model.

**Materials and Procedures**

**Cognitive ability.** Working Memory: Alloway Working Memory Assessment-II (AWMA-II, 2012) and nonverbal IQ: Ravens Coloured Progressive Matrices (see appendix).

Two working memory tests, one verbal and one visuo-spatial, were utilized via an online program to measure the working memory of the participants. Those tests were the Processing Letter Recall and the Mr. X subtests of the Automated Working Memory Assessment (Alloway, 2007). Processing Letter Recall was used to test the verbal working memory of participants, while the Mr. X subtest was used to test the visual-spatial working memory of participants. Test reliability of the AWMA II, reported in Alloway (2007a), for letter recall .88 and for Mr. X .84.

Nonverbal IQ of participants was tested using the Ravens Coloured Progressive Matrices (CPM): designed to measure non-verbal intelligence in children aged 5 through 11 years of age, the elderly, and mentally and physically impaired individuals (Basso, Capitani & Laiacona, 1987). This test has commonly been used to measure the nonverbal component of Spearman’s g-factor in research, educational and clinical settings (Cotton et al., 2005). It contains sets A and B from the standard matrices, with a further set of 12 items inserted between the two, as set AB. Most items were presented on a coloured background to make the test visually stimulating for
participants. For the purpose of this study only Set A was administered to the participants. This measure has good test-retest reliability of .80 (Raven, Raven & Court, 1998: Raven, Court & Raven, 1990), internal consistency averaged about .85 (Simoes, 1989), and a reliability coefficient from item analysis of .89 (Green & Kluever, 1991).

**Metacognitive awareness.** MetaCognitive Awareness Index - Junior version A; measures children metacognition (based on Sperling, Howard, Miller, Murphy, 2002; see appendix). It was developed from a previous instrument, the Metacognitive Awareness Inventory (MAI) used with adult populations and consist of 12 statements that participants either disagree, sometimes agree or agree with (ratings: 1=Never, 2=Sometimes, 3=Always). It has reported an internal consistency-based reliability estimate of .76 for Version A for grades 3–5 (see appendix for Jr. MAI). The scale consisted of items that measure knowledge and regulation of cognition. Metacognitive awareness was scored by adopting the authors rating scale to now represent 1=low, 2= average, and 3= high metacognitive awareness. Overall, participants scoring 1-12 were considered as having low metacognitive awareness, those scoring 13-24 average metacognitive awareness, and scoring 25-36 reflects high metacognitive awareness.

**Implicit theories of intelligence.** The Dweck Mindset Inventory (DMI) was developed and created by Dr. Carol Dweck and used to assess students’ implicit theories of intelligence (entity or incremental; see appendix). The DMI comprises of 16 separate item statements, that students rank on an agreement scale of 1-6 (1=strongly agree, 2=agree, 3=mostly agree, 4= mostly disagree, 5=disagree, and 6= strongly disagree). For the present study, the DMI was modified to only include a set of 8 of the 16 statements (see appendix for scale). These 8 questions only measure students implicit theories of intelligence, while the other 8 questions (9-16) measured talents. Students were instructed to read each of the 8 statements and then rank
their level of agreement or disagreement with the item based on the modified numeric scale (1=disagree, 2=somewhat agree, 3=agree). The DMI having contain both fixed and incremental statements, the scores from the incremental items are “reversed” so that strongly disagreeing with an entity item is similar to strongly agreeing with an incremental item. The ratings selected by students for the incremental items were reversed so that 1=3, 2=2, and 3=1. The items measuring fixed intelligence included statements 1, 2, 4 and 6. The items measuring incremental (malleable) intelligence included the statements numbered 3, 5, 7, and 8.

A new variable was then created with the averages of all 8 of the item scores. Students’ scores were represented such that those with averages of 1-1.49= incremental learners, 1.5-2.49= undecided, and 2.5-3= entity learners. The reason for not rounding off the averages was to avoid variability from being reduced. This variability of scores provides a measure of how accurately the sample represents the entire population in drawing inferential conclusions. Additionally, this variable was kept as a continuous variable to avoid loss of statistical information by categorizing variables, and instead retain the continuous information that is more sensitive and will yield more accurate results (Jose, 2013).

**Home Environment.** SES and parental involvement in homework measure: A SES questionnaire included parents education and household income (see appendix). Parents/guardians had to state whether they were involved in child’s homework, reasons why they are involved, how/strategies used in their involvement, and whether or not they believed that their involvement in homework influences their child’s grades.

Home life measure: The Home Observation for Measurement of the Environment (HOME) Inventory (Caldwell, & Bradley, 1984, 2003) is designed to measure the quality and quantity of stimulation and support available to a child in the home environment (Totsika &
Sylva, 2004). The HOME inventory assesses the levels of emotional support and cognitive stimulation which children are exposed to in their home environment and family surroundings (Linver, Brooks-Gunn, & Cabera, 2004). The inventory evaluates a child’s home environment and parent-child socialization. According to the authors it is “a brief instrument designed to distinguish environments that pose a risk for developmental problems from environments which offer basically adequate support for development” (Bradley, Corwyn, & Whiteside-Mansell, 1996, p. 253). The HOME has been widely used throughout North and South America (including the Caribbean), several European and Asian countries, Australia, and two African nations (University of Arkansas, 2005a). Reliability of the HOME, according to Bradley (1994) reports that, as a rule, internal consistency coefficients have been greater than .8 for the total scores. Subscale coefficients have ranged from .3 to .8 with inter-rater agreement levels being at least 85%.

The HOME is believed to be a predictor of success for young children and higher HOME scores, results in school success (Bradley & Caldwell, 1976). The HOME has also been used in investigating the relationship between the quality of home environment and a wide variety of child development outcomes. There have been studies linking the HOME to cognitive development (Caldwell and Bradley 1984). For the present study, the Home Observation for Measurement of the Environment (HOME) Inventory (Caldwell, & Bradley, 1984, 2003) was modified to include only 20 items that measured the quality and quantity of stimulation and support available to participants in the home environment. The subscales used were from both MC-HOME and EA-HOME and composed of seven subscales: (1) Learning materials, (2) Enrichment, (3) Family Companionship, (4) Modeling, (5) Encouraging Maturity, (6) Emotional Climate, and (7) Family Integration. The interview component of the HOME was not utilized.
Parents were asked to read all 20 items and select either ‘yes’ or ‘no’ (see appendix). A binary-choice (yes/no) format is used in scoring items for the HOME. All the ‘yes’ responses were counted as one. A high score indicates a more supportive environment and scores in the ¼ of average scores indicate environment that poses risk to child’s development.

Parents also answered questions about involvement in child’s homework. These questions included: are they involved, do they think their involvement influence performance, reasons for their involvement, and ways of involvement. Reasons for involvement were grouped into the following categories: Warmth (e.g. because I love my child), expectations (e.g. I expect my child to do well), responsibility (e.g. it is my duty to be involved), monitoring (e.g. I have to ensure that homework is done), and facilitate (e.g. continuous learning). The activities/strategies used during their involvement included: flashcards, review notes, rewrite notes, discuss/explain, practice recall/quiz, scaffolding, practice, memorize, personalize, reinforcement, independent learning, structure, manipulatives, child invite, and accessing information sources.

Procedures

**Phase 1.** Students between the ages of 11-15 were each given parental consent forms, and home life survey to carry home and return.

**Phase 2.** Upon obtaining consent, schools were contacted to arrange a suitable time for testing.

**Phase 3.** Children were tested on one to two separate occasions to avoid a fatigue effect. Each testing session lasted no longer than 30 minutes. They were tested on both computers and paper and pencil tests. They were also tested in small groups in a quiet room. Participants whose parents gave consent to participate in the research were then given child assent forms.
Participants then completed the Metacognitive Awareness Index- Jr. Version (Sperling, Howard, Miller & Murphy, 2002) and the implicit theories of intelligence (Dweck, 1999) surveys. Following was the test for nonverbal ability (IQ), the Ravens Colored Progressive Matrices. Finally, participants completed the online Alloway Working Memory Assessment- II.

**Phase 4.** Participants’ grades were obtained from the school’s administration and the data entered into SPSS.

**Results**

**Cognitive Ability**

Descriptive statistics for the cognitive ability test are shown in Table 1. For all memory measures, standard scores \((M=100; SD=15)\) are reported. Group performance in working memory for US students was in the low to average range (verbal- 83.9; visuospatial- 86.6), and in the average for the Grenadian students (verbal- 97.7; visuospatial- 100.6). Both groups performed in the average range in nonverbal IQ scale score of 9.0 and 10.7 respectively (scale score \(M=10; SD=3\)). For metacognitive awareness, both groups scored in the high range, with means of 28.2 and 29.7, respectively.

A multivariate analysis of variance (MANOVA) revealed that the two cultures differed significantly on all cognitive abilities (Wilk’s Lambda = 0.808, \(F(4, 83) = 4.941, p<0.001\)). The Grenada students outperformed their US counterparts on all cognitive measures: verbal WM, \(F(1, 87) = 11.64, MSE = 355.77, p = .001\), visuospatial WM, \(F(1, 87) = 7.23, MSE = 584.66, p = .009\), metacognitive awareness, \(F(1, 87) = 5.84, MSE = 8.79, p = .018\), and nonverbal IQ, \(F(1, 87) = 16.08, MSE = 4.07, p = .000\).
### Table 1

**Descriptive Statistics for all measures**

<table>
<thead>
<tr>
<th>Construct Measures</th>
<th>Grenada</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N= 50</td>
<td>N= 38</td>
</tr>
<tr>
<td>Cognitive Ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal Working Memory¹</td>
<td>97.7 (18.4)</td>
<td>83.9 (19.5)</td>
</tr>
<tr>
<td>Visual Working Memory¹</td>
<td>100.6 (21.8)</td>
<td>86.6 (27.0)</td>
</tr>
<tr>
<td>Non-Verbal IQ²</td>
<td>10.7 (1.2)</td>
<td>9.0 (2.8)</td>
</tr>
<tr>
<td>Metacognitive Awareness</td>
<td>29.7 (2.6)</td>
<td>28.2 (3.4)</td>
</tr>
<tr>
<td>Home Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home life survey</td>
<td>11.9 (3.1)</td>
<td>13.3 (2.9)</td>
</tr>
<tr>
<td>Parental Involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>77.1%</td>
<td>94.3%</td>
</tr>
<tr>
<td>Reasons for Involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warmth</td>
<td>29.4%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Expectations</td>
<td>8.8%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Responsibility</td>
<td>2.9%</td>
<td>13.8%</td>
</tr>
<tr>
<td>Monitoring</td>
<td>29.4%</td>
<td>13.8%</td>
</tr>
<tr>
<td>Facilitating</td>
<td>29.4%</td>
<td>62.1%</td>
</tr>
<tr>
<td>Parental Involvement Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>86%</td>
<td>97%</td>
</tr>
<tr>
<td>Implicit theories of IQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entity theory</td>
<td>10%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Incremental theory</td>
<td>30%</td>
<td>34.2%</td>
</tr>
<tr>
<td>Undecided</td>
<td>60%</td>
<td>63.2%</td>
</tr>
<tr>
<td>Grades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>76.9(11.9)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Math</td>
<td>77.4(16.6)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>English</td>
<td>79.8(11.1)</td>
<td>M (SD)</td>
</tr>
</tbody>
</table>

¹Standard scores= \((M= 100, SD= 15)\) ²Scale score= \((M= 10, SD= 3)\)

**Implicit Theories of Intelligence (Academic Mindsets)**

When asked to rate their implicit theories of intelligence, students from both groups appeared to fall into the undecided group than the entity and incremental groups (US-63.2%, GND-60%). Two percent of US students believed that their intelligence is fixed (entity learners),
while 10% of the Grenadian students believed this to also be so. Approximately 30% of the students from both the US (34.2%) and Grenadian (30%) groups perceived their intelligence to be malleable (incremental learners). The large proportion of undecided participants coincides with their quest of developing their identity and knowledge of oneself and exploration evidenced in adolescence (Steinberg, 2014).

**Home Life**

The mean scores for the home life survey, which had a total of 20 items were 13.3 for the US students and 11.9 for the Grenadian students, respectively. On average, the US students had more quality and quantity of stimulation and support available to them in their home environment as seen in Table 1.

**Parental Involvement in Home/Work**

Both groups had high parental involvement as in Table 1, with the US sample reporting more (94.3%) involvement than the Grenadians (77.1%). However, some variation existed among reasons for parental involvement in their child’s homework. Written descriptions of the reasons for involvement were coded into five categories: warmth, expectations, responsibility, monitoring, and facilitating (see Table 2). A chi square test revealed that both groups differed significantly in their reasons for involvement $\chi^2 (4, N=63) = 13.91, p = .008$, an indication that culture has an effect on reasons for involvement. It is important to note that these results violated some assumptions of chi square test with cell count less than 5 making the conclusion suspect or tenuous.

Grenada parents reported more involvement because of warmth, expectations for their child to do well, and monitoring, compared to their US counterparts. A higher percentage of US parents believed their involvement were their responsibility, compared to the Grenada parents.
This could be so because of a prevalent view in Grenada that teachers are the sole educators. More than half of the US parents reported that their involvement was to facilitate and continue to build on what the child was taught in school, more so than their Grenadian counterparts.

Parents who were involved in their child homework had a strong belief that their involvement had an impact on their child’s grades (US-97%, GND-86%).

**Table 2**

*Reasons for involvement categories*

<table>
<thead>
<tr>
<th>Reason for Involvement</th>
<th>Grenada (%)</th>
<th>US (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warmth</td>
<td>29.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Expectations</td>
<td>8.8</td>
<td>6.9</td>
</tr>
<tr>
<td>Responsibility</td>
<td>2.9</td>
<td>13.8</td>
</tr>
<tr>
<td>Monitoring</td>
<td>29.4</td>
<td>13.8</td>
</tr>
<tr>
<td>Facilitate</td>
<td>29.4</td>
<td>62.1</td>
</tr>
</tbody>
</table>

**Grades**

Grenadian students’ overall grades averaged out of 100 had a mean score of 76.9% placing them in the average-high performance category. Both their math (77.4%) and English scores fell within that same range with English grades being higher (79.8%); (see Table 1).

**Relations of Cognitive Ability Measures**

A Pearson correlational analysis was conducted on the cognitive ability variables in both groups (see Table 3).

**In the US sample.** Verbal working memory was significantly correlated with their visuospatial working memory, nonverbal ability, and metacognitive awareness. Nonverbal ability
was related to verbal and visual working memory. Students’ implicit theories of intelligence were negatively related to working memory (verbal and visuospatial) and nonverbal IQ.

**In the Grenada sample.** Verbal working memory was significantly correlated with visuospatial working memory and nonverbal ability. Similarly, nonverbal ability was related to verbal and visual working memory. Students’ implicit theories of intelligence were negatively related to visuospatial working memory, metacognitive awareness, and nonverbal IQ.

**Table 3**

*Correlations matrix of the Cognitive Ability Measures (Grenada top/US below)*

<table>
<thead>
<tr>
<th>Measures</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Verbal WM</td>
<td>1</td>
<td>.37**</td>
<td>.17</td>
<td>.42**</td>
<td>-.25</td>
</tr>
<tr>
<td>2. Visuospatial WM</td>
<td>.76**</td>
<td>1</td>
<td>.12</td>
<td>.38**</td>
<td>-.49**</td>
</tr>
<tr>
<td>3. Metacognitive</td>
<td>.33*</td>
<td>.17</td>
<td>1</td>
<td>.23</td>
<td>-.40**</td>
</tr>
<tr>
<td>Awareness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Non-verbal IQ</td>
<td>.66**</td>
<td>.53**</td>
<td>.19</td>
<td>1</td>
<td>-.35*</td>
</tr>
<tr>
<td>5. Implicit theories</td>
<td>-.44**</td>
<td>-.43**</td>
<td>-.17</td>
<td>-.32*</td>
<td>1</td>
</tr>
<tr>
<td>of IQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p < .001, **p < .005 WM = Working Memory

**Predictors of Overall Grades (Grenada sample)**

A stepwise multiple regression analysis was conducted to identify the combinations of variables that may predict students’ overall grades (see Table 4). Categorical variables were converted to dummy variables (i.e., either 0 or 1), whereas dichotomous variables were kept in their existing format (i.e., 0 or 1). With outliers removed, the results revealed that the following 4 variables significantly predicted student overall grades: verbal working memory [$F(1, 47) = 12.49, p < .01$]; parents’ educational background (associates degree) [$F(2, 45) = 5.76, p < .02$];
implicit theories of intelligence \([F (3, 44) = 4.43, p < .04]\); and home life \([F (4, 43) = 5.98, p < .02]\).

The \(R^2\) change statistic indicated that verbal working memory explained 21.4% of variance in overall grades and with parents’ educational background, implicit theories of IQ and home life added to the model the three (3) further explained an additional 9%, 6% and 7% of the variance in student’s overall grades, respectively (see Table 4). For the final model, all four variables explained a total of 40% of the variance in overall grades. It was revealed that high verbal working memory scores predicted higher grades. For parent’s educational background, students of parents with only an associate degree had significantly lower grades than those in other educational attainment categories. With regards, implicit theories of intelligence, incremental learners were reported as having higher grades than entity learners. It was observed that the undecided group earned grades \((M=75.39, SD=11.05)\) that were just below average \((M=76.98, SD=11.92)\), however, they scored higher than the entity group \((M=71.19, SD=14.26)\). The incremental group earned above average grades \((M=82.11, SD=11.88)\). Students with higher home life scores had significantly higher grades than those with lower home life scores. Tests for multicollinearity indicated that a low level of multicollinearity was present (tolerance = .915, .935, .897 and .896 for verbal working memory, parents’ education, implicit theories of IQ, and home life respectively).

### Table 4

**Predictors of overall grades (Grenada sample)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Adjusted R Square</th>
<th>(R^2) change</th>
<th>F change</th>
<th>Sig.</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- WM Verbal</td>
<td>.197</td>
<td>.214</td>
<td>12.496</td>
<td>.001</td>
<td>.487</td>
</tr>
</tbody>
</table>
Predictors of Implicit theories of Intelligence (Grenada sample)

Discriminant function analyses were used to measure the significant differences of students who are in these implicit theories categories. A stepwise function was used to determine which variable(s) best discriminate between the groups. The analysis was based on the cognitive abilities variables that were correlated with students’ implicit theories of intelligence. However, this test does not meet the assumption of equivalent sample size among the levels or groups, therefore the results should be interpreted with caution. These variables were visuospatial working memory, metacognitive awareness and nonverbal ability. Due to inequivalent sample size among groups (incremental n=15, entity n=5, and undecided n=30) two discriminant analysis were conducted.

The first analysis included all three groups and the results revealed that visual working memory was the only significant discriminator with a Wilks Lamda of $\lambda=0.71$, $\chi^2(2, N=50) =16.03, p=.01$. Performance on the visual working memory test was sufficient to correctly assign group membership for 46% of the three with incremental learners achieving higher scores ($M=115$) than the undecided ($M=97$) and entity learners ($M=75$). The successful categorization was achieved in incremental and entity groups (73% and 80% respectively) than for the undecided group (27%). The second analysis which only included the incremental and undecided group revealed that visual working memory was still the only significant discriminator with a Wilks Lamda of $\lambda=0.83$, $\chi^2(1, N=45) =7.90, p=.05$. Performance on the visual working memory
test was sufficient to correctly assign group membership for 64% of the two groups with incremental learners achieving higher scores ($M=115$) than the undecided group ($M=97$). The membership percentage was higher for incremental (73%) and undecided (60%).

**Predictors of Implicit theories of Intelligence (US sample)**

For the US sample, the discriminant analysis was based on the cognitive abilities variables that were correlated with implicit theories of IQ, which included nonverbal ability, visual and verbal working memory. Due to inequivalent sample size among groups (incremental $N=13$, entity $N=1$, and undecided $N=24$), one discriminant analysis was conducted that only included the incremental and undecided group. The results revealed that verbal working memory was the only significant discriminator with a Wilks Lambda of $\lambda=0.76$, $\chi^2(1, N=37) = 9.67, p=.02$. Performance on the working memory verbal task was sufficient to correctly assign group membership for 70% of the two groups with incremental learners achieving higher scores ($M=96.8$) than the undecided group ($M=76.7$). The membership percentage was higher for incremental (77%) and undecided (66%).

**Discussion**

The findings are discussed in conjunction with the research questions posed in this study.

**Research question 1: Predictors of grades.** The first research question sought to answer which of the factors – cognitive ability, metacognitive awareness, implicit theories of intelligence, and the home environment – predicted student overall grades for both samples? It was hypothesized that given their innate characteristics and significance in shaping human development, as well as being substantiated with theoretical and empirical backing, that all three
variables will predict student overall grades. Having been unable to obtain the grades for the US sample, analyses were only conducted only for the Grenada sample.

The results revealed that the most significant predictors of students’ overall grades were their verbal working memory, parents’ educational level, students’ implicit theories of intelligence, and stimulation of home environment. Findings of the present study were consistent with Alloway and Alloway’s (2010) working memory theory, in that working memory emerged the best predictor of academic achievement. Additionally, similar relationships were observed that supported several other studies including: Englund, Luckner, Whaley, and Egeland (2004), and Children Trends (2004), support for a positive association between parents’ educational level and achievement; Yeager and Dweck’s (2012) implicit theories of intelligence theoretical framework favoring an incremental mindset; and Bradley and Caldwell’s (1976) postulate of children’s home environment influence on academic achievement.

Consistent with Hill and Tyson’s (2009) work, parental involvement in homework for the Grenada sample did not predict their grades, though parents were observed to be highly involved. Analogous to Dumont and colleagues (2012), this finding can be attributed to the students’ age and developmental stage (adolescence). Their need for autonomy and independence could have caused students to perceive their parents’ involvement as interference, making them unreceptive, resulting in the effect (or no effect for that matter) that it had on their learning. As the results indicated, for adolescence, the role of parents can be better aimed at providing their child with a stimulating home environment and experiences.

**Theoretical model.** The adapted model demonstrated in the present study was the mixed model (see Fig. 4), with cognitive ability (verbal working memory), having the greatest predictive value. The mixed model proposed that metacognitive awareness, cognitive ability,
implicit theories of intelligence, and home environment are all related and predict learning, with metacognitive awareness having the highest predictive value of learning.

Fig. 4. Mixed model illustrating the relation between cognitive ability, metacognitive awareness, implicit theories of intelligence, home environment and learning. Note = asterisks (*) represent the variables that significantly predicted students’ overall grades.

**Non-predictors of grades.** Though recognized as an important factor of learning, and theoretically and empirically supported (see Brown, 1978; Veenman & Elshout, 1995; Veenman, Wilhelm & Beishuizen, 2004), metacognition did not predict overall grades for the Grenada students. A possible explanation for this finding could be the use of the JR MAI Version A (for grades 3 to 5), instead of Version B (for grades 6 to 9). Apart from assessing a younger age group, Version A also excluded 6 additional items that Version B had. These additional 6 items assessed higher levels of regulation that would likely be evidenced in older, more experienced
learners. The reason guiding this decision was to accommodate US students with disabilities who were involved in the study. It is important to note that in Grenada students are not classed as students with or without disabilities.

Another possible explanation could be that even though students were observed as having metacognitive awareness, as per observations, metacognitive awareness and strategy use is not well emphasized within the Grenada classrooms. Therefore, lack of acknowledgement of metacognitive awareness and strategy use in the classrooms could have contributed to it not being a predictor. According to Veenman, Kok, and Blote (2005) metacognition plays a vital role in school life and providing students with metacognitive cues helps with getting the initial learning process started. As underscored by the same authors, the Grenada students could be possibly suffering from a metacognitive production deficiency, rather than a metacognitive availability deficiency, thus providing a possible explanation for not predicting learning. Therefore, emphasis and/ or cueing of metacognition can yield better learning outcomes.

**Research question 2: Cultural differences of predictors.** The second research question sought to answer whether the predictors varied across cultural context. It was anticipated that due to differences in the two countries’ wealth (developed vs underdeveloped), cultural values (individualist vs collectivist), and educational systems (US vs UK), that the predictors will vary across the two cultures. As identified earlier, because of the lack of data on the US outcome variable, some of the cultural differences observed in the study will be highlighted.

**Classification.** Firstly, according to UNDP, the World Bank, and the IMF classifications of countries based on their level of development, the two countries fall into two extremely distinct categories (Nielsen, 2011). The US is classified as developed country, with characteristics of being highly advanced and industrialized, and having high income and human
development. Grenada, on the other hand, is classified as developing country, with characteristics of being less advanced, and having lower income per capita and human development.

**Educational Setting/practices.** As a consequence of being a third world country, Grenada has limited resources and opportunities, compared to its first world counterpart, leading to our second cultural difference. Cultural differences exist in the practices that occur in the educational settings of the two cultures. In Grenada, due to lack of resources in being a developing country, educators rely heavily on verbalization of instruction, in turn resulting in students having to use the component of working memory (phonological loop) that deals with spoken and written material (Baddeley and Hitch, 1976). Hence, students’ verbal working memory was the greatest predictor of their grades. With regard to the US, it was expected that both verbal and visuospatial working memory would have predicted their grades given their vast exposure to both verbal and visuospatial instruction.

**Cognitive measures.** Thirdly, though identified as a developing country, students from Grenada were observed to perform significantly better on all cognitive measures than their US counterparts. This phenomenon can be possibly attributed to Grenada being a collectivist society. Even with great inequality of income, families with higher SES and resources often open their doors to those who are less fortunate, resulting in shared learning strategies (Chiu, Chow, & Mcbride-Chang, 2007). Collectivist societies also have benefits of directed attention. The differing cognitive abilities scores could be as a result of the cultural emphasis placed by teachers within the classroom, and parents within the home setting. Unlike individualistic societies (US), collectivist societies (Grenada) emphasize self-control, and skills that promote following directions and concentrating on subject matter (Lan, Legare, Ponitz, Li, & Morrison,
2011). For Grenada students discipline is much more enforced within the home and classrooms, whereas for the US students’ free choice and self-expression is much more valued. Therefore, when the Grenada students are required to use directed attention, they may not only be better able to do so but have the advantage over their urban counterparts for it to be replenished.

Further explanations for this pattern include running barefoot, and exposure to natural environment. Alloway, Alloway, Magyari, and Floyd (2016), observed cognitive benefits of running barefooted versus shod. Their reported increase in working memory were attributed to the act of running itself which activates the part of the brain associated with WM (Gray, Chabris & Braver, 2003), greater proprioception (Lieberman et al., 2010), route planning, and focused attention (Souza, Rerko, Lin, & Oberauer, 2014). Barefoot running is very prominent among Grenada participants, not for reasons that are pleasing but due to not having proper shoes or resources to purchase new ones.

An advantage of growing up in a developing country is being surrounded by nature. Berman, Jonides, and Kaplan (2008) observed that there are cognitive benefits to interacting with nature. According to the authors, natural environments are filled with intriguing stimuli that modestly grab attention in a bottom-up manner that allows for directed abilities to be replenished. Urban environments, on the other hand, are filled with stimuli that grab attention drastically requiring the use of more directed attention without much replenishing. Directed attention has been implicated in playing a pertinent role in successful cognitive and emotional functioning (Posner & Rothbart’s, 2007), as well as short-term memory and school success (Jonides et al., 2008; Diamond, Barnett, Thomas, & Munro, 2007). For the Grenada students, this means that the natural environment helps minimize directed attention, causing it to be replenished especially after being taxed from high attention activities (such as running
barefooted). According to Berman and colleagues (2008), after an interaction with natural environments, one is better able to perform tasks that depend on directed-attention abilities (such as school work).

Implicit theories of intelligence. Fourthly, examination of zero-order correlations among cognitive ability measures within each country also revealed differences. Verbal WM was significantly correlated with visuospatial WM, nonverbal ability, and metacognitive awareness in the US sample, whereas it correlated with visuospatial WM and nonverbal ability in the Grenada sample. However, a similarity was observed. Nonverbal ability correlated with verbal and visuospatial WM in both the US and Grenada sample.

Zero-order correlations also revealed that students’ implicit theories of intelligence were negatively related to working memory (verbal & visuospatial), and nonverbal IQ in the US sample. For the Grenada sample, implicit theories of intelligence were negatively related to visuospatial working memory, nonverbal IQ, and metacognitive awareness. Discriminant function analysis revealed that the variable that discriminated between the groups of implicit theories of intelligence, or mindsets, differed for both cultures. For the Grenada sample, visuospatial scores discriminated, whereas for the US sample verbal working memory emerges as the discriminatory variable.

A key concept of Dweck’s social-cognitive theory of motivation, is the implicit theory of intelligence which refers to our underlying beliefs about our intelligence or abilities and whether they can change (Dweck & Legget, 1988; Dupeyrat & Marine, 2005). These implicit beliefs or what Dweck calls ‘mindsets’ are adapted though our interaction with the environment, are what individuals use to interpret themselves and others, and affect human behavior (Dweck, 2012). In the case of children, these mindsets are developed through their interaction with their parents and
One such way to influence the type of mindset of children is through the type of praises (whether about the process or on ability) given for successful work (Yeager & Dweck, 2012). Praises emphasizing the process (such you tried really hard, or you did a good job) rather than their ability (you are smart) are said to create an incremental mindset in children. A caveat of the Grenada culture is the lack of verbalized praises (about the process or ability) given to students. Therefore, a possible explanation for their verbal WM not being correlated (but their visuospatial WM scores discriminated between) could be that they had to rely on visual representation or information stored in memory of maybe how their grades have or have not changed. Secondly, streaming is exercised within the school system in Grenada, and as such the students could have also reflected on the class they were placed in. Whether they moved from one class to the other (e.g. lower to a higher) could have influenced their beliefs about their own intelligence. Additionally, students’ implicit beliefs about their intelligence could have been determined by the efforts put in by others to help with improving their performance.

Children are said to have more of an incremental mindset than adults (Cabello & Fernández-Berrocal, 2015). Given their plasticity, or their ability to change, it is best as proposed by Dweck that interventions be established to help students develop an incremental mindset that will be more beneficial to social and academic achievement (Steinberg, 2014). Additionally, training will help to eliminate the sizeable proportion of students observed to be undecided as to what they believe about their intelligence. This sizeable proportion is typical of adolescents given their self-exploration and search for self-identification. Students with an incremental mindset are said to take feedback and direct it into determination to trying new strategies to help
with the problem they are faced with, which can also be called self-regulated learning, an aspect of metacognition (Mueller & Dweck, 1998).

**Limitations**

Though this study has been proven fruitful, it suffered some setbacks. The limitations of this investigation should be taken into account when interpreting findings. Firstly, being unable to obtain the outcome variable (students’ grades) for our US sample for reasons beyond our control. Consequently, the study suffered some constraints in being able to fully address the research questions. Secondly, given the inequality of resources of a developing country, such as Grenada, there were outliers that had to be removed. Additionally, skewness and kurtosis values were identified in the normal distribution of some variables including income and parents’ education.

Finally, with regards measuring metacognition the Jr MAI Version B (for grades 6 to 9) should have been used instead of Version A (for grades 3 to 5) to assess students. Additionally, as proposed by Meijer, Veenman, and Hout-Wolters (2012) research on metacognition and learning should utilize multi-media designs given its implicit and explicit nature. Unobserved effects of metacognition on learning are likely to be due to the child assessment selected for the investigation. Though it was the easiest and most cost-effective method, the use of self-reported HOME survey poses issues of social desirability bias, acquiescence, and variation in understanding and interpreting questions, as well as possible misunderstanding of questions. These issues can and could have in fact influenced our results. The use of the original interview/observation HOME inventory, instead of the self-reported survey would have assisted with addressing the issues identified above as well as provide stronger validity of the measure.
Conclusions and Future Directions

Overall, the findings provide support for the persistent role of working memory, implicit theories of intelligence, parents’ education, and stimulating home environment in academic achievement. Three of these areas are of great interest and should be considered in assisting with improving learning outcomes of Grenada students. Firstly, educators should begin assessment and training with working memory interventions for students to help boost their working memory capacity. Secondly, in accordance with Dweck’s theory and as our results show, students who possessed an incremental mindset had better grades. Therefore, schools should implement interventions, as well as adopt teaching styles, that encourage the development of an incremental mindset in students – consequently, minimizing the large percentage of undecided students. By implementing such interventions, it is important that students be provided by parents and teachers opportunities to try new strategies and improve their outcomes. Finally, educators must advocate that parents create for their children stimulating home environments and experiences that in turn improve their academic performance.
Appendix

Parental Consent form:

Dear Parent/Guardian,

We are carrying out a large-scale study into how children’s study habits and memory ability relate to their learning. Our previous research has suggested that such ability is an important factor in learning.

If your child participates, it will involve:
- Completing some brief memory and ability tests
- Answering questions about their study habits and learning style
- Having their FCAT and grade information released to the researchers for use in this study
- Obtaining information on whether they are a student with disability, a struggling student, or a regular standards student
- We anticipate that children will participate in 1 session, lasting about 30 minutes

We are also seeking your consent to collect basic survey data from you regarding demographics information and your daily interactions with your child. This parent/guardian survey should only take about 5 - 10 minutes of your time.

Participation in this research is entirely voluntary you and your child may discontinue participation at any time without penalty or loss of benefits to which you and your child would otherwise receive. If your child does not assent to this research, he or she will not be included in the research. If you give permission for your child to participate or consent for your participation, but later change your mind and wish to withdraw your child or yourself from the study, please notify the researcher by email to request the withdrawal (email provided below).

Participation in the study has no effect on education your child is already receiving or will receive in the future. Your child will continue with their normal educational practices regardless of research participation. However, children who participate in this research will be removed from the class for a short time for testing. We confirm that instructional time will not be used for these research activities.

Data will be kept confidential as no names will be associated with the results in the datasheet. There are no foreseeable risks or discomforts anticipated for individuals who participate in this research. While there are no direct benefits or compensation for participants, the information from this study can drive decisions made by professionals in the fields of education, psychology and related disciplines and can further understanding of supporting students with learning needs. The results of the research may be published or used for

Lake Shore Middle School

UNF IRB Number 080723.4
Approved Date: 2/25/2016
Negotiation Date: 2/25/2016
Processed on behalf of UNF's IRB KLC
Parental Consent from cont’d

academic recognition. However, your privacy and the privacy of your child will be maintained in all publications, presentations, and reports that originate from this research.

If you have questions about your rights as a research participant or if you would like to contact someone about a research-related concern, please contact the chair of the UNF Institutional Review board by calling (904)- 620-2498 or email irb@unf.edu.

Please feel free to contact us if you have any queries about the project.

Thank you for your help.

Dr. Tracy Alloway and Nadina Williams, Master’s Student
Email: ____________________________

I, .................................................. the undersigned being the parent/guardian of
(parent/guardian full name)

.................................................. have read and understood the details of the research
(child’s full name)
project presented to me and give consent for the child named above to take part in this project. I give full consent for my survey data to be used in this project.

Signed ........................................ Date....................................................

(parent/guardian)
Home Environment Survey:

*Please check the box or reply with a short response to the following items*

**Ethnicity origin (Race): Please specify your ethnicity**
- □ White/Caucasian
- □ Black or African American
- □ Hispanic or Latino
- □ Native American or American Indian
- □ Asian/Pacific Islander
- □ Other

**Gender:** □ Male □ Female

**Zip Code:**

**Education: What is the highest degree or level of school you have completed?**
- □ No schooling completed
- □ Nursery school to 8th grade
- □ Some High School
- □ High School Graduate or GED
- □ Some college credit
- □ Trade/technical/vocational training
- □ College Associate degree
- □ College Bachelor's degree
- □ College Master's degree
- □ Professional degree
- □ Doctorate degree

**What is your total household income?**
- □ Less than $20,000
- □ $21,000 to $30,000
- □ $31,000 to $40,000
- □ $41,000 to $50,000
- □ $51,000 to $70,000
- □ $71,000 to $90,000
- □ $91,000 to $100,000
- □ $100,000 and Above

**Are you the primary caregiver?** YES / NO

**If yes, what is your role?**
- □ Mother
- □ Father
- □ Family member, not parent
- □ Other

**Marital Status: What is your marital status?**
- □ Single, never married
- □ Married or domestic partnership
- □ Widowed
- □ Divorced/Separated

**What is your Occupation?**

**Are you retired?** YES / NO

1. Are you involved in your child’s homework? YES / NO
2. Why are you involved in your child’s homework?
3. Which activities and strategies do you use to help them with their homework?
4. Do you think your involvement influences your child’s grades? YES / NO
*Please select Yes or No for the following items

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>My child has at least 4 children’s books</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>My child gets lessons and/or belongs to a club in music/art/dance/drama/or Sports</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>There is at least 1 musical instrument at home my child can use</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>My family gets a newspaper daily</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>When watching TV, I discuss the program with my child</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>My family encourages my child to start hobbies</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I read aloud to my child at least 5 times a week</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>My child is expected to make his/her own bed at least 2 times a week</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>My child is expected to clean his/her room at least 2 times a week</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>My child is expected to clean up after spills at least 2 times a week</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>My child is expected to bath him/herself at least 2 times a week</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>My child is expected to pick up after himself/herself at least 2 times a week</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>My child reads for enjoyment at least 3 times a week</td>
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<tr>
<td>14</td>
<td>My child spends time with father (figure) doing outdoor activities at least 1 time a week</td>
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<tr>
<td>15</td>
<td>My child eats meals with both mother and father (figure) at least 3 times a week</td>
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<tr>
<td>16</td>
<td>I address behavior issues with my child at least 2 times a week</td>
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<tr>
<td>17</td>
<td>My child spends time with father (figure) at least 3 time a week</td>
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<tr>
<td>18</td>
<td>My child visits with family or friends at least 4 times a month</td>
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</tr>
<tr>
<td>19</td>
<td>I have taken my child to a museum at least 1 time in the past year</td>
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<tr>
<td>20</td>
<td>I have taken my child to a musical or drama performance at least 1 time in the past year</td>
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Working memory test sample: Verbal/Visuospatial

Ravens test sample:
CHILD ID

Child Form - Raven's Matrices

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References


Dumont, H., Trautwein, U., Lüdtke, O., Neumann, M., Niggli, A., & Schnyder, I. (2012). Does parental homework involvement mediate the relationship between family background and
educational outcomes? *Contemporary Educational Psychology, 37*, 55-69.


Hoover-Dempsey, K. V., Battiato, A. C., Walker, J. M. T., Reed, R. P., DeJong, J. M., & Jones,


Marks, G. N. (2016). The relative effects of socio-economic, demographic, non-cognitive and
cognitive influences on student achievement in Australia. *Learning and Individual Differences, 49*, 1-10. United Kingdom: Elsevier Ltd. Retrieved from https://doi.org/10.1016/j.lindif.2016.05.012


Nielsen, L. (2011). Classifications of countries based on their level of development: How it is done and how it could be done. *International Monetary Fund, WP/11/31*.


comparison of high-risk families and families from general population. *American Journal of Mental Deficiency, 80*, 40-42.


of four components of parental involvement on eighth grade student achievement:


metacognitive skills in novice learning across domains. *Learning and Instruction, 14*, 89-109.


Vitae

Nadina Williams is a foreign Fulbright scholar from Grenada pursuing a Master of Science in psychological science at the University of North Florida. Mrs. Williams attained a bachelor’s degree in Human Services at the Metropolitan College of New York, in May 2008. She is employed in her home country of Carriacou, Grenada in the capacity of school counselor. Her intentions upon her return to her home country is to continue in the field of school psychology.