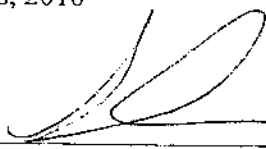


APPROVAL SHEET

Title of Thesis: The Effects of Home-based Academic and Regulatory Practices on Reading and Mathematics in Early Childhood: Self-Regulation and Executive Functioning as Mediators

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ABSTRACT

Title of Document: THE EFFECTS OF HOME-BASED ACADEMIC AND REGULATORY PRACTICES ON READING AND MATHEMATICS IN EARLY CHILDHOOD: SELF-REGULATION AND EXECUTIVE FUNCTIONING AS MEDIATORS

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To succeed academically children must be able to pay attention, follow instructions, and ignore distractions. These skills require self-regulation and executive functioning.

Research shows that parents' home-based practices predict children's self-regulation and executive functioning, as well as their reading and mathematics scores. However, studies have not yet explored whether parenting exerts its influence on children's reading and mathematics skills through its relations with self-regulation and executive functioning.

This study investigated the potential mediating roles of self-regulation and executive functioning in the association between a composite of parents' home-based practices and children's reading and mathematics scores in kindergarten. The parenting composite included parent-reported warmth, family routines, and home reading and mathematics activities. Data came from the ECLS-K 2011 and included 14,080 children who were first-time kindergarteners in the fall of 2010. Analyses of parallel multiple mediator models revealed that both self-regulation and executive functioning significantly mediated the relation between parents' home-based practices and children's reading and mathematics scores in kindergarten. In order to explore potential racial/ethnic differences in parents' home-based practices, mean levels of warmth, family routines, and home

math and reading activities were compared across Asian, Black, Latino, and White participants. Separate parallel multiple mediator models were conducted in each racial/ethnic group. Results revealed significant racial/ethnic differences in parents' home-based practices. Self-regulation was a significant mediator of the relation between home-based practices and children's mathematics and reading scores in all racial/ethnic groups. Overall, the study demonstrated that although parents' home-based practices differed significantly across racial/ethnic groups, they were consistently related to children's reading and mathematics scores through their relation with self-regulation.

The Effects of Home-based Academic and Regulatory Practices on Reading and
Mathematics in Early Childhood: Self-Regulation and Executive Functioning as
Mediators

By

Cassandra L. Simons

Thesis submitted to the Faculty of the Graduate School of the University of Maryland,
Baltimore County in partial fulfillment
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CHAPTER 1 INTRODUCTION

Research shows that parenting is associated with children's self-regulation, as well as their academic success (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Morrison & Cooney, 2002). Some aspects of parenting that are positively associated with children's academic and regulatory outcomes include warm interactions (Colman, Hardy, Albert, Raffaelli, & Crockett, 2006; Jennings, Sandberg, Kelley, Valdes, Yaggi, Abrew, & Macey-Kalcevic, 2008; Spinrad, Eisenberg, Silva, Eggum, Reiser, Edwards, Gaertner, 2012; Uddin, 2011; von Suchodoletz, Trommsdorff, & Heikamp, 2011), establishing family routines (Ferretti & Bub, 2014; Keltner, 1990; Roche & Ghazarian, 2012; Spagnola & Fiese, 2007), and engaging in reading and mathematics activities at home (Hindman & Morrison, 2012; LeFevre, Kwarchuk, Smith-Chant, Fast, Kamawar, & Bisanz, 2009; Melhuish, Phan, Sylva, Sammons, Siraj-Blatchford, & Taggart, 2008; Payne, Whithurst, & Angell, 1994). For the purposes of the current study, these parenting components will be referred to as *home-based academic and regulatory practices (HARP)*. Researchers have posited that parents' home-based practices may influence children's academic outcomes through their associations with children's self-regulation and executive functioning (Grolnick & Slowiaczek, 1994; Hindman & Morrison, 2012; Pomerantz, Moorman, & Litwack, 2007). The current study draws from past research to investigate the relations between HARP, self-regulation, executive functioning, and academic outcomes (see Figure 1).

The goal of the current study is to explore the extent to which children's self-regulation and executive functioning may mediate the relation between HARP and children's reading and mathematics scores during kindergarten and the extent to which

the mediating effects of self-regulation and executive functioning vary across racial/ethnic groups. In the following literature review, I will first discuss theoretical models of the relation between parental home-based involvement and children's early reading and mathematics skills and present the theoretical model that will be used to conceptualize the relations between HARP, self-regulation, executive functioning, and reading and mathematics skills. I will then describe how specific components of HARP may affect children's reading and mathematics skills, as well as, their self-regulation and executive functioning. Finally, I will discuss potential racial/ethnic differences in HARP and its effects on children's self-regulation, executive functioning, reading and mathematics skills.

Figure 1. Conceptual Parallel Multiple Mediation Model

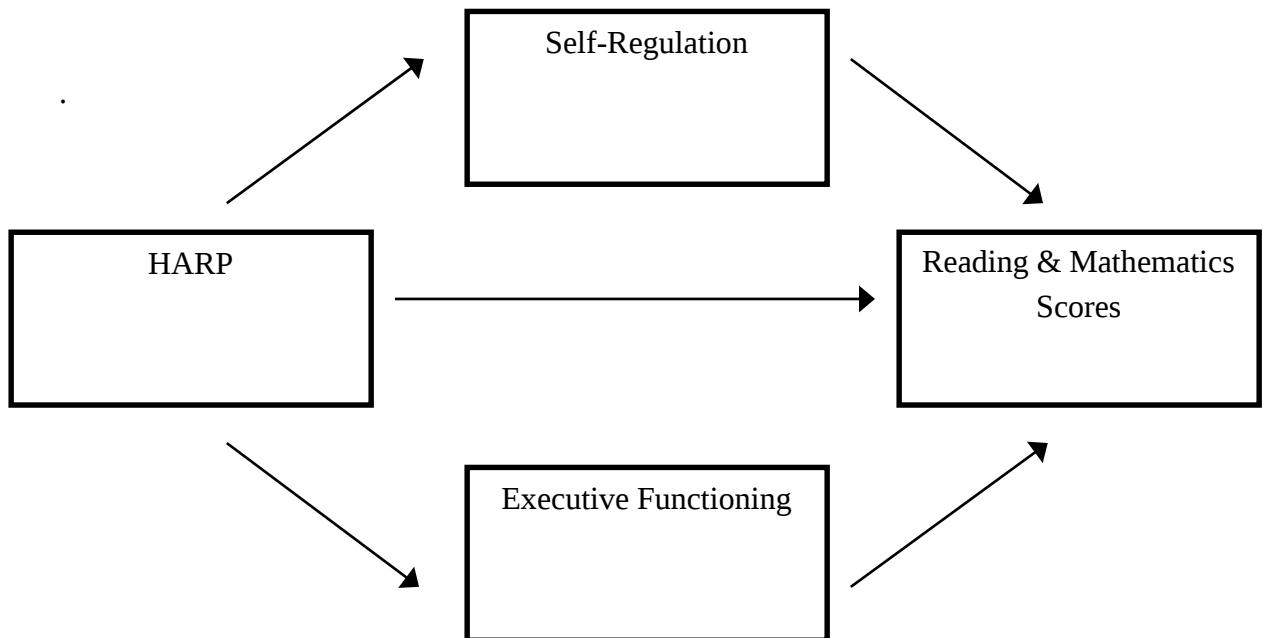


Figure 1. Conceptual parallel multiple mediation model being tested. Home-based academic and regulatory practices (HARP) represents a composite score of parent reported warmth, routines, and math and reading activities in the home.

Literature Review

Many researchers have emphasized the importance of parents' home-based involvement for children's academic outcomes. Grolnick and Slowiaczek (1994) defined parents' educational involvement as the parent's commitment of resources to the academic area of children's lives. School-based and home-based involvement are often referenced under the umbrella term of parent educational involvement. Home-based parent involvement includes engaging children in academic and intellectual activities (e.g. reading books with children or practicing reading and writing numbers) at home or outside of school. Grolnick and Slowiaczek (1994) called this kind of involvement cognitive-intellectual involvement. The current study will focus on parents' cognitive-intellectual involvement in the home as well as other parenting behaviors that have been shown to increase self-regulation, executive functioning, and children's mathematics and reading scores.

The theoretical model relevant for this study is based on Morrison and Cooney's (2002) model of parental influences on literacy development (see Figure 2). Morrison & Cooney (2002) theorized that several pathways simultaneously influence the growth of children's early literacy. For example, what they called social skills (e.g. self-regulation, independence, responsibility, and cooperation) affect children's academic achievement during early childhood. In addition, aspects of the family learning environment such as parental speech and literacy activities directly influence literacy skills. Parental warmth also shapes children's emergent literacy through its effects on children's social skills.

Figure 2. Conceptual Model of Parental Influence on Academic Achievement (Morrison & Cooney, 2002).

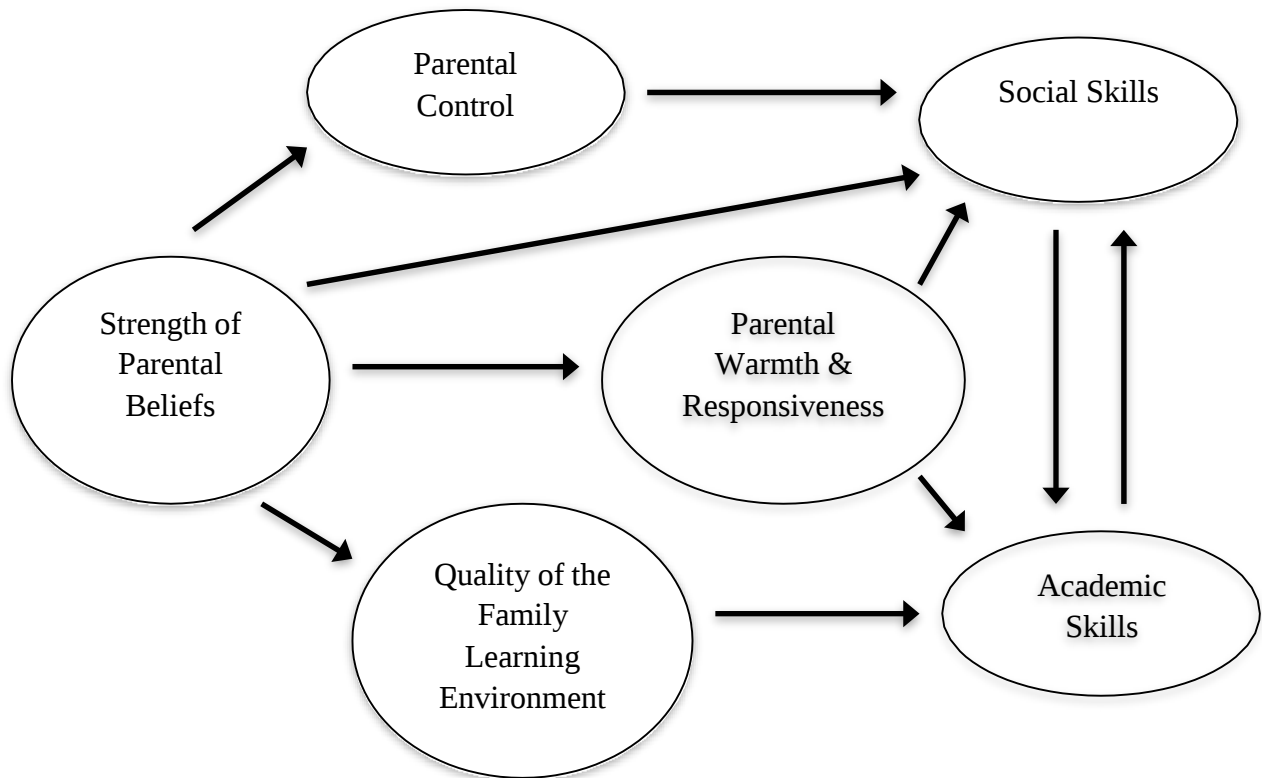


Figure 2. Conceptual model of parental influence on academic achievement by Morrison and Cooney (2002).

Morrison & Cooney (2002) used structural equation modeling to test the associations between parenting practices and child outcomes in their theorized model. They found that their model of parental influences on academic development explained a significant proportion of variance in children's academic skills, which included vocabulary, general information, reading, and mathematics. More specifically, the

quality of the family learning environment and parental warmth and responsiveness significantly and directly influenced children's literacy skills. In addition, children's social skills significantly predicted their literacy skills, and parent warmth and responsiveness significantly predicted children's literacy and social skills. Morrison and Cooney (2002) stated that the relations shown by their structural equation model implied that parental warmth and responsiveness might influence literacy acquisition through their effect on children's developing social skills. Building on the work of Morrison & Cooney (2002), the conceptual model of the current study takes into account parental warmth, quality of the family learning environment, and children's academic and social skills. However, it also includes other factors such as family routines, and the cognitive outcome of child executive functioning (see Figure 1). The proposed conceptual mediation model shows self-regulation and executive functioning as mediators of the relation between HARP (e.g. warmth, family routines, reading activities, mathematics activities) and children's reading and mathematics scores.

The conceptualization of HARP in the current study draws strongly from the construct of "positive parenting behavior" defined by Raver, Gershoff & Aber (2007) and the "Home Learning Environment" index, which has been widely used in developmental research (see Niklas, Nguyen, Cloney, Tayler, & Adams, 2016 for review). Raver et al (2007) created a latent variable of "positive parenting behavior" from material in the ECLS-K 1998-1999. They included observed indicators of parental warmth, parental cognitive stimulation, parent's use of physical punishment, and parents' reported use of rules and routines. Although HARP measures many of the same indicators, HARP differs from "positive parenting behavior." HARP does not include measures of parent's

use of physical punishment, or parent's provision of extracurricular activities such as playing sports and exercising together, carrying out nature, science, and construction projects, or involving children in household chores. The physical punishment component of the scale was removed because research shows that corporal punishment is not significantly associated with child adjustment after the effects of parental involvement are accounted for (Simons, Johnson, & Conger, 1994). Furthermore, Raver et al. (2007) found that the physical punishment and cognitive stimulation aspects of their positive parenting construct were strongly inequivalent across racial/ethnic groups.

HARP includes activities that are directly theoretically relevant for self-regulation, executive functioning, and academic outcomes. Following the model of the Home Learning Environment Index (Melhuish et al., 2008) the mathematics and reading aspect of HARP includes only activities that have clear learning opportunities. In addition, only indicators of routines from the rules and routines section of the parent interview are included in HARP, as the rules items included in the ECLS-K 2011 mostly pertain to TV watching, which is not theoretically related to self-regulation or executive functioning. Theoretical relations between HARP components and child outcomes of interest are discussed in detail in the following sections.

HARP and Academic Outcomes

The following section describes the contributions of four HARP practices, warm interactions, family routines, and parent involvement in reading and mathematics activities, to children's mathematics and reading scores (Grolnick & Slowiaczek, 1994;; Hindman & Morrison, 2012; Morrison & Cooney, 2002; Pomerantz et al., 2007).

Parental warmth. Parental warmth involves the expression of positive emotions in the child's presence and during parent-child interactions (Belsky, Bell, Bradley, Stallard, & Stewart-Brown, 2007; Ispa et al., 2004). A small body of research shows that maternal warmth is related to academic outcomes and general measures of cognitive ability (Morrison & Cooney, 2002; Watkins-Lewis & Hamre, 2012). For example, Watkins-Lewis and Hamre (2012) investigated parental warmth and other parenting characteristics in a low-income sample of Black families ($N=105$). Results showed that children of Black parents who reported higher levels of maternal warmth had higher levels of cognitive development and academic achievement at school entry.

Family routines. Family routines are repetitive patterns, which characterize daily and weekly events within a family unit (Boyce, Jensen, James, & Peacock, 1983). Routines help organize family life and keep it from becoming too chaotic. Having regular, predictable, and consistent routines may allow children to better anticipate and prepare for transitions between activities (Spagnola & Fiese, 2007). For children, routines often include eating meals together at certain times and having a predictable bedtime (Boyce et al., 1983). Children who wake up knowing that they will put on their clothes and walk downstairs for a quick family breakfast before catching the school bus may have an easier time getting ready for school. Likewise, children who know that they will have dinner with their family at 5pm and go to bed at 8pm may be better able to prepare for bedtime or plan when they need to get their school work done for the following day. For this reason, family routines may ease the transition to school, as they provide children with examples of the structure and culturally based expectations for behavior including following directions and orderly behavior (Norton, 1993).

Family routines are positively related to children's academic achievement and early cognitive ability (Brody & Flor, 1997; Budescu & Taylor, 2013; Ferretti & Bub, 2014; Fiese, 2002; Seaton & Taylor, 2003; Taylor & Lopez, 2005). Ferretti & Bub (2014) found that family routines, assessed when children were 14 months old, predicted their overall cognitive development and receptive vocabulary at 36 months. Fiese (2002) examined family routines and rituals and child executive functioning when children were four years old and again when they were nine years old. She found that families who had high levels of family rituals at both time points had children with higher scores on standardized tests of achievement than children of families who reported less ritualized interactions. Furthermore, other studies have shown that regularity of family routines is associated with academic success in low-income families from both urban (Seaton & Taylor, 2003) and rural settings (Brody & Flor, 1997).

Chaotic living conditions are often thought of as the opposite of family routines. Chaotic living conditions include noise and crowding, variability in household residents and location, and lack of routines and structure (Evans, Gonnella, Marcynyszyn, Gentile, & Salpekar, 2005). Chaos, or the lack of family routines, is negatively correlated with children's school performance. Hanscombe, Haworth, Davis, Jaffee, & Plomin (2011) investigated the relations between children's experience of family chaos at ages 9 and 12 and their academic achievement at age 12. They found that family chaos and children's school achievement were significantly negatively correlated. Thus, although research on family routines and academic achievement in early schooling is relatively limited the existing evidence points to a strong connection between routines and academic outcomes.

Reading activities. The ways that parents foster language and reading at home are strongly associated with children's early reading ability (Griffin & Morrison, 1997;; Payne et al., 1994; Sénéchal, 2011). After controlling for variables such as vocabulary and phonemic awareness, parental teaching accounts for an additional 4-19% of the unique variance in children's reading scores (Sénéchal, 2011). What is important to note, however, is that it is not just the act of reading with children that enhances their literacy skills, but the parent-child interaction that goes on during reading activities (Senechal, 2011; Sonnenschein & Munsterman, 2002). The home literacy environment includes the frequency of parent-child reading (Bus, vanIjzendoorn, & Pelegrinni, 1995), the presence of reading materials in the home (Griffin & Morrison, 1997; Payne et al., 1994; Scarborough, Dobrich, & Hager, 1991), and other reading and language related practices that take place in the home such as storytelling, and writing (Serpell, Baker, & Sonnenschein, 2005; Sonnenschein & Munsterman, 2002). These home reading activities have been shown to influence children's language and reading skills as well as their attitudes towards reading (Griffin & Morrison, 1997; Payne et al., 1994; Sonnenschein & Munsterman, 2002).

Home reading activities can foster vocabulary, print knowledge, and phonemic awareness in young children (Senechal, Ouellette, & Rodney, 2006; Serpell et al., 2005). It is widely acknowledged that reading books with children can play an important role in enhancing vocabulary (Bradley, Caldwell, & Corwyn, 2003; Evans, Shaw, & Bell, 2000; Farrant & Zubrick, 2012; Kaderavek & Justice, 2002; Senechal, 2006). Skwarchuck, Sowinski, and LeFevre (2014) showed that parental reports of formal literacy practices like helping children to read words predicted children's word recognition whereas reports

of informal experiences like shared reading predicted children's vocabulary.

Additionally, shared book reading interventions have been successful at increasing children's vocabulary (Becker, 2011; Farrant & Zubrick, 2013; Senechal, Ouellette, & Rodney, 2006). This finding is important because vocabulary size is a significant predictor of children's later reading comprehension (Ouellette, 2006; Wixson, 1986), and success in school (Snow, Burns & Griffin, 1998).

The ways in which reading activities are implemented in the home also plays a role in fostering children's attitudes towards reading. Rodríguez-Brown (2011) reported that often in low-income families, drill and practice of reading skills are favored over more informal reading opportunities. As a result, reading may become less enjoyable for the child, and motivation to read and the value of reading may diminish (Baker, Mackler, Sonnenschein, & Serpell, 2001; Sonnenschein & Munsterman, 2002). Children's interest in reading activities is predictive of their early literacy skills such as knowledge of letter-name and letter-sound correspondence in kindergarten (Sénéchal, 2011).

Finally, a recent line of research shows that engaging children in literacy related activities at home is associated with children's mathematics achievement (Sonnenschein & Galindo, 2015). For example, Sonnenschein and Galindo (2015) investigated the associations between quality of the home learning environment and mathematics achievement of Black, Latino/a, and White kindergarten children. They found that reading at home was a predictor of mathematics scores for all groups. Thus, home reading activities are likely to directly influence children's reading and mathematics scores.

Mathematics activities. The amount and frequency of mathematics-related activities that children engage in at home predict their later mathematics abilities

(Blevins-Knabe & Musun-Miller, 1996; Kleemans, Peeters, Segers, & Verhoeven, 2012; Kleemans, Segers, & Verhoeven, 2011; LeFevre et al., 2009). Parents can help children foster mathematics skills at home by engaging them in everyday mathematics-related activities, such as counting, playing board games, noting prices and item weights while shopping, and measuring while cooking (LeFevre et al., 2009; Manolitsis, Georgiou, & Tziraki, 2013; Skwarchuk, 2009; Young-Loveridge, 1989).

Discussing mathematics can also positively influence children's knowledge of mathematics vocabulary and increase their problem solving skills (Anders et al., 2012; Levine, Suriyakham, Rowe, Huttenlocher, & Gunderson, 2010). For example, Blevins-Knabe and Musun-Miller (1996) conducted two studies of the effects of number related home activities on kindergarteners' mathematics performance. In both studies, parents were interviewed about the frequency and type of number activities they did with their children during the past week. They found that parental reports of the frequency of children's number activities at home were predictive of children's scores on the Test of Early Mathematics Ability – Second Edition (TEMA-2), which assesses formal and informal mathematics knowledge, as well as calculations. Additionally, Kleemans et al. (2012) investigated the influence of home numeracy experiences on the early numeracy skills of 89 kindergarten children. After controlling for cognitive and linguistic precursors of numeracy development, parent-reported home numeracy activities significantly predicted early numeracy outcomes. Skwarchuk and colleagues (2014) also found that parents' reports of formal home numeracy practices, like addition and subtraction, predicted children's symbolic number system knowledge, whereas informal exposure to

games with numerical content predicted children's non-symbolic arithmetic, or their ability to use approximate mental calculations to solve mathematics problems.

Although much of the research discussed above has been correlational, the assertion that engaging in home mathematics activities improves mathematics skills has been supported by intervention studies. Starkey and Klein (2000) conducted two studies on the effectiveness of an intervention to enhance low-income parents' support for their pre-kindergarten children's math development. Results showed that children in the intervention group developed more extensive mathematical knowledge than a comparison group. Young-Loverdige (2004) found that children who participated in an intervention involving numeric board games and number storybooks made significant gains in early numeracy knowledge. Additionally, Siegler and Ramani (2008) found that children from low-income families who participated in a mathematics intervention involving playing simple numeric board games for an hour experienced gains in number knowledge and magnitude comparison skills. Thus, like home-reading, home mathematics activities are likely to directly influence children's mathematics scores.

Self-Regulation and Academic Outcomes

Self-regulation is defined as the “voluntary control of attentional, emotional, and behavioral impulses in the service of personally valued goals and standards” (Duckworth & Carlson, 2013, p. 209). Children who are able to control their behavior in order to comply with classroom demands exhibit classroom behaviors that facilitate learning and are better able to interact with learning materials and their peers (Lin, Lawrence, & Gorrell, 2003; Rimm-Kaufman, Pianta, & Cox, 2000). In addition, children who can regulate uncomfortable emotions and persist with difficult activities are better able to

focus on learning cognitive skills. Children who are unable to regulate their emotions and impulses often disengage from learning activities when they become frustrated, failing to achieve their full potential (Hyson, 2008). For these reasons, teachers report that the ability to follow rules, sit still, and pay attention are the most important determinants of kindergarten success and early report-card grades (Rimm-Kaufman et al., 2000).

Self-regulation and reading. Children's self-regulation also contributes to the development of reading skills (McClelland et al., 2007). McClelland and colleagues (2007) demonstrated that behavioral regulation significantly and positively predicts emergent literacy and vocabulary. In addition, growth in behavioral regulation predicts growth in emergent literacy and vocabulary over the pre-kindergarten year. Approaches to learning, a construct similar to self-regulation, includes persistence, emotion regulation, flexibility, and attentiveness (Li-Grining, Votruba-Drzal, Maldonado-Carreño, & Haas, 2010). Li-Grining and colleagues (2010) longitudinally investigated children's approaches to learning from kindergarten through fifth grade using the ECLS-K dataset. They found that children's approaches to learning positively predicted reading performance controlling for race/ethnicity, SES, and initial reading scores. Thus, self-regulation, a competency that is highly related to parenting, is likely to be associated with children's reading scores.

Self-regulation and mathematics. Children's self-regulatory skills predict early mathematics development (Blair & Razza, 2007; McClelland, Cameron, Connor, Farris, Jewkes, & Morrison, 2007). One self-regulatory skill that has proven to be especially important for mathematics development is effortful control. Effortful control represents

the behavioral and emotional control that children exert in order to overcome pre-potent responses in the service of immediate task demands (Blair & Razza, 2007). Effortful control is different from inhibition (a component of executive functioning) because it is tied to innate temperamental characteristics and is more automatic than the act of consciously inhibiting a response. Effortful control and inhibition also occur in different types of situations. Although inhibition is a cognitive process that occurs under affectively neutral circumstances, effortful control is often present in aversive situations when automatic responses are needed (Blair & Razza, 2007). Blair and Razza (2007) investigated the relations between effortful control, inhibition, and reading and mathematics ability in preschool age children from low-income homes. They found that child self-regulation accounted for unique variance in both reading and mathematics outcomes independent of child intelligence. In addition, McClelland et al. (2007) examined the relations between preschoolers' behavioral regulation and mathematics achievement. They found that growth in behavioral regulation predicted growth in mathematics over the preschool year. These studies show that self-regulation is likely to predict children's reading and mathematics scores.

HARP and Self-Regulation

Warmth and self-regulation. Both self-reported and observed parental warmth have been shown to predict children's self-regulation in early childhood (Colman et al., 2006; Eiden, Colder, Edwards, & Leonard, 2009; Eisenberg, Zhou, Spinrad, Valiente, Fabes, & Liew, 2005; Jennings et al., 2008). Parental warmth in toddlerhood has been associated with children's self-regulation during the preschool period (Eiden, Colder, Edwards, & Leonard, 2009; Eiden, Edwards, & Leonard, 2007; Spinrad et al., 2007),

while a lack of warmth is related to lower self-regulatory development in children (Rodriguez, Ayduk, Aber, Mischel, Sethi, & Shoda, 2005). Warm and sensitive interactions between mother and child at age 12-18 months predicted better child self-regulation at three years old in a sample of children of alcoholic parents (Eiden et al., 2009). Maternal warmth is also related to increases in children's emotion regulation (Davidov & Grusec, 2006), attention shifting abilities (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002) and effortful control (Eisenberg et al., 2005; Kochanska, Murray, & Harlan, 2000; Spinrad et al., 2007), which are components of self-regulation. For example, Colman et al. (2006) investigated the relation between self- and interviewer-reported caregiving practices when children were four and again when they were nine. They found that high levels of maternal warmth and low levels of harsh discipline at age four predicted greater self-regulation at age nine. This relation remained significant even after controlling for self-regulation at age four, showing that caregiver warmth and harsh discipline are associated with children's self-regulation through the preschool and kindergarten years.

Positive emotional expressivity is a key component of parental warmth. Emotional expressivity in the home provides a model of regulatory behavior for children, as they watch the ways in which family members manage and express their own emotions on a day-to-day basis (Morris, Silk, Steinberg, Myers, & Robinson, 2007). Parents who display positive expressivity may also provide affective environments that allow toddlers to learn how to manage behaviors during stressful experiences. For example, infants and toddlers who have observed parents using positive emotion coping strategies and expressing positive emotions have been shown to continue exploratory behavior longer

than their peers when in strange environments (Garner, 1995). Brophy-Herb, Stansbury, Bocknek, and Horodynski (2012) examined associations between six emotion-related socialization behaviors, warmth and supportiveness, emotional responsivity, mealtime interactions, maternal labeling of child emotions, and maternal positive expressivity, with toddlers' delay of gratification and coping skills. Upon examination of emotion-related socialization behaviors as a latent construct, they found that these behaviors were significantly related to toddlers' self-regulation, as evidenced by delayed gratification and effective coping.

Routines and self-regulation. Family routines are associated with cooperation and compliance in preschoolers (Keltner, 1990) and overall self-regulatory skills (Kopp, 1982). Ferretti and Bubb (2014) longitudinally examined the relation between family routines, components of executive function and self-regulation (e.g. impulse control, inhibitory control, attention, and working memory), and the cognitive skills of an ethnically diverse sample of children from birth through 36 months of age. Children who experienced higher levels of routines at 14 months of age showed higher levels of self-regulation at 36 months, suggesting that family routines have long term associations with self-regulation (Ferretti & Bub, 2014). A growing line of research shows that chaotic living conditions, the opposite of routines, may strain children's regulatory capacities and impair their ability to use mastery-oriented responses to challenge (Evans, 2003; Evans et al., 2005). This is problematic, as children are expected to contend with academic challenges on a daily basis. Indeed, Brown & Low (2008) found that children who live in homes with high levels of chaos lack academic persistence and are more likely to withdraw from academic challenges.

Although family routines have been shown to predict self-regulation (Brody & Flor, 1997; Ferretti & Bub, 2014; Keltner, 1990; Kopp, 1982) and academic outcomes (Brody & Flor, 1997; Budescu & Taylor, 2013; Ferretti & Bub, 2014; Taylor & Lopez, 2005), only one study (Brody & Flor, 1997) has investigated self-regulation as a mediator of the relation between routines and academic outcomes. Brody and Flor (1997) found that the relation between family routines and academic outcomes was mediated by the development of child self-regulation. The current study will further examine the relations between family routines, self-regulation, and academic outcomes.

Reading activities and self-regulation. Children's language competencies have been associated with their self-regulation throughout the early school years (Kray, Eber, & Lindenberger, 2004; Vallotton & Ayoub, 2011). Having better language skills predicts improved self-regulation because language is needed in order to express wants and needs and to consciously regulate behavior. Vallotton and Ayoub (2011) investigated longitudinal associations between toddlers' vocabulary and self-regulation from 14 to 36 months, finding that vocabulary positively predicted children's levels of self-regulation. In addition, when cognitive development was controlled, vocabulary still predicted self-regulation. Thus, engaging in literacy related activities in the home might facilitate children's self-regulation.

Mathematics activities and self-regulation. Doing mathematics activities has the potential to foster self-regulation because mathematics activities require children to use problem solving skills and regulate their behavior and emotions in order to persist during challenging activities (Blair & Razza, 2007). However, research has not yet

examined the relation between doing mathematics activities at home and children's self-regulation.

Executive Functioning and Academic Outcomes

In addition to enabling children to control their emotions and behaviors to facilitate learning (Ley & Young, 1998; McCann & Garcia, 1999; Pintrich, 2004), cognitive components of self-regulation called executive functions actually influence children's ability to retain information, shift attention to meet different task demands, and inhibit unwanted responses during problem solving (Miyake et al., 2000). Executive functioning is defined as the coordination of higher order thought processes such as inhibitory control, working memory, and attention shifting, which are required for problem solving (Zelazo, Muller, Frye, & Marcovitch, 2003). Thus, executive functioning is implicated in any activity that requires logic and active control over one's thoughts and actions (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009). Inhibitory control involves the ability to inhibit a dominant response and activate an alternative subdominant response associated with goal attainment (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Inhibitory control is important for school readiness and self-regulation because it enables behavioral flexibility (Barkley, Edwards, Laneri, Fletcher, & Metevia, 2001; Miyake et al., 2000) and allows children to think about problems from multiple perspectives (Diamond, Carlson, & Beck, 2005). Working memory is important because it enables children to remember and act on mental representations (Bierman et al., 2008). Researchers have posited that working memory fosters academic knowledge by enabling children to hold more information in mind for a longer period of time, mentally rehearse, and increase opportunities for storing information into long term

memory (Bull & Scerif, 2001). Finally, attentional shifting fosters learning by allowing children to focus attention on different aspects of a problem or situation and to ignore distractions (Posner & Petersen, 1990). Thus, executive functioning is necessary for success in every aspect of schooling from behavioral regulation to problem solving. In addition to being a strong predictor of emotional and behavioral regulation in the classroom, executive functioning also predicts reading and mathematics skills (Gathercole, Pickering, Knight, & Stegmann, 2004).

Executive functioning and reading. Studies with preschoolers and kindergarteners show that executive functioning is also associated with reading ability (Blair & Razza, 2007; Brock et al., 2009; McClelland et al., 2007; Neuenschwander, Röthlisberger, Cimeli, & Roebbers, 2012). Blair and Razza (2007) examined the relations between executive functions and early literacy in 41 low-income kindergarteners. They found that children's performance on a peg-tapping task requiring inhibitory control during preschool predicted letter knowledge but not phonemic awareness during kindergarten.

Bull, Espy, & Weibe (2008) investigated longitudinal associations between short-term memory, working memory, and executive function in children from preschool to third grade. They found that shifting and inhibitory control abilities uniquely predicted reading performance. Similarly, Neuenschwander et al. (2012) investigated the relations between executive functions such as updating, inhibition, and shifting and reading test scores. They found that executive functions in kindergarteners and first graders uniquely predicted their reading performance on standardized tests of achievement one year later.

Thus executive functioning seems to play a role in the development of reading skills during early schooling.

Executive functioning and mathematics. Executive functioning contributes to the development of mathematics skills (Bull & Scerif, 2001; Bull et al., 2008; Clark, Pritchard, & Woodward, 2010; Espy, McDiarmid, Cwik, Stalets, Hamby, & Senn, 2004; Mazzocco & Kover, 2007; Van der Ven, Kroesbergen, Boom, & Leseman, 2012). The core components of executive functioning include working memory, set shifting, and inhibition (Miyake et al., 2000). Working memory and inhibition seem to be the most related to mathematical ability (Bull & Scerif, 2001). Espy and colleagues (2004) investigated the contribution of executive function to emergent mathematic skills in preschool children. They assessed the working memory, inhibitory control, shifting abilities, and arithmetic skills of 96 preschool children. They observed robust relations between working memory, inhibitory control, and early arithmetic skills even after controlling for child age, maternal education, and child vocabulary. When components of executive functioning were examined separately, only inhibitory control made a significant unique contribution to early arithmetic, suggesting that inhibitory control may be an especially important cognitive prerequisite for early mathematics. This finding is consistent with that of other studies, which have highlighted the importance of inhibitory control, but not attention, for early mathematics ability (Blair & Razza, 2007; Espy et al., 2004).

Longitudinal associations between these aspects of executive functioning and mathematics have also been found (Bull et al., 2008; Van der ven et al., 2012). Van der ven et al. (2012) investigated associations between executive functions such as inhibition,

shifting, and updating, and mathematics skills from grades one through two. Updating, which is a component of working memory, represents the ability to manipulate and update information temporarily stored in working memory. Van der ven et al. (2012) found that updating scores during first grade predicted gains in mathematics scores across the two years of schooling. Thus the current study will explore a composite of working memory and inhibitory control as a mediator of the relation between parenting and academic achievement.

HARP and Executive Functioning

There is evidence that many of the previously mentioned HARP practices may influence executive functioning as well as academic outcomes (Bernier, Carlson, & Whipple, 2010; Bull & Scerif, 2001; Bull et al., 2008; Clark et al., 2010; Espy et al., 2004; Hughes & Ensor, 2009; Mazzocco & Kover, 2007; Vallotton & Ayoub, 2011; Van der Ven et al., 2012). The following section describes research on the relations between specific aspects of HARP and executive functioning.

Warmth and executive functioning. Although research has mostly examined maternal warmth in relation to emotional self-regulation, warmth also has implications for children's executive functioning. Research shows that children with warm parents are better able to regulate their arousal, and direct their attention selectively than children with harsh and insensitive parents (Bernier et al., 2010). Because of these positive relations with executive functioning, children may also benefit more from interactions with their parents by internalizing rules and guidance (Bernier et al., 2010).

Routines and executive functioning. Although no studies have examined the relation between executive functioning and family routines, there is reason to believe that

having routines would be beneficial for executive functioning. Research shows that chaos, or the extreme lack of family routines, is detrimental to executive functioning (Hughes & Ensor, 2009). Hughes and Ensor (2009) found that level of family chaos measured when children were two years old was significantly associated with children's executive functioning at age four. Family chaos was associated with a lack of improvement in executive functioning between ages two and four (Hughes & Ensor, 2009). This finding shows the potentially negative impact that a disorganized and unpredictable environment may have on children's abilities to remember, plan, and execute goal directed responses, as well as, to suppress impulsive responses.

Reading activities and executive functioning. Literacy activities require higher order thinking skills implicated in executive functioning. As discussed above, having enhanced language skills predicts improved self-regulation because language is needed in order to express wants and needs and to consciously regulate behavior (Vallotton & Ayoub, 2011). Although no research has explored whether doing literacy activities at home improves children's executive functioning skills, the correlation between literacy and executive functioning suggests that doing literacy activities may foster executive functioning.

Mathematics activities and executive functioning. Executive functioning is highly related to mathematics achievement (Bull & Scerif, 2001; Bull et al., 2008; Clark et al., 2010; Espy et al., 2004; Mazzocco & Kover, 2007; Van der Ven et al., 2012). In order to successfully complete mathematics problems, children must engage their cognitive reasoning abilities to consider different solutions. In addition, in order to solve problems, children must hold information in working memory and shift their attention

between aspects of equations (Blair & Razza, 2007). Thus, it is likely that engaging in mathematics activities will increase children's executive functioning because of the problem solving skills required.

Racial/Ethnic and Cultural Considerations

Although research shows that warmth, routines, reading and mathematics activities may enhance self-regulation, executive functioning, and academic outcomes for White children (Collins et al., 2000; Morrison & Cooney, 2002), we cannot assume that the same parent behaviors will affect children from different racial/ethnic backgrounds in the same way. Factors related to culture and racial/ethnic development may influence parent socialization behaviors and child responses to those behaviors (García Coll et al., 1996; Raver, 2004; Trommsdorff & Cole, 2011). According to the 2010 Census, the four largest racial/ethnic groups in the U.S. were White (72.4%), Latino (16.3%), Black (12.6%), and Asian (4.8%; Humes, Jones, & Ramirez, 2011). The current study will explore levels of HARP and its components among these four racial/ethnic groups and will replicate mediation models separately in each ethnic group. I will use the race/ethnic categories of "Asian", "Black", "White", and "Latino" to refer to four groups of children who were identified by their parents as falling into a single race/ethnic category during the kindergarten year of the ECLS-K 2011. Analyses of within-group variance and analyses including Native American/Alaskan Native, Hawaiian Native/Pacific Islander racial/ethnic groups, and of individuals belonging to two or more racial/ethnic groups are equally important but are not included in this study. The racial ethnic comparisons in this paper will shed light on whether HARP, as a construct, is similar across groups, and whether patterns of association differ with respect to race/ethnicity.

Race/Ethnicity and Academic Outcomes

Research examining academic achievement gaps has shown significant variation in the reading and mathematics scores of children from these racial/ethnic groups (Chatterji, 2006; Reardon & Galindo, 2009; Reardon, 2013; Reardon, Valentino, & Shores, 2012; Reardon, Greenberg, Kalogrides, Shores, & Valentino, 2013; Wang, 2008). Ethnic group comparisons of elementary school children show that, on average, Black and Latino children score lower than White and Asian children on reading and mathematics (Chatterji, 2006; Martinez, 2012; Reardon & Galindo, 2009; Reardon et al., 2012; Wang, 2008). Moreover, researchers have attributed at least some of the differences in child achievement between racial/ethnic groups to “out-of-school” factors such as parenting and the availability of academically relevant materials and experiences (Brooks-Gunn & Markman, 2005; Cheadle, 2008; Huntsinger & Jose, 2009; Pearce, 2006; Sonnenschein & Galindo, 2015).

Race/Ethnicity and HARP

The components of HARP have been shown to differ based on race/ethnicity (Brooks-Gunn & Markman, 2005; Huntsinger & Jose, 2009; Keels, 2009; Rao, McHale, & Pearson, 2003). Levels of maternal warmth (Isapa et al., 2004), family routines, (Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003) and cognitive stimulation (Bradley, Corwyn, McAdoo, & Coll, 2001; Brooks-Gunn & Markman, 2005) vary with culture and race/ethnicity, after controlling for socio-economic status. Sociocultural research suggests that parents from different racial/ethnic groups offer their children different types of exposure to academic and cognitively stimulating experiences (Garcia Coll et al., 1996). Thus, it is important to understand what experiences Asian, Black,

Latino, and White parents provide for their children because these differences may affect child outcomes (Super & Harkness, 2002).

Research suggests that Black parents may be more authoritarian (more controlling and less warm) than White parents (Baumrind, 1972; Baumrind, 1997; Hashima & Amato, 1994; McGroder, 2000). However, the authoritarian style may lead to relatively more adaptive outcomes among Black youth (Baumrind, 1997; Brody & Flor, 1998; Costello, Keeler, & Angold, 2001; Dodge, Pettit, & Bates, 1994; Kilgore, Snyder, & Lentz, 2000; McLoyd, 1990). It is important to note that these findings cannot be properly interpreted without considering context. Environmental stressors, such as dangerous neighborhoods, where Black families are more likely to live than White families (Le, Ceballo, Chao, Hill, Murry, & Pinderhughes, 2008), may require parenting that uses more control (Brody & Flor, 1998; Garcia Coll, Meyer, & Brillon, 1995). Consistent with these findings, “no nonsense parenting” emerged in the literature to reflect a parenting style similar to authoritarian with relatively higher levels control and moderate (not low) warmth (Brody & Flor, 1998; Young, 1974). No nonsense parenting has been associated with more youth independence and assertiveness and increased cognitive and social competence in low-income Black youth (Brody & Flor, 1998).

In keeping with Confucian values, Asian parents often highly emphasize the importance of their children’s educational success (Luo, Tamis-LeMonda, & Song 2013) because children’s academic performance is seen as a measure of good parenting. Thus, Asian parents, and Chinese parents in particular, often invest a lot of time in the active training or systematic instruction of children for educational and social success (Chao, 2001; Huntsinger & Jose, 2009; Pomerantz, Ng, Cheung, & Qu, 2014). Research shows

that Chinese parents also place great importance on children's grades (Hidalgo, Siu, & Epstein, 2004) and emphasize the value of effort rather than innate talent (Stevenson et al., 1990). Asian parents also appear to place special value on providing direct academic instruction in the home (Chao, 1994; Huntsinger & Jose, 2009). Chao (1994) examined White and Chinese immigrant parents' ideologies regarding direct academic instruction, finding that Chinese immigrant parents' scored significantly higher on direct academic instruction ideologies. Thus, guided academic and intellectual stimulation appears to be something practiced by Asian families more often than by Black and Latino families. Some research also suggests that Asian parents may express warmth through fulfilling children's physical needs rather than through positive expressiveness and praise. Cheah, Li, Zhou, Yamamoto, and Leung, (2015) found that although White and Chinese immigrant mother's perceived expressing warmth to their children to be similarly important, Chinese immigrant mothers reported expressing less warmth toward their children. In addition, they found that Chinese and European American mothers differed in the ways they expressed warmth. Chinese immigrant mothers highlighted the importance of expressing warmth through meeting children's fundamental needs. They also reported that one of the outcomes of warmth is obedience and that helping their children develop self-control was a good way of expressing warmth. Thus Asian parents may think about and express warmth differently than White middle-class families.

Latino parents also greatly value education and believe that it is essential for prosperity. This is especially true of Latino immigrant parents who often come to the U.S. to gain access to a better education for their children (Olmeda, 2003; Reese, 2002; Suárez-Orozco & Suárez-Orozco, 2001). Latino parents have high expectations for their

children's educational attainment, and often focus on motivating their children to succeed by discussing gifts and sacrifices (Ceballo, Maurizi, Suarez, & Aretakis, 2014; Hill & Torres, 2010). For example, Latino parents may try to get their children motivated to succeed in school by telling them about the sacrifices they have made for their education, by giving advice, and by providing moral support (Azmitia, Cooper, & Brown, 2009; Ramos, 2014). However, research has not yet addressed whether Latino parents use the more traditional forms of home-based involvement documented with White parents in addition to motivational strategies.

Cheadle (2008) found racial/ethnic differences in the extent to which parents practiced guided academic stimulation at home, such that White parents were more likely to have children participating in extracurricular activities, to invest in educational materials, and to be more involved with school than Black, Latino, or Asian parents. Further, the extent to which parents invested in guided academic and intellectual stimulation was positively related to children's mathematics skills at kindergarten entry, and was a significant mediator of socioeconomic and racial/ethnic disparities in child reading and mathematics scores. Cheadle and Amato (2010) also found that Black and Latino families were less likely to provide cognitively stimulating activities for their children. Similarly, Bradley, Corwyn, McAdoo, & Garcia Coll (2001) found that Black and Latino families were more likely than White and Asian families to report having no books at home and less likely to read to their children three or more times per week. Brooks-Gunn and Markman's (2005) review of the literature on ethnic differences in parental involvement related to schooling shows that Black and Latino parents are less likely to read to their children every day than White and Asian parents. Black and Latino

families, on average, have fewer reading materials in the home (Bradley et al., 2001; Brooks-Gunn & Markman, 2005). In addition, Sonnenschein and Galindo (2015) found significant variability in the home learning environments of Black, Latino, and White kindergarteners participating in the ECLS-K (1998-1999). White children participated in reading, general learning activities, and the use of learning tools more frequently than Black and Latino children. Among Black and Latino families, Black parents reported that their children had higher exposure to general learning activities.

The effects of HARP on academic achievement may differ across racial/ethnic groups (Bae, Hopkins, Gouze, & Lavigne, 2014; Bean, Bush, McKenry, & Wilson, 2003; Darling & Steinberg, 1993; Desimone, 1999; Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987; Hill et al., 2004). For example, Dornbusch (1987) found that adolescent reported authoritative parenting style was significantly related to academic achievement among White adolescents but was not significantly associated with Black adolescents' gains in academic achievement. In addition, LeCuyer, Swanson, Cole, & Kitzman (2011) investigated the effects of maternal attitudes and limit-setting strategies on children's self-regulation (i.e. compliance) in Black and European American dyads. They found that race/ethnicity moderated the association between maternal authoritarian attitudes and children's compliance, such that higher authoritarian attitudes predicted lower compliance in European American children and higher compliance in Black families (LeCuyer et al., 2011).

Although there is evidence for differing relations between parenting behaviors and child outcomes across racial/ethnic groups, research suggests that race/ethnicity is not a significant moderator of the relations between the parents' home-based practices,

self-regulation, and academic outcomes (Li-Grining, 2007; Moilanen, Shaw, Dishion, Gardner, & Wilson, 2010). Instead, parental influence on self-regulation functions in the same way across Black, Latino, and White families when using nationally representative datasets (Raver, Gershoff, & Aber, 2007). These findings also suggest that self-regulation plays the same role in the academic outcomes of children from many diverse racial/ethnic groups.

The current study will examine mean levels of parenting behaviors (HARP) in order to create a full picture of parenting practices across diverse groups in the United States. In addition, due to the evidence that parenting varies across racial/ethnic groups, it is important to understand the effects of different constellations of parenting practices on self-regulation, executive functioning, and academics. Thus, separate analyses will be examined for each racial/ethnic group in this sample to understand whether mechanisms of parental influence on self-regulation and academic outcomes differ or remain stable across groups.

The Current Study

Although researchers have investigated the relations between parents' home based practices, self-regulation, executive function, and academic outcomes, several gaps still remain in the existing literature. First, no studies have explored whether self-regulation and executive functioning mediate the relation between parents home based practices and children's reading and mathematics skills in kindergarten. Second, research has often used the terms self-regulation and executive functioning interchangeably, when, in fact, they represent different constructs and different measurements. Due to the fact that self-regulation and executive functioning are often grouped together in research or examined

in separate and non-comparable studies, their differential relations with children's reading and mathematics outcomes have not yet been explored. Third, although some studies have examined the mediating effects of self-regulation on the relation between parenting and achievement (e.g. Li-Grining & Haas, 2010) in particular racial/ethnic groups, no studies have examined how the effects of HARP may differ across the four largest racial/ethnic groups in the United States. Finally, children develop the most essential self-regulatory and executive functioning skills during the first five years of life (Blair, 2002; Florez, 2011). However, much research on achievement gaps and self-regulation related to learning has been conducted on older children (e.g. Evans & Rosenbaum, 2008; Reardon, Valentino, & Shores, 2012). Thus, it is important to examine associations between HARP, self-regulation, executive functioning, and children's math and reading in Kindergarten. Drawing from the parental involvement factors identified by Morrison and Cooney (2002) and related research (Bradley & Caldwell, 2001; Griffin & Morrison, 1997; Pomerantz et al., 2007) the current study will examine the effects of warmth, family routines, reading, mathematics activities on kindergarteners' self-regulation, executive functioning, reading and mathematics scores across the four major racial/ethnic groups in the U.S. (e.g. Black, Asian American, Latino, and White) (Humes et al., 2011).

Aims & Hypotheses

Aim 1. Evaluate the extent to which self-regulation and executive functioning mediate the relation between HARP and children's reading and mathematics scores in kindergarten when controlling for the effects of race/ethnicity, child gender, child age, SES, speaking a non-English language at home, and having non-parental care.

Hypothesis 1. Both self-regulation and executive functioning will mediate the relation between HARP and kindergarteners' reading and mathematics skills.

Aim 2. Explore mean levels of HARP components (e.g. warmth, routines, reading and mathematics activities) across Asian, Black, Latino, and White families in order to gain greater understanding of the home environments of U.S. kindergarteners. Previous research shows that direct instruction and engagement in reading and mathematics activities at home are more likely to be a part of White and Asian families' HARP practices (Bradley, Corwyn, McAdoo, & Garcia Coll, 2001; Brooks-Gunn & Markman, 2005; Sonnenschein & Galindo, 2015). However, research has not shown consistent ethnic differences in family routines and warmth.

Hypothesis 2. White families will report higher levels of reading and mathematics activities at home.

Aim 3. Investigate whether self-regulation and executive functioning mediate the relation between HARP and children's reading and mathematics scores in each ethnic group.

Hypothesis 3. Research shows that the associations between self-regulation and parenting are similar in Black, Latino, and White children (Raver et al., 2007). Thus self-regulation and executive functioning will mediate the relation between parenting and reading and mathematics skills in Asian, Black, Latino, and White children.

CHAPTER 2 METHOD

Sample

The data for the current study came from the Early Childhood Longitudinal Study, Kindergarten Class of 2010-11, which is a nationally representative dataset (ECLS-K: 2011; U.S. Department of Education, National Center for Education Statistics, 2013). The ECLS-K base year kindergarten child-level data file contains data for approximately 18,170 children. Each child record contains data from multiple respondents including the child, parents/guardians, teachers, and non-parental care providers.

The sample for the current study was restricted to Asian, Black, Latino, and White children, the four largest racial/ethnic groups in the United States (Humes et al., 2011), and to children who were first time kindergartners in 2010. In order to be included in the analytic sample, children needed to have valid data for both fall and spring reading and mathematics assessments. The final sample for this study included approximately 14,080 children. Analyses focused on child-level data collected from parents, teachers, and children in the fall and spring of kindergarten. Demographic characteristics of the study are described below in Table 1.

Table 1.
Demographic Information for Kindergarten Children

	Frequency % (N)
Male	50.8 (7,130)
Female	49.2 (6,900)
Asian	8.1 (1,130)
Black	13.7 (1,940)
Latino	25.8 (3,640)
White	52.4 (7,370)
Non-English language spoken at home	26.9 (3,190)
Non-parental child care	43.6 (5,120)

According to the U.S. Census Bureau (2014) the United States is 77.4% White, 13.2% Black or African American, 5.4% Asian, and 17.4% Hispanic or Latino. Thus, this sample of ECLS-K data is somewhat representative of the national ethnic concentration of the U.S. However, the creators oversampled Asian participants in order to ensure that the sample included enough such children to be able to make accurate estimates for these students as groups (Torangeau et al., 2012). In 2011, approximately 22% of children in the U.S. between the ages of 5-17 spoke a language other than English at home (U.S. Census Bureau, 2011) In terms of non-parental child care, the U.S. census reported that in 2011, 32.9 % of preschoolers attended non-relative care (Laughlin, 2013).

Measures

HARP. A HARP composite was created to examine the overall frequency of warmth, routines, and reading and mathematics activities in the home. The composite

score was composed of the mean of parent responses to all components of HARP (see Table 2 for item descriptions and reliabilities). Indices of warmth, routines, and reading and mathematics activities were also constructed by calculating the mean of parent responses for cases in which there were valid data for at least one of the targeted questions. Given that metrics for many of the questions used different scales, item scores within each index were standardized before the creation of composites.

Warmth. The parental warmth index was composed of four questions that asked parents to evaluate statements about the extent to which (*true, mostly true, somewhat true, not at all true*) the child and she/he had warm and close times together, the amount of affection shown to the child, and the extent to which the parent felt that the child liked him or her (see Table 2 for item descriptions and reliabilities).

Family routines. The family routines index was composed of five items which asked parents how many days per week the family ate breakfast together, had breakfast at a regular time, ate the evening meal together, had the evening meal at a regular time, and whether the child had a regular bedtime (*yes/no*) (see Table 2 for item descriptions and reliabilities).

Reading and mathematics activities. The reading and mathematics activities index consisted of seven questions which asked parents about activities such as reading books, telling stories, singing songs, practicing reading and writing numbers with their child, etc. Parents indicated how often in a typical week a family member engaged in the focal activities with the child (*not at all, once or twice a week, three to six times a week, and everyday*) (see Table 2 for item descriptions and reliabilities).

Self-regulation. Self-regulation was assessed with the Approaches to Learning (ATL) scale and the self-control subscale of the Social Skills Rating System (SSRS; Gresham & Elliot, 1990). Scores on these two scales were averaged to create the self-regulation composite score. ATL involves the ability to voluntarily manage attention, behaviors, and emotions in adaptive ways (Li-Grining et al., 2010). Teachers and parents reported how often (*1 = never to 4 = very often*) children kept belongings organized, wanted to learn new things, worked independently, adapted to changes in routine, exhibited persistence, paid attention, and followed rules (Tourangeau et al., 2012). The same ATL items were administered in the fall and spring of kindergarten. Reliability was good (teacher scale $\alpha=.91$ fall, .91 spring;; parent scale, $\alpha = .72$ fall, .70 spring;; Tourangeau et al., 2012).

Parent and teacher-rated self-control scores from the fall of kindergarten were also examined. Mean scores on these items were used to calculate children's self-control scores. Scores range from 1-4, with higher scores indicating that the child exhibited self-control more often (Teacher scale $\alpha=.81$, parent scale, $\alpha=.73$; Tourangeau et al., 2012).

Executive functioning. The mean of children's performance scores on two direct cognitive assessments was used to assess executive functioning. Cognitive assessments in the ECLS-K: 2011 measured cognitive flexibility and working memory. To measure cognitive flexibility, children were administered the Dimensional Change Card Sort (DCCS) (Zelazo, 2006). The DCCS asks children to sort 22 picture cards into one of two trays according to different rules. Each card shows a picture of either a red rabbit or a blue boat. The sorting trays are marked with these pictures as well. Children were first asked to sort the cards by color and then by shape. If the child correctly sorted four of the

six cards by shape, the child moved on to the much more difficult “border game” where a third sorting rule was introduced. Cards with a black border had to be sorted by color. However, if the card did not have a black border, the child had to sort the cards by shape.

Following the DCCS, children were administered the Numbers Reversed task (Mather & Woodcock, 2001). In this task, they were asked to repeat an increasingly long series of orally presented numbers backwards to the interviewer. If children responded incorrectly to several items in a row, the task ended. Spanish-speaking children completed the full executive function assessment in Spanish. In order to retain scoring procedures used in the original administration, children’s standard scores on the DCCS and Numbers Reversed task were averaged to form the composite used in this study. For this reason, reliability coefficients for this composite could not be calculated.

Reading. Children completed a reading assessment focusing primarily on basic reading skills, including print familiarity, letter recognition, beginning and ending sounds, and recognition of common words. The assessment was developed in consultation with child development, education, and content area experts (Tourangeau et al., 2012). Reliability for the reading assessment was .95 in the 2010-2011 year (Tourangeau et al., 2012).

Mathematics. The mathematics assessment measured conceptual knowledge, procedural knowledge, and problem solving. The assessment contained questions relating to number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and patterns, algebra, and functions. Reading and mathematics assessments were measured using IRT-based scores. For this type of score, the reliability of the overall ability estimate, theta, was based on the variance of

repeated estimates of theta for each individual child compared with total sample variance. The mathematics assessment had excellent reliability in the fall ($\alpha=.92$) and spring ($\alpha=.94$) of kindergarten (Tourangeau et al., 2012).

Race/ethnicity. The variable used to identify children's race/ethnicity was a single race/ethnicity composite derived from data collected in the ECLS-K 2011 parent interviews. Parents were asked to classify their child's racial and ethnic group membership. They first were asked to identify whether their child was Hispanic, then to select one or more races for their child. These variables were combined to yield composite race/ethnicity categories of "White, not Hispanic," "Black or African American, not Hispanic," "Hispanic, race specified," "Hispanic, no race specified," "Asian, not Hispanic," "Native Hawaiian or other Pacific Islander, not Hispanic," "American Indian or Alaska Native, not Hispanic," and "more than one race specified, not Hispanic." In the ECLS-K 2011, children are considered Hispanic if a parent indicated that child's ethnicity was Hispanic regardless of whether a race was identified and what that race was.

The following analyses use data for children who fall into four of these categories, labeled "Asian, not Hispanic," "Black or African American, not Hispanic," "Hispanic," and "White, not Hispanic." For the purposes of the current study, these groups will be referred to as "Asian," "Black," "Latino," and "White." At times, race/ethnicity was also used as a covariate.

Covariates. Child gender, child age, non-English language spoken at home, non-parental child-care, fall reading/mathematics scores, and SES may be associated with the variables of interest in this study (Bialystok, 2015; Bialystok, Luk, Peets, & Yang, 2010;

Carlson & Meltzoff, 2008; Dauber, Alexander, & Entwisle, 1993; Diamond, 2013; Hinshaw, 1992; Lee & Burkam, 2002; McCoy & Reynolds, 1999; Stein, Malmberg, Leach, Barnes, Sylva, & the FCCC Team, 2012; Yamauchi & Leigh, 2011). Therefore, they were included as covariates.

Child gender. On average, boys earn lower grades and have greater problems with behavior in the school environment than do girls (Dauber, Alexander, & Entwisle, 1993; McCoy & Reynolds, 1999). These differences are especially pronounced among low-income children (Hinshaw, 1992). Due to the fact that this study involved the examination of relations between child behavior and achievement, it was necessary to control for child gender. The child gender variable used for this study was the gender reported by parents during the fall 2010 parent interview.

Child age. The variable selected to represent child age was child age at assessment. There was significant variability in child age at assessment. Executive functioning and self-regulatory skills develop rapidly during kindergarten (see Diamond, 2013 for review); therefore, it is important to control for children's age.

Non-English language spoken at home. Speaking two or more languages may be positively associated with executive functioning abilities, due to the increased need to code-switch between languages, which requires greater attention, inhibitory control, and cognitive flexibility (Bialystok, 2015; Carlson & Meltzoff, 2008). In contrast, speaking a language other than English at home, when attending a school where English is the instructional language has been associated with lower vocabulary scores in elementary school (Bialystok, Luk, Peets, & Yang, 2010) Thus, analyses controlled for speaking a non-English language at home.

Socioeconomic status (SES). Children from low-income families enter school with lower mean academic skills, and the gap tends to widen as children advance through school (Lee & Burkam, 2002). Poverty may also influence HARP through its association with environmental noise and chaos, which, in turn, are associated with lower school achievement (Hanscombe et al., 2011). Long-term exposure to stressors associated with a low-income environment may place high demands on children's ability to regulate their reactions to stress, which may decrease the efficiency of brain regions associated with self-regulatory skills (Evans, 2003; Ursache, Blair, & Raver, 2012).

According to the ECLS-K manual, the continuous socioeconomic status (SES) variable was computed using household level data from parents' fall 2010 (or spring 2011 interviews if fall data was unavailable; Torangeau et al., 2013). Five components were used to create the SES variable: the parent or guardian's education level, secondary caregiver's education level, the primary caregiver's occupational prestige score, the secondary caregiver's occupational prestige score, and household income. The vast majority of parents' education data were collected in fall of 2010. Education information was collected in spring of 2011 only for those who were fall 2010 non-respondents. Parent's occupation data were collected in fall of 2010. Household income data were collected in spring of 2011. Parents were asked to report household income to the nearest \$1,000 (exact income) and by a broad range (\$25,000 or less or more than \$25,000). Not all parents provided complete information on all parts of the SES composite. In the ECLS-K 2011, missing values were imputed for the SES components before computing the SES composite.

Non-parental child care. Research shows that non-parental child care has a small but significant association with child development (Stein et al., 2012; Yamauchi & Leigh, 2011). Some studies show that children who spend more time in non-parental child care have more behavioral problems, especially hyperactivity (NICHD ECCRN, 2003; Stein et al., 2012; Yamauchi & Leigh, 2011). For example, a study by the National Institute of Child Health and Human Development, Early Child Care Research Network (2003) examined the relations between time spent in non-maternal care and children's problem behavior, finding that the more time children spent in child care in the first 4.5 years of life, the more externalizing behavior and conflict with adults they presented in kindergarten. Others have found that non-parental child care is not related to behavioral issues and is positively associated with improved cognitive skills (NICHD ECCRN, 1998). Thus, non-parental child care may influence self-regulation, executive functioning, and academic outcomes. As such, analyses also controlled for the whether or not children received non-parental child care prior to or during kindergarten.

Table 2.

HARP Items and Components ($\alpha = .70$)

Component (α)	Item
<i>Warmth</i> ($\alpha = .68$)	Child and I have warm, close times together
	Child likes me
	Always show child love
	Express affection
<i>Routines</i> ($\alpha = .55$)	# Days eat breakfast together
	# Days child eats breakfast at regular time
	# Days eat dinner together
	# Days eat dinner regular time
	Child has regular bedtime
<i>Reading and Mathematics Activities</i> ($\alpha = .71$)	Frequency read outside of school
	Frequency look at picture books outside school
	Frequency read outside of school
	How often reads picture books
	How often you all sing songs
	How often you tell stories
	Read books to child
	How often practice reading and writing numbers

Procedure

Children's mathematics and reading skills were individually assessed in the spring of kindergarten in their schools. Children were initially given a 20-item routing test to determine the appropriate difficulty level of assessments to follow. Teachers completed self-administered questionnaires during the spring of kindergarten to evaluate child approaches to learning and self-control. Parents were interviewed concerning the home environment, as well as child approaches to learning and self-control, typically over the phone but in some cases in person, in the fall and spring of the children's kindergarten year. Child executive functioning was assessed directly using the DCCS and Numbers Reversed tasks in the fall and spring of kindergarten.

Data Analysis

Approximately 14,080 cases were suitable for inclusion in the analysis. An alpha level of .05 was used to test for significance. In order to adjust for nonresponse bias, sampling weights were applied to the data. Specifically, student level weight W12P0 was used to adjust for nonresponses associated with either fall or spring kindergarten parent interviews.

Preliminary analyses. The assumption of normality was explored in this data set using regression diagnostics. Bivariate associations were conducted to check for multicollinearity and to examine relations between variables, as multicollinearity might be problematic in regression and mediation analyses. If multicollinearity appeared, some variables may have been removed from the final mediation and ANCOVA analyses.

Primary analyses. A series of multiple mediation models and one-way analyses of covariance (ANCOVAs) were conducted to explore the relations between key variables and differences in key variables across ethnic groups.

Aim 1. *Evaluate the extent to which self-regulation and executive functioning mediate the relation between HARP and children's reading and mathematics scores in kindergarten when controlling for the effects of race/ethnicity, child gender, child age, SES, speaking a non-English language at home, and having non-parental care.*

Hypothesis 1. *Both self-regulation and executive functioning will mediate the relation between HARP and kindergarteners' reading and mathematics skills.* Two parallel multiple mediator models (Preacher & Hayes, 2008) were tested to determine whether the effect of HARP on reading and mathematics was mediated by self-regulation and executive functioning (see Figure 1). Analyses were conducted using SPSS version

22.0 (IBM Corp., 2013) and PROCESS macro for SPSS (Hayes, 2013). Indirect effect testing was conducted using bias corrected bootstrap confidence intervals in PROCESS (Hayes, 2013).

***Aim 2.** Explore mean levels of HARP components (e.g. warmth, routines, reading and mathematics activities) across Asian, Black, Latino, and White families in order to gain greater understanding of the home environments of U.S. kindergarteners.*

***Hypothesis 2.** White and families will report higher levels of reading and mathematics activities at home. A series of ANCOVA's were conducted to determine whether mean levels of overall HARP and HARP components varied between Asian, Black, Latino, and White racial/ethnic groups, controlling for socioeconomic status, child gender, child age, non-parental child care, non-English language spoken at home, and fall reading/mathematics scores.*

***Aim 3.** Investigate whether self-regulation and executive functioning, respectively, mediate the relation between HARP and children's reading and mathematics scores in each racial/ethnic group.*

***Hypothesis 3.** Self-regulation and executive functioning would mediate the relation between parenting and reading and mathematics skills in Asian, Black, Latino, and White children. Four parallel multiple mediator models were tested, wherein, self-regulation and executive functioning mediated the relation between HARP and children's reading and mathematics scores, controlling for socioeconomic status, child gender, child age, non-parental child care, non-English language spoken at home, and fall reading/mathematics scores.*

CHAPTER 3 RESULTS

Preliminary Analyses

Examinations of normality plots revealed that all data were approximately normal. Examination of diagnostic test statistics showed that all skewness and kurtosis statistics were in the acceptable range of skewness less than three and kurtosis less than seven (West, Finch, & Curran, 1995). Variance inflation factors were calculated to check for multicollinearity. Kutner, Nachtsheim, & Neter (2004) have proposed the cut-off of 10 for acceptable variance inflation factor (VIF) estimates. None of the independent variables obtained VIF's greater than 10;; therefore, no multicollinearity issues were indicated. Basic descriptive data for and correlations between key variables are presented below in Tables 3 and 4.

The ECLS-K publication guidelines prohibit the printing of degrees of freedom and require that all sample size estimates be rounded to the nearest ten to protect confidentiality of data. The results shared below reflect these requirements.

Table 3.

Descriptive Statistics for Key Variables

	<i>N</i>	Range	Min	Max	<i>M</i>	<i>SD</i>
Child Age at Spring Assessment	13,740	43.80	45.47	89.27	68.14	4.23
Fall Reading IRT Score	13,640	76.348	6.235	82.583	34.554	11.798
Fall Math IRT Score	13,590	69.575	5.333	74.908	29.250	10.784
Spring Reading IRT Score	13,440	74.515	5.882	80.397	49.353	11.778
Spring Math IRT Score	13,410	67.753	5.331	73.084	41.987	11.110
HARP	12,780	4.850	-2.630	2.220	-0.006	0.470
Warmth	10,120	6.260	-5.800	0.450	0.001	0.710
Routines	10,530	3.730	-2.930	0.810	0.008	0.594
Reading and Mathematics Activities	11,850	3.720	-2.790	0.920	0.001	0.637
Self-Regulation	14,070	5.030	-3.100	1.930	-0.017	0.684
Executive Functioning	13,890	11.740	-1.830	9.920	-0.003	0.318

Note. Indices of HARP, Warmth, Routines, Reading and Mathematics Activities, Self-Regulation, Executive Functioning were standardized.

Table 4.

Pearson Correlations between Key Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(11)	(12)	(13)
(1) HARP	1											
(2) Child Age	.007	1										
(3) Child Sex	.100**	-.075**	1									
(4) Non-English Language	.047**	.031**	-.019	1								
(5) Child Ethnicity	-.193**	-.140**	.019	-.194**	1							
(6) SES	.199**	.005	.003	-.015	-.121**	1						
(7) Non-parental Child Care	-.055**	-.030**	.002	.019	.015	.013	1					
(8) Fall Reading	.175**	.167**	.066**	-.014	-.034**	.382**	.005	1				
(9) Fall Math	.148**	.252**	-.011	-.010	-.099**	.394**	.015	.768**	1			
(10) Self-Regulation	.267**	.090**	.232**	-.014	-.057**	.189**	-.048**	.326**	.343**	1		
(11) Executive Functioning	.155**	.004	.083**	.007	-.156**	.307**	.010	.501**	.587**	.293**	1	
(12) Spring Reading	.185**	.175**	.091**	-.023*	-.050**	.337**	.003	.798**	.707**	.371**	.535**	1
(13) Spring Math	.152**	.240**	-.001	-.008	-.116**	.363**	.006	.664**	.814**	.378**	.619**	.742**

Note. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). Listwise $N = 9,930$

Primary Analyses

Self-regulation and executive functioning as mediators. The first aim of the present study was to evaluate whether self-regulation and executive functioning mediate the relation between HARP and children's mathematics and reading scores. I hypothesized that both self-regulation and executive functioning would significantly mediate the relation. To test this hypothesis, two parallel multiple mediator models were run using PROCESS macro for SPSS (Hayes, 2013). The results of the mediation analyses, which are discussed below, support my hypothesis.

For children's reading scores, HARP significantly predicted parent and teacher reported self-regulation ($b = 0.27, t = 20.43, p < .001$) and children's scores on executive functioning assessments ($b = 0.04, t = 3.13, p = .002$) after controlling for socioeconomic status, child gender, child age, non-parental care, non-English language spoken at home, fall reading scores, and race/ethnicity.

In addition, self-regulation ($b = 1.68, t = 14.24, p < .001$) and executive functioning scores significantly predicted children's spring reading scores ($b = 3.18, t = 24.96, p < .001$) after controlling for the variables mentioned above. HARP directly predicted spring reading scores ($b = 0.46, t = 2.93, p = .003$) and indirectly predicted them through self-regulation ($ab = 0.46, 95\% \text{ CI: } 0.38, 0.53$) and executive functioning ($ab = 0.12, 95\% \text{ CI: } 0.05, 0.21$). PROCESS macro for SPSS automatically generates contrast estimates of the difference in magnitude between mediation effects using 1000 samples for bias corrected bootstrap 95% confidence intervals (Hayes, 2013). Comparisons of indirect effects showed that self-regulation was a significantly stronger mediator than executive functioning ($ab = 0.33, 95\% \text{ CI: } 0.22, 0.45$).

For mathematics, HARP significantly predicted parent and teacher reported self-regulation ($b = 0.27, t = 20.90, p < .001$) and children's scores on executive functioning assessments ($b = 0.04, t = 3.48, p < .001$) after controlling for socioeconomic status, child gender, child age, non-parental care, non-English language spoken at home, fall mathematics scores, and race/ethnicity. In addition, self-regulation ($b = 1.69, t = 15.74, p < .001$) and executive functioning scores significantly predicted children's spring mathematics scores ($b = 3.87, t = 31.15, p < .001$) after controlling for the variables mentioned above. HARP was not a significant direct predictor of mathematics scores ($b = -0.10, t = -0.67, p = .502$). However, HARP did indirectly predict spring mathematics scores through self-regulation ($ab = 0.46, 95\% \text{ CI: } 0.39, 0.53$) and executive functioning ($ab = 0.15, 95\% \text{ CI: } 0.06, 0.24$). Similarly to the model predicting reading scores, comparisons of indirect effects showed that self-regulation was a significantly stronger mediator of the relation between HARP and mathematics than executive functioning ($ab = 0.31, 95\% \text{ CI: } 0.19, 0.43$).

Racial/ethnic differences in HARP. The second aim of the present study was to explore mean levels of HARP and its components across racial/ethnic groups. To explore this aim, five ANCOVA's were conducted in order to compare levels of overall HARP, warmth, routines, and mathematics and reading activities across racial/ethnic groups. The Bonferroni correction for multiple comparisons was used when interpreting p values. As discussed below, there was significant variability in levels of HARP, and its components, across ethnic groups. The means presented below represent estimated marginal means evaluated at mean levels of covariates.

I will first discuss racial/ethnic differences in the composite of parenting practices (HARP). Then I will describe variations in components of HARP. There was a significant effect of race/ethnicity on levels of HARP, after controlling for SES, child gender, child age, non-

English language spoken at home, and non-parental child care, $F = 62.60$, $p < .001$. Planned contrasts revealed that White parents ($M = 0.092$, $SE = 0.008$) engaged in HARP practices significantly more than Black ($M = -0.003$, $SE = 0.014$), Latino ($M = -0.057$, $SE = 0.019$), and Asian parents ($M = -0.117$, $SE = 0.018$), $p < .001$. In addition, Black parents engaged in significantly more HARP practices than Asian parents ($p < .001$). Race/ethnicity accounted for 2.6% of unique variance in HARP ($\Delta R^2 = .026$).

Warmth. There was a significant effect of race/ethnicity on levels of parental warmth, after controlling for SES, child gender, child age, non-English language spoken at home, and non-parental child care, $F = 19.40$, $p < .001$. Planned contrasts revealed that Black parents ($M = 0.101$, $SE = 0.021$) reported significantly more warmth than White ($M = 0.042$, $SE = 0.011$) ($p = .020$), Latino ($M = -0.036$, $SE = 0.017$), and Asian parents ($M = -0.135$, $SE = 0.033$). The differences in warmth between each ethnic group were statistically significant ($p < .05$). Race/ethnicity accounted for 0.6% of unique variance in parent-reported warmth ($\Delta R^2 = .006$).

Routines. There was a significant effect of race/ethnicity on frequency with which families reported daily routines, after controlling for SES, child gender, child age, non-English language spoken at home, and non-parental child care, $F = 43.39$, $p < .001$. White parents ($M = 0.098$, $SE = 0.015$) had significantly more routines than Latino ($M = -0.045$, $SE = 0.022$), Asian ($M = -0.074$, $SE = 0.024$), and Black parents ($M = -0.149$, $SE = 0.022$, $p < .001$). In addition, Latino parents reported significantly more routines than Black parents ($p = .004$). Race/ethnicity accounted for 2.2% of unique variance in parent-reported routines ($\Delta R^2 = .022$).

Reading and mathematics. I hypothesized that White parents would report higher levels of reading and mathematics at home than parents of other ethnic groups. This hypothesis was supported, as White and Black parents reported the highest levels of mathematics and reading

activities. There was a significant effect of race/ethnicity on levels of reading and mathematics activities, after controlling for SES, child gender, child age, non-English language spoken at home, and non-parental child care, $F = 28.51$, $p < .001$. White ($M = 0.100$, $SE = 0.010$) and Black parents ($M = 0.088$, $SE = 0.022$) reported that their children engaged in reading and mathematics activities with similar frequency, and significantly more than Latino ($M = -0.082$, $SE = 0.029$) and Asian ($M = -0.120$, $SE = 0.031$) parents, $p < .001$. Latino and Asian parents did not differ significantly in levels of reading and mathematics activities in the home ($p > .05$). Race/ethnicity accounted for 1.6% of unique variance in parent-reported home-based reading and mathematics activities ($\Delta R^2 = .016$).

Self-regulation and executive functioning as mediators across ethnic groups. The third and final aim of the present study was to explore whether self-regulation and executive functioning mediate the relation between HARP and children's reading and mathematics scores in Asian, Black, Latino, and White families. It was hypothesized that self-regulation and executive functioning would mediate the relation between parenting and reading and mathematics skills in all four groups of children. The results partially support my hypothesis, showing that self-regulation functions as a mediator in all racial/ethnic groups (see Table 5). However, executive functioning was only a significant mediator of the relation between HARP and reading and mathematics for Latino children.

There were significant indirect effects of HARP on children's mathematics and reading scores through self-regulation, controlling for SES, child age, child sex, fall reading/mathematics scores, non-English language spoken at home, and non-parental child care in all racial/ethnic groups. Thus, the pattern of mediation was similar across groups for self-regulation. However,

executive functioning was only a significant mediator of the relation between HARP and reading and mathematics for Latino children (see Table 5).

Table 5.

Indirect Effects of HARP Through SR and EF Across Ethnic Groups

	Ethnicity	<i>n</i>	<i>ab</i>	SE	LLCI	ULCI
HARP $\rightarrow$ SR $\rightarrow$ Reading	Asian	730	0.31	0.15	0.05	0.66
	Black	1,210	0.44	0.12	0.26	0.72
	Latino	2,000	0.45	0.08	0.30	0.63
	White	6,020	0.51	0.05	0.40	0.63
HARP $\rightarrow$ EF $\rightarrow$ Reading	Asian	730	-0.03	0.16	-0.35	0.30
	Black	1,210	0.13	0.09	-0.03	0.34
	Latino	2,000	0.27	0.10	0.08	0.48
	White	6,020	0.05	0.05	-0.05	0.15
HARP $\rightarrow$ SR $\rightarrow$ Mathematics	Asian	730	0.24	0.12	0.05	0.53
	Black	1,210	0.37	0.10	0.21	0.60
	Latino	2,000	0.46	0.08	0.32	0.66
	White	6,010	0.52	0.05	0.43	0.63
HARP $\rightarrow$ EF $\rightarrow$ Mathematics	Asian	730	-0.13	0.14	-0.44	0.12
	Black	1,210	0.17	0.12	-0.01	0.41
	Latino	2,000	0.28	0.11	0.07	0.51
	White	6,010	0.10	0.06	-0.02	0.21

CHAPTER 4 DISCUSSION

The primary goal of the current study was to investigate the extent to which self-regulation and executive functioning mediated the relation between a composite of parent behaviors related to academic and regulatory outcomes (HARP) and children's math and reading scores in kindergarten, controlling for race/ethnicity and other demographic variables. Results showed that both self-regulation and executive functioning significantly mediated the relation between HARP and children's math and reading scores. In order to support the first research question, two secondary research questions investigated (1) the extent to which parent behaviors used to form the composite (HARP) varied by race/ethnicity, and (2) whether the mediating effects found in the first set of analyses could be replicated when examined separately in each racial/ethnic group. Results showed that HARP, and the parenting components that comprised it, varied significantly by race/ethnicity. However, self-regulation remained a significant mediator of the relation between HARP and children's math and reading scores across racial/ethnic groups.

SR & EF Mediate the Relation between HARP and Children's Math and Reading

This study makes an important contribution to the literature by showing that both self-regulation and executive functioning are significant mediators of the relation between parents' home based practices and children's mathematics and reading scores in kindergarten, after controlling for socioeconomic status, child gender, child age, non-parental care, non-English language spoken at home, fall reading scores, and race/ethnicity. These findings support the assumption that parenting is related to the development of children's self-regulation (Hofer, 1994; Kopp, 1982). More experimental research is needed to show causal effects. However, this finding suggests parents do not just influence children's academic outcomes directly by

increasing mathematics or reading skills. The things that parents do at home, such as providing warmth, routines, and mathematics and reading activities, are associated with children's self-regulation and executive functioning. And, through their relation with self-regulation and executive functioning, HARP practices influence children's mathematics and reading.

To my knowledge, no other studies have examined the respective mediating effects of executive functioning and self-regulation on the relation between parents' home based practices and children's reading and mathematics. The mediation analysis in this study was conducted using PROCESS macro for SPSS, which allows researchers to estimate comparisons of the magnitudes of indirect effects using bootstrap confidence intervals (Hayes, 2013). Comparisons of indirect effects showed that self-regulation was a significantly stronger mediator than executive functioning. This finding is difficult to interpret because very little is known about the antecedents of child executive functioning, aside from intrinsic factors like general cognitive functioning (e.g. Carlson et al., 2008; Hughes & Ensor, 2009). The difference in magnitude could be due to the fact that characteristics such as self-control and appropriate classroom behavior (self-regulation) are more emphasized by parents during early childhood than things that might be related to executive functioning such as complex problem solving. However, it may suggest that parents can influence behavioral self-regulation more easily than executive functioning.

Racial/Ethnic Differences in HARP

As the United States has become more diverse, researchers have called for studies of parenting and academic achievement to consider whether the practices and processes that we assume to be true for White middle-income children generalize to children who come from other ethnic and cultural backgrounds (e.g. Chao, 1994; Deater-Deckard, Dodge, Bates, & Pettit, 1996;

Steinberg, Dornbusch, & Brown, 1992). This study attempted to investigate whether home-based academic and regulatory practices (HARP) varied by race/ethnicity and whether the patterns of mediation discussed above were similar in Asian, Black, Latino, and White samples. The results show significant variability in levels of HARP across ethnic groups. White parents reportedly engaged in HARP practices significantly more than Black, Latino, and Asian parents, in that order. Black parents reportedly engaged in significantly more HARP practices than Asian parents. When individual HARP factors were examined, it became apparent that White parents reported relatively high levels of warmth, routines, and math and reading activities compared to parents of other race/ethnicities.

Parental warmth has been consistently associated with children's self-regulation and academic outcomes in Western cultures (Chen, Liu, & Li, 2000; Eisenberg, Cumberland, & Spinrad, 1998; Jennings et al., 2008). However, numerous studies have documented cultural differences in the amount of warmth and positive emotion that parents show to their children (Camras, Chen, Bakeman, Norris, & Cain, 2006; Ng, Pomerantz, & Lam, 2007). Some parents in this study reported more warmth than others. Black parents reported significantly more warmth than White, Latino, and Asian parents, in that order, and all ethnic groups significantly differed from each other. The fact that Black and White parents had the highest levels of warmth may suggest this study used a highly American or individualistic conception of warmth. In Asian and Latino populations, which often have higher concentrations of immigrants, parent-reported warmth was significantly lower. In an observational study of mother-toddler relationships, Ispa et al (2004) found that less acculturated Mexican American mothers show significantly less warmth than White mothers and more acculturated Mexican American mothers. Thus, there is some evidence that variations in warmth may be related to acculturation.

It is not surprising that Asian parents showed relatively low levels of warmth on this particular measure. The measure of warmth addressed the extent to which parents felt closeness and affection for children and the extent to which they displayed warmth through hugging, kissing, etc. Past studies have shown significant differences in parental warmth between Eastern and Western cultures. For example, Camras, Kolmodin, & Chen (2008) and Huntsinger & Jose (2009) both found that Chinese American mothers reported showing their children less warmth than European American mothers.

Many researchers have posited that these variations are due to differences in perceptions and practices of parental warmth in Asian (particularly Chinese) and European American cultures (Cheah, Li, Zhou, Yamamoto, & Leung, 2015; Wang & Chang, 2008). A recent study by Cheah and colleagues (2015) found that although White and Chinese immigrant mother's perceived expressing warmth to be similarly important, Chinese immigrant mothers reported expressing less warmth toward their children. In addition, they found that Chinese mothers thought of warm interactions as those in which they cared for children's fundamental needs, whereas European Americans expressed warmth through affection. These findings are consistent with the traditional Chinese cultural emphasis on interdependence between parents and children (Kagitcibasi, 2005) and providing children with constant care (Wu & Chao, 2005). Thus, more culturally sensitive measures of warmth may be needed to address this construct with Asian participants. At this time, however, no measures of warmth have been published that accurately represent maternal warmth in Asian and, in particular, Chinese immigrant, samples (Cheah et al., 2015).

Black parents in this study were shown to be particularly warm compared to other ethnic groups. This finding is at odds with other studies that have documented racial/ethnic differences

in maternal warmth and the amount of negative emotion (negative regard) shown towards children, with Black mothers being slightly less warm and more negative during caregiving interactions than White parents (Berlin, Brady-Smith, & Brooks-Gunn, 2002). This divergence from past findings may be due to the use of parent-report measures over observations of parent-child interactions. One recent study shows that parent's self-reported positive expressivity is not correlated with their observed positive affect (Chen et al., 2015). This finding may also reflect a change from past studies, which treated warmth control and physical punishment as part of the same scale (e.g. Greenberger & Chen, 1996). Black parent often report authoritarian practices in which they are simultaneously warm and controlling (Brody & Flor, 1998; Young, 1974). This study confirms that Black parents in the U.S. perceive themselves as being very warm towards their children.

Family routines are positively related to children's academic achievement and early cognitive ability (Brody & Flor, 1997; Budescu & Taylor, 2013; Ferretti & Bub, 2014; Fiese, 2002; Fiese, Eckert, & Spagnola, 2005; Seaton & Taylor, 2003; Taylor & Lopez, 2005). They are also associated with cooperation and compliance in preschoolers (Keltner, 1990) and overall self-regulatory skills (Kopp, 1982). Thus, having family routines may be an important aspect of preparing children for school. However, prior to this study no research investigated the extent to which parents in the four main ethnic groups in the U.S. reportedly engaged in mealtime and bedtime routines. Results of the current study showed that White parents reported significantly higher levels of family routines than Latino, Asian, and Black parents. In addition, Latino parents reported significantly higher levels of family routines than Black parents. This finding is interesting because prior studies have only examined family routines in Black and White families and have not compared routines across other races/ethnicities. Due to the high value placed on

family meals and regular bedtimes in White middle-income communities (Fulkerson, Neumark-Sztainer, & Story, 2006). It is not surprising that White parents reported the highest levels of family routines. In addition, the measure of routines used in this study only included bedtime and mealtime routines. Other forms of family routines that were not represented in the ECLS-K may be relevant for children's self-regulation. For example, families may have specific reading routines or attend certain community or religious events together (Serpell, Sonnenschein, Baker, & Ganapathy, 2002). Black parents reported the lowest levels of regular family meal and bedtime routines. This signals that these routines may not be a natural part of daily life for most Black families. As such, more research is needed to find routines that do occur in Black homes and how more routines can be fostered.

Research shows that children who are exposed to more reading and mathematics activities at home often have higher standardized test scores (Blevins-Knabe & Musun-Miller, 1996; Kleemans, Peeters, Segers, & Verhoeven, 2012; Kleemans, Segers, & Verhoeven, 2011; Lefevre et al., 2009; Griffin & Morrison, 1997; Payne et al., 1994; Sénéchal, 2011) and higher levels of self regulation and executive functioning (Blair & Razza, 2007; Bull & Scerif, 2001; Bull et al., 2008; Li-Grining et al, 2010; McClelland et al., 2007). Somewhat consistent with the results of similar studies, White and Black parents reported the highest levels of mathematics and reading activities at home, when controlling for socioeconomic status and other demographic variables (Sonnenschein et al., 2012). Previous research has suggested that Black families have fewer reading materials at home and are less likely to read to their children than White families of comparable socioeconomic status (Bradley et al., 2001). According to this study, Black families are no different from White families in their self-reported home based mathematics and reading activities.

Past research shows that doing reading and mathematics activities with children at home is more likely to be a part of White families' home based practices than that of Asian, Black, and Latino families (Bradley et al., 2001; Brooks-Gunn & Markman, 2005; Cheadle, 2005; Cheadle & Amato, 2007; Sonnenschein & Galindo, 2015, Sonnenschein et al., 2012). However, it is surprising that Asian parents reported doing reading and mathematics activities significantly less than all other ethnic groups, as they are typically seen as a group that highly values academic achievement (Zhou & Lee, 2014). Research shows that many Asian immigrant parents have high expectations for their children's academic achievement (Zhou & Kim, 2006;; Zhou & Lee, 2014). Sonnenschein and colleagues (2012) compared math related beliefs and practices of Chinese and White families. They found that although there was a significant difference in parent ratings between Chinese and White parents, the majority of both groups (over 75%) reported that doing math activities at home was important or very important.

Great care should be taken in interpreting these findings, as past data suggests that many Asian parents, especially those of Chinese decent, engage in concerted cultivation, which includes both academic and non-academic activities (Cheadle, 2008; Laureau, 2003). Asian parents may be working with their children on music or other academically relevant activities at home, which were not included in this study. Another explanation for the finding that Asian parents were least likely to engage in math and reading at home is that these kinds of activities typically take place outside the home. Many Asian immigrant communities have developed elaborate systems of supplementary education including tutoring services, enrichment programs, and other private after school services to help their children advance their education (Zhou & Kim, 2006; Zhou & Lee, 2014). These kinds of activities were not measured in the current

study because they did not directly involve parents. Thus, parents may still be fostering reading and mathematics engagement by sending their children to related activities outside of the home.

Self-Regulation is a Significant Mediator in All Racial/Ethnic Groups

The final aim of the present study was to explore whether self-regulation and executive functioning mediated the relation between HARP and children's reading and mathematics scores in Asian, Black, Latino, and White families. It was hypothesized that self-regulation and executive functioning would mediate the relation between HARP and reading and mathematics skills in Asian, Black, Latino, and White children. The results partially support my hypothesis, showing that self-regulation functions as a mediator in all racial/ethnic groups. However, executive functioning was only a significant mediator of the relation between HARP and reading and mathematics for Latino children.

In terms of reading, self-regulation was a partial mediator of the relation between HARP and children's reading scores in Asian, Black, White, and Latino families. In other words, HARP had a direct effect on children's reading, as well as an indirect effect on children's reading, through self-regulation. When parents are reading to children, singing, and helping them with number and letter activities, they are constantly communicating through spoken and written language. So, it is not surprising that higher levels of HARP were associated with children's reading scores, as well as, their self-regulation.

In terms of mathematics, self-regulation fully mediated the relation between HARP and children's mathematics scores in Asian, Black, White and Latino families. The measure of reading and mathematics activities in this study included only one option for endorsing mathematics activities at home. Thus, it is not surprising that HARP was not directly related to mathematics. Instead, there was a significant mediating effect of self-regulation. Although the

analyses in this study were correlational, this finding might suggest that parents can foster mathematics skills in children through helping them develop better self-regulatory skills, which help them learn both at home and at school.

Perhaps the most surprising finding in the current study is that executive functioning only played a significant mediating role in the relation between HARP and children's reading and mathematics scores for Latino families. It is unclear why executive functioning would play a mediating role only for Latino families. No other studies suggest that the role of executive functioning in learning should vary between racial/ethnic groups. Before drawing conclusions about this finding, it is important to note that the magnitude of the indirect effects was small ($ab = 0.27$ to 0.28). In a sizable sample like the one used in this study, it is common for some findings to be statistically significant, but not meaningful.

Limitations

The current study has three notable limitations that may constrain its generalizability. The first limitation is the use of parent and teacher report data as a measure of child self-regulation. Having a direct observation of child self-regulation would strengthen the construct validity of child self-regulation as addressed in this study. The second limitation is the use of secondary data analysis. Although using a large pre-collected dataset allows for a large number of participants and a representative sample, it does not allow for the addition of questions to fit specific hypotheses. One example of this issue is the availability of only one measure of home mathematics activities in the current study. Another limitation related to the use of pre-collected data was the inability to study within group racial differences related to culture. The current study treated all Asian, Black, Latino, and White families as homogeneous groups and excluded children of more than one race/ethnicity. Important within group variations

exist, but there was not sufficient information related to culture in the ECLS-K 2011 to make comparisons within groups. In addition, some of the reliability coefficients for indices of HARP and executive functioning are below current recommendations for scale construction. Although, this may be seen as a methodological weakness, I felt it was important to adhere to the theoretical underpinnings of this study rather than remove items in order to seek greater reliability coefficients. It makes sense that many of the constructs that were included in specific indices do not hang together particularly well. Theoretically, global measures of parents' home-based practices may contain indicators that are unrelated, as they represent many different facets of the home-environment. In the case of HARP and its components, other studies using parenting indicators from the ECLS-K have constructed indices with reliability coefficients in the .50 range (Raver et al., 2007).

Another important consideration is that the mediation model in this study was not entirely longitudinal in nature and therefore relatively weak. The data for the independent variable (HARP) was collected very close to the time that the mediators (executive functioning and self-regulation) were assessed. More longitudinal studies are needed to support the finding that parents' home-based practices are related to children's math and reading scores through their relations with self-regulation and executive functioning.

Finally, some of the measures used in the ECLS-K may not be representative of all families from non-White backgrounds. In particular, the measure of warmth and the measures that comprised the self-regulation could be interpreted as measures of White middle-income cultural capital. For example, Asian parents may have scored lower than White parents on measures of warmth, not because they were cold or distant from their children, but because they express warmth differently. Recent research shows that Asian parents may show warmth

through the provision of physical necessities like food and clothing rather than through hugging, kissing, and showing positive affect (Cheah et al., 2015). In addition, the measure of self-regulation used in this study partly measures appropriate classroom behavior, which may reflect White middle-class cultural capital (Bourdieu, 1986). However, these measures are still useful for children of all race/ethnicities because they represent views of the dominant White middle-income culture which are, unfortunately, most valued in many U.S. public schools.

Implications

One way to improve children's self-regulation may be to increase HARP at home. As these results show, the frequency with which parents engaged in various components of HARP differed significantly across racial/ethnic groups. For example, in this study Asian and Latino parents were less likely to report parental warmth towards children than Black and White parents. This shows that the conception of warmth used in this study may not be a natural part of the home environment for families of all race/ethnicities. Therefore, efforts to improve HARP should be tailored to relevant strengths of different racial/ethnic groups.

Despite differences in specific aspects of HARP across racial/ethnic groups, self-regulation significantly mediated the relation between overall HARP and children's reading and mathematics scores in kindergarten for all groups. This suggests that HARP does not just directly affect children's academic outcomes. Rather, by engaging in HARP, parents may also shape children's ability to control their thoughts, emotions, and behaviors in order to function in a school setting, which in turn, is associated with their acquisition of reading and mathematics skills. The knowledge that self-regulation functions as a mediator in the relation between HARP and children's reading and mathematics scores is important because researchers (Diamond & Lee, 2011; Li-Grining, 2012) have suggested that improving children's self-regulation may be an

effective way to decrease achievement gaps in the U.S. By encouraging parents to engage in specific HARP practices that align with their culture, researchers, teachers, and policymakers can help children acquire the skills necessary to achieve in school.

Conclusion

In conclusion, the current study makes a significant contribution to the literature on school readiness and parenting by showing that the association between a composite of home-based academic and regulatory practices and children's math and reading scores in kindergarten was partially mediated by both self-regulation and executive functioning, when controlling for race/ethnicity, SES and other demographic variables. This has important implications for the way parents and early child care providers prepare children for school. Instead of focusing only on how activities can benefit children academically, researchers and practitioners need to emphasize the importance of fostering self-regulation.

In addition, the current study shows that parent behaviors generally associated with self-regulation, executive functioning, and children's academic outcomes may differ based on race/ethnicity. Asian, Black, Latino and White families differed significantly in terms of warmth, family routines, and reading and mathematics activities. These variations may show that current measures of home-practices included in national datasets may not be capturing the same constructs across race/ethnicities. For example, Black and White parents were shown to report higher levels of warmth (having warm and close times, hugging, kissing, showing affection, and showing love) than Latino and Asian parents. Research shows that parents from collectivist cultures (particularly Chinese immigrant parents) may think of warmth as providing instrumental assistance and fulfilling basic needs like food and clothing rather than positive expressivity etc. (Cheah et al., 2015). This study makes an important first step in examining

home-based practices related to self-regulation and academics. But more sensitive measures are needed to adequately describe the practices of families from all cultural backgrounds.

Finally, although the current study revealed differences in home-based practices, self-regulation was revealed as a significant mediator of the relation between home-based academic and regulatory practices and children's reading and mathematics scores in kindergarten in all racial/ethnic groups. Thus, warmth, family routines, and reading and mathematics activities are associated with both self-regulation and academic achievement across race/ethnicities. Future research should continue to examine the role of self-regulation in the relation between parenting and academic achievement.

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