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A Longitudinal Examination of the Association between Contextual Stress, Parenting, and School Readiness

A Dissertation

Submitted to the Graduate Faculty of the
University of New Orleans
in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy
In
Applied Psychology
Applied Developmental Psychology

by

Jessica M. Grande

B.A., Loyola University New Orleans, 2009
M.S., University of New Orleans, 2015

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Dedication

For my wonderful husband Jorge,

Thank you for your endless love, support, and encouragement to follow my dreams. I could not have made it this far without you;

For my children Tomas and Adrian,

Y'all are the best study buddies. Thank you for helping me put things in perspective and blessing me with the best tittle of all…Mami.

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Abstract

Contextual stress has been associated with poor school readiness skills during early childhood. This study evaluated mechanisms by which parent's exposure to poverty-related contextual stressors influence the acquisition of school readiness skills from child age 2 to 4 among 167 parent-child dyads. Parent report of contextual stress and observational measures of parenting quality were collected during the children's 2-year-old assessment. Teacher reports and children's scores on school readiness tasks were collected during the 4-year-old assessment. Two approaches were used to understand the process by which contextual stressors influences school readiness; the accumulation of stressors approach and the constellations of stressors approach. Using the accumulation of stressors approach, each indicator of contextual stress was identified as a stressor or non-stressor and the number of categories in which families experienced a stressor were summed. Results from separate structural equation models (SEM) indicated that the accumulation of stressors did not influence school readiness skills by way of positive parenting. The constellation of stressors approach considered how clusters of stressors may differentially impact children's school readiness. Results of the Latent Class Analysis (LCA) revealed the presence of two risk profile groups that differed qualitatively, indicating that not all stressors are equal; the "low-stressor" group and the "multi-stressor" group. The multi-stressor group represented thirty-three percent of families (n= 55). When considering the influence of the multi-stressor group probability to each of the school readiness indicators, none of the path coefficients were statistically significant. Implications for research and intervention are discussed.

Keywords: contextual stress, positive parenting, school readiness, early childhood

A Longitudinal Examination of the Association between Contextual Stress, Parenting, and School Readiness

Experiences during early childhood provide the foundation for children to develop skills needed to successfully transition into kindergarten. School readiness skills are the skills children need to successfully transition into kindergarten. The National School Readiness Indicators Initiative (2005) identified five general domains of school readiness, which include: physical well-being and motor development (e.g., gross and fine motor skills), readiness to learn (e.g., enthusiasm, curiosity, creativity, cooperativeness, and persistence on tasks), executive functions (e.g., problem solving, abstract thought), language development (e.g., receptive and expressive language skills) and social and emotional development. Skills in each domain are linked such that skills in one domain will build and support skills in other domains. For instance, following school rules requires receptive language abilities as well as the ability to inhibit play behaviors during focused learning times (e.g., executive function; Blair, 2016; Diamond, 2013; Verbruggen & Logan, 2009; Zelazo, 2015). Children with emerging competence in each of the five school readiness domains are able, from the first day of kindergarten, to meet the social, cognitive, and attentional demands required for school success.

While all five domains of school readiness are important, three domains are essential: executive functions, language, and social-emotional development. For instance, executive functions include skills such as cognitive flexibility, inhibitory control, and working memory. Executive function skills allow children to focus attention on the teacher and listen to teacher instructions while ignoring irrelevant distracting stimuli (Blair & Diamond, 2008; Blair & Razza, 2007; Bull, Espy, Wiebe, Sheffield, & Nelson, 2011). Executive function skills also facilitate problem solving by promoting the flexibility and recall of relevant information (Blaye &

Chevalier, 2011; Chevalier et al., 2013). Similarly, language abilities also allow children to comprehend classroom rules and instructions from teachers as well as to participate in class discussions and communicate with peers (Birch & Ladd, 1997; Mashburn et al., 2009; McCabe & Meller, 2004; Pianta, Steinberg, & Rollins, 1995). Finally, social competence allows children to cooperate with others and work well with others. Socially competent children also are easier for teachers to manage (Brophy-Herb, Lee, Nievar, & Stollak, 2007; Fabes, Gaertner, & Popp, 2006; Fabes et al., 2012; Ladd, Herald, & Kochel, 2006, Mashburn & Pianta, 2006). Collectively, these three domains of school readiness, executive functions, language development and social competence, promote school success and will be the focus of the current investigation.

During early childhood, children primarily learn school readiness skills through interactions with parents at home (Ansari & Gershoff, 2016; Bono, Sy & Kopp, 2016; Merz et al., 2015) and interactions with teachers at preschool/day care (Goble et al., 2016). High quality preschool programs organize their curriculum to encourage the development of school readiness skills (Bierman et al., 2008; Huang, Invernizzi & Drake, 2012; Manning, Homel, & Smith, 2010; Rao, Sun, Zhou, Zhang, 2012). In these preschools, instruction occurs in small groups, in one-on-one teacher-child interactions, or in child-initiated experiences that support cognitive (e.g., language, attention to tasks) and social development (e.g., prosocial behavior; Morrow, 2005). For instance, the Head Start REDI (i.e., Research-based, Developmentally Informed) program targets the promotion of language and emergent literacy skills (i.e., vocabulary, syntax, phonological awareness, and print awareness), prosocial friendship skills, self-control (e.g., inhibit impulsive behavior), and problem-solving skills such as interpersonal negotiation and

conflict resolution (Bierman et al., 2008; Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Bierman et al., 2014).

In the home, parents teach school readiness skills by reinforcing limits for appropriate behavior, talking regularly with their children, and supporting children's efforts towards independence. For instance, parents who play with their children or supervise peer play can model and reinforce turn-taking, sharing, and compromise (Bower & Casas, 2016; Kiss et al., 2014). Parents who set and consistently enforce rules for conduct also communicate to their children expectations for social behavior. Parents foster language stimulation through labeling, reading, talking to their children regularly, and asking open-ended questions (Connell & Prinz, 2002; Hindman & Skibbe, 2013; Wasik, Hindman, & Snell, 2016). Children continually exposed to parental speech have more opportunities to hear and practice language. Thus, children whose parents rely on positive parenting are more likely to internalize rules, have larger vocabularies, and have more successful interpersonal interactions (Kochanska et al.,2000; Praet, Titeca, Ceulemans, & Desoete, 2013).

However, not all parents are equally able to prepare their children for school. Economic hardship may undermine parents' abilities to encourage school readiness skills. First, poverty is stressful. Chronic exposure to financial strain, daily hassles and negative life events, and neighborhood disadvantage may tax parents' cognitive resources leaving them less able to teach their children the cognitive and social skills needed for school success (Morales & Guerra, 2006; Noel, Peterson, & Jessi, 2008). Second, the strain associated with poverty may indirectly influence children's acquisition of school readiness skills by undermining parenting quality. That is, parents who experience more contextual stressors and strains have been found to use harsher and less positive parenting (Barnett, Shanahan, Deng, Haskett & Cox, 2010). Children exposed

to less positive parenting have less opportunities to practice and develop school readiness skills (Blair et al., 2011; Holochwost, 2013; Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Lengua et al., 2007; Rhoades et al., 2011). Perhaps it is not surprising then that economically disadvantaged children seem to be at greater risk for entering kindergarten without the requisite skills needed to succeed (Evans & Kim 2012, 2013; Evans, Li, & Whipple, 2013; Holochwost et al., 2016; Lengua et al., 2007; Sameroff, Seifer, & McDonough, 2004).

While contextual stressors, like economic disadvantage and neighborhood danger, have been associated with poor school readiness, how contextual stressors affect school readiness is less well known. Two approaches have been used to understand the process by which contextual stressors influences social adjustment; the accumulation of stressors approach and the constellation of stressors approach. First, the accumulation of stressors approach suggests that positive coping diminishes as contextual stressors increase. As stressors accumulate, parents will be less able to use positive parenting strategies during interactions with their children. Consistent with this hypothesis, increases in contextual stressors has been linked to increases in maladjustment (Rutter, 1979). Second, the constellation of stressors approach proposes that the collection of stressors parents experience matters more than the quantity. Recognizing that each stressor is not equally stressful, a constellation approach argues that some stressors are more potent, and that quality of adjustment depends on which configuration of stressors are experienced (Rhoades, Greenberg, Lanza, & Blair, 2011).

The goal of the current study is to consider mechanisms by which parents' exposure to poverty-related contextual stressors influence children's school readiness skills. First, consistent with previous research, increases in positive parenting across the early childhood period (e.g., from child age 2 to 4) were expected to be associated with higher levels of school readiness upon

entry into preschool (e.g., child age 4; Riley, Scaramella, & McGoron, 2014). Second, exposure to poverty-related contextual stressors was expected to undermine the impact of positive parenting on promoting school readiness. Two mechanisms by which poverty-related contextual stressors may interfere with children's acquisition of school readiness skills were considered. Consistent with the accumulation of stressors approach, an accumulation of contextual stressors would diminish the benefits of positive parenting on school readiness. Consistent with a constellation of stressors approach, the impact of positive parenting on children's acquisition of school readiness skills would vary for different patterns of stressors.

In sum, the present study explored how exposure to contextual risk factors affects children's acquisition of school readiness during early childhood through parenting quality. The following sections first describes the importance of developing school readiness skills during early childhood. Second, associations between the quality of parenting and school readiness are discussed. Finally, the mediating role of parenting quality on contextual stress and the acquisition of school readiness are considered using two conceptual approaches: the accumulation of stressors approach and the constellation of stressors approach.

Importance of developing school readiness skills during early childhood

Every year nearly 4 million children enter kindergarten (U.S. Department of Education, 2015). As compared to preschool or daycare settings, kindergarten represents a qualitative change in the level of expectations for children's behavior. Immediately upon entry into kindergarten, children are expected to be able to learn and internalize rules for classroom conduct, listen and comply with teacher instructions, focus and sustain attention during learning periods, and persist the completion of novel or challenging tasks (Cole, Martin, & Dennis, 2004; Kochanska, Coy, Murray, 2001; Raver, 2003). Beginning kindergarten ready to learn facilitates

an easy transition into kindergarten (Bierman et al., 2008). Children's readiness for school upon entry into kindergarten provides a foundation for long term academic achievement (Duncan et al., 2007; Fabes et al., 2003: Pratt et al., 2016; Romano et al., 2010). Given the importance of each domain of school readiness, the following section will discuss how each of the three targeted school readiness skills develops and how each skill fits within the overall domain of school readiness.

Executive function skills. Executive functions are cognitive processes used in problem solving, goal directed behavior, and self-regulation. (Blair, 2002; Diamond, 2013). Executive functions include: cognitive flexibility, working memory, and inhibitory control (Diamond, 2013; Wiebe et al., 2011). More sophisticated executive function skills have been linked to better school adjustment and academic achievement (Blair, 2002; Blair & Razza, 2007; Morrison et al., 2010; Nayfelf, Fuccillo, & Greenfield, 2013). While all three components of executive function work together to support school success, each skill develops at different rates during early childhood.

Cognitive flexibility reflects the ability to think about a concept in multiple ways, to shift thinking from one concept to another, and to evaluate multiple concepts at the same time (Deak, 2003; Ionescu, 2012). Cognitive flexibility allows children to be creative, to figure out compromises, and to shift their attention to situational demands as needed (Bogacz, et al., 2010; Davidson et al., 2006; Miyake et al., 2000). During the preschool period, cognitively flexible children can adjust and adapt to new situations and classroom changes (e.g., substitute teacher) as well as switch from one task to another (e.g., circle time, nap time; Ionescu, 2012). Conversely, children lacking cognitive flexibility often will use the same strategy across multiple situations even if a strategy is no longer effective (Carroll, Blakey, & FitzGibbon, 2016;

Diamond, Carlson, & Beck, 2005). Additionally, children lacking cognitive flexibility struggle with novel situations and may be perceived by others as rigid or stubborn (Huizinga, Smidts, & Ridderinkhof, 2014). Moreover, less flexible children have difficulty switching from one task to another and become distressed when daily routines are not followed (Huizinga, Smidts, & Ridderinklof, 2014). Thus, cognitive flexibility provides children with the ability to adapt to the changing demands of preschool and kindergarten.

Working memory also is an important component of executive function. Working memory involves the ability to hold pieces of information while simultaneously processing other pieces of information (Cowan, 2014; Diamond, 2013). Unlike long-term memory, which is the storage of information accumulated over time, or short-term memory, which involves holding information for a short duration of time, working memory is limited to information used during cognitive tasks (Cowen, 2014). Working memory allows young children to remember multi-step directions, such as grab your coat and form a line by the door (Matinussen & Major, 2011). Children with working memory deficits have a difficult time recalling and complying with instructions (Matinussen & Major, 2011).

Finally, inhibitory control is a necessary component of executive function. Inhibitory control is defined as the ability to suppress responses that are no longer required or that are inappropriate (Diamond, 2013; Verbruggen & Logan, 2009; Zelazo, 2015). Inhibitory control allows children to ignore competing attentional demands and to focus attention on the classroom task. Children with well-developed inhibitory control can pay attention, follow rules, and control initial behavioral and emotional impulses (Diamond, 2013; Rhoades, Greenberg, & Domitrovich, 2009). Conversely, children with poor inhibitory control are more impulsive and often have externalizing behavior problems or psychopathology (e.g., attention-deficit/hyperactivity

disorder (ADHD); Oosterlaan, Logan, & Sergeant, 1998; Schachar et al., 2000; Schoemaker et al., 2013).

Studying the development of executive function skills is challenging because the components are interrelated and mutually influencing. That is, cognitive flexibility, working memory, and inhibitory control interact in a coordinated way to enhance children's ability to attend to relevant information, plan appropriate responses, and execute and communicate action plans (Diamond, 2013; Zelazo, 2015). For example, during reading circle time children are expected to sit, follow along with the story, and answer questions pertaining to the story. Children must overcome the natural tendency to wander around the room or to play with toys and instead must focus attention on the teacher and story. Children also use working memory to remember important parts of the story, while flexibly shifting from listening to answering questions.

Measuring executive function skills is challenging because skills work together. One task that is often used to measure executive functions is the Day/Night Stroop task. This task taps into the working memory, cognitive flexibility, and inhibitory control dimensions of executive function (Shoemaker, Mulder, Dekovic, & Matthys, 2013). The Day/Night Stroop task is a card task which requires children to verbally respond to the visual cues of a sun and moon stimulus cards. In teaching trials, children are asked to say "day" in response to sun cards and "night" in response to moon cards. After practice trials, the rules change. Children are asked to say "night" in response to sun cards and "day" in response to moon cards (Gerstadt et al., 1994). The Day/Night Stroop task is a developmentally appropriate measure of executive function among preschoolers because no literacy skills are needed to complete the task (Carlson, 2005; Montgomery & Koeltzow, 2010). The task challenges inhibitory control by requiring children to

inhibit the label of sun as “day” and moon as “night.” Working memory also is tested by demanding children to remember task instructions across all trials. Finally, labeling the sun as “night” and moon as “day” requires the flexibility to switch labels. In the current study, the children’s performance on the Day/Night Stroop was used to measure executive function.

Language proficiency. While executive functions allow children to adapt and regulate their behavior to different situations, language skills facilitate clear communication and understanding. Specifically, expressive language involves children’s ability to use words and non-verbal facial expressions to communicate with others (Forget-Dubois et al., 2009) and receptive language encompasses understanding the meaning of words expressed by others (Burger & Chong, 2011). Both expressive and receptive language skills are needed in a school context. Expressive language skills support children’s ability to participate in class instruction, answer questions from others, and communicate with peers and teachers (Mashburn, Justice, Downer, & Pianta, 2009; Zucker, Justice, Piasta, & Kadevarek, 2010). Receptive language skills ensure understanding of classroom rules and instructions as well as social interactions among peers and teachers (Walker et al., 1994). Children with poor receptive language skills may experience compliance problems because they do not understand teachers’ requests (Gatlin, Wanzeck, & Al-Otaiba, 2016).

Receptive language is a prerequisite for expressive language. That is, comprehension of language is essential before children can produce words to communicate (Gershkoff-Stowe & Hahn, 2013). During toddlerhood, children understand more than twice as many words as they can speak (Benedict, 1979; Ryan, Gibbon, & O’Shea, 2016). Children’s early experiences with their caregivers promote receptive language development through exposure to conversations, parental labeling, and prompt verbal responses to attention seeking behaviors (Hoff, 2013).

Exposure to an enriched language environment expands toddler's receptive vocabulary by associating sounds with their meaning (Coddington, Mistry, & Bailey, 2014; Stolt et al., 2016; Tamis-LeMonda, Bornstein, & Baumwell, 2001). For instance, mothers who frequently read to their children and who point to and label pictures in books directly teach the meaning of words, thereby improving their children's receptive language (Praet, Titeca, Ceulemans, & Desoete, 2013).

Expressive vocabulary develops as children mimic sounds to create words associated with objects and to express wants and needs (Ganea, Shutts, Spelke, & DeLoache, 2007). Toddlers learn words at the rate of one to three words a week (Ganger & Brent, 2004). By the end of toddlerhood, children can speak 50 to 250 words and can use short sentences to communicate with others (Berke & Myers, 2016). Increases in vocabulary size precede the use of simple speech, like the use of two-word phrases. By age 2, most children can communicate using two-word utterances (e.g., "more juice"; Berke & Myers, 2016).

The preschool period is marked by increases in vocabulary, complexity in sentences, and adherence to grammatical rules (Berke & Myers, 2016; Roberts, Burchinal, & Durham, 1999). Preschool-aged children's vocabulary acquisition increases substantially such that most children can speak 500 words by the time they enter kindergarten (Callahan & Osofsky, 2015; Gotzke & Gosse, 2007). Sentence structure becomes more complex as preschoolers begin to add prepositions (e.g., "car under the table") and pronouns (e.g., "I want that;" Gotzke & Gosse, 2007). Mistakes in verb use are common (e.g., "car breaked;" Berke & Myers, 2016) and errors in verb agreement diminish (Deak, 2003). Characteristically, the preschool period is noted for questions. Increases in children's use of why, what, where, and how questions help organize novelty and promote comprehension (Seidl, Hollich, & Jusczyk, 2003). Upon kindergarten entry,

most children can communicate complete thoughts in grammatically correct ways and understand requests from others.

While receptive and expressive language both develop rapidly during early childhood, there is variability in the timing of language acquisition. Children who are "late talkers" display a delay in expressive vocabulary, while receptive language is intact (Demarais, Sylvestre, Bairati, & Rouleau, 2008; Hawa & Spanoudis, 2014; Roos & Weismer, 2008). Given that comprehension of language precedes the production of language (Benedict, 1979), studies frequently rely on measures of receptive language as an index of language skills rather than expressive language ability (Scarborough, 2001). Children's receptive language is also predictive of later expressive language (Ellis & Thal, 2008; Ellis, Weismer, Murray-Branch, & Miller, 1994; Pesco & O'Neill, 2012).

In sum, early social interactions and conversations with caregivers provides an abundance of opportunities for children's expressive and receptive language to expand (Dodidi et al., 2003). Children who enter kindergarten with well-developed language skills can express their needs and understand feedback from others (McCabe & Meller, 2004). Conversely, children with poorly developed language skills often experience frustration when their wants or needs are not understood or when they do not understand requests directed towards them; such frustration often manifests itself as acting out behavior or behavior problems (Girard et al., 2016; Salmon, O'Kearney, Reese, & Fortune, 2016). Since receptive language develops first and is predictive of expressive language, the current study focused on children's receptive language to measure language skill.

Social Competence. In addition to basic cognitive and language capacities, kindergarten is an inherently social event. Children must be able to complete tasks and activities with adults

and peers (Brophy-Herb, Lee, Nievar, & Stollak, 2007). Social competence involves the ability to get along with others to meet shared goals (Rose-Krasnor, 1997). Socially competent behavior during the preschool and kindergarten periods includes the ability to initiate and sustain positive reciprocal interactions with peers and teachers (Howes & Phillipsen, 1998, Vriens-Van Hoogdalem, de Haan, & Boom, 2016). Positive reciprocal interactions involve turn taking, compromising, negotiating, sharing, and resolving conflicts in a way that leaves participants satisfied with the outcome of the interaction (Barnett, Gustafsson, Deng, Mills-Koonce, & Cox, 2012; Brownell, Svetlova, Anderson, Nichols & Drummond, 2013; Malecki & Elliott, 2002). When disagreements occur, socially competent children can negotiate and compromise to resolve the dispute in a way that maintains or supports positive interactions (Denham, 2007).

Socially competent kindergarten-aged children tend to be more well-liked by teachers and peers and receive more positive attention from teachers than children lacking social skills (Goble et al., 2016; Hamre & Pianta, 2001; Kochenderfer & Ladd, 1996; Ladd, Birch, & Buhs, 1999). Not surprisingly, children rated as more socially competent during preschool and kindergarten years demonstrated more academic success during the elementary school years (Arnold, Kupersmidt, Voegler-Lee & Marshall, 2012; Ladd, 1990; Ladd et al., 1999). For example, among children enrolled in Head Start, more positive play with peers was associated with more active engagement in the classroom learning activities, while more disengagement during peer interactions was associated with inattention, passivity, and lack of motivation for learning activities (Coolahan, Fantuzzo, Mendez, & McDermott, 2000). Children who enter kindergarten lacking critical social skills often experience peer rejection and are more challenging for teachers to manage behaviorally (Birch &Ladd, 1997; Ladd, Birch, & Buhs, 1999; Razza, Martin, & Brooks-Gunn, 2015). Quite possibly, socially competent children's

ability to get along well with teachers and peers results in better enjoyment of school and more effective social interactions (Birch & Ladd, 1997; Goble et al., 2016; Pianta, Smith, & Reeve, 1991).

In sum, social competence is an important component of school readiness. Early experiences with parents can foster children's school readiness skills though modeling appropriate display of social behaviors and emotions. Moreover, daily exposure to daycare caregivers and peers provide multiple socialization opportunities to practice and adapt social skills to maintain positive interactions. Positive interactions with peers and teachers are associated with better academic achievement (Buyse et al., 2009; Hamre & Pianta, 2001; Hughes & Kwok, 2006). Conversely, negative interactions (e.g., high levels of conflict) is associated with children's externalizing problems and lower levels of academic achievement (Burchinal, Peisner-Feinberg, Pianta,& Howes, 2002; Buyse et al., 2009; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004; Silver, Measelle, Armstrong,& Essex, 2005).

While each of these three dimensions of school readiness is uniquely associated with learning and academic achievement, each domain also impacts the efficacy of other readiness skills. For example, preschoolers with well-developed executive functions are able to comply with teachers' instructions and directions, wait in line or take turns, or negotiate a compromise to a peer dispute. Resolving peer conflicts taps into each of the executive function domains. Resolving peer disputes is enhanced when children can communicate their needs, understand others' points of view, and regulate their own behavior appropriately (Cole et al., 2010; Cutting & Dunn, 1999; Salmon, O'Kearney, Reese, & Fortune, 2016). Although school readiness skills develop at different rates across the early childhood period, these skills coalesce to support and promote academic success during the preschool and kindergarten periods.

Positive parenting promotes school readiness skills

The quality of parenting children receive directly influences children's school readiness (Bernier, Carlson, & Whipple, 2010; Hammond, Muller, Carpendale, Bibok, & Liebermann-Finestone, 2012; Tamis-LeMonda, Bornsteain, & Baumwell, 2001; Vernon-Feagans et al., 2016). Theoretically, positive parenting is defined as parenting interactions and socialization efforts that are sensitive to their children's abilities, supportive of children's independence, communicates in an emotionally positive or neutral way, and stimulates learning (Barnett & Scaramella, 2013; Volling, Blandon, & Gorvine, 2006). Positive parenting involves responding promptly and calmly to children's needs in a way that supports children's independence and autonomy while communicating parent's socializations goals (Lunkenheimer et al., 2008). Everyday activities provide good socialization opportunities. For example, getting children ready for school on time is often a daily struggle for parents. Positive parenting can achieve this goal while also supporting children's autonomy needs by allowing children to have controlled options. For instance, allowing children to choose from two outfits or breakfast options gives children choices, while allowing parents to set the parameters for those choices.

In contrast, negative parenting includes intrusive and harsh controlling behaviors that impose parents' agenda at the cost of children's autonomy (Barnett & Scaramella, 2013; Callahan, Scaramella, Laird, & Sohr-Preston, 2008). Negative parenting involves imposing rules without explanations, controlling children's activities and actions, and disregarding children's interest in a way that is emotionally negative and dismissive (Pungello et al., 2009). While negative parenting may ensure obedience, children do not internalize compliance because children do not learn the reasons for compliance (e.g., Kochanska, 1995; Kochanska, et al., 1996). All parents vary in terms of their overall use of positive and negative parenting. Parents

who rely more heavily on positive parenting than negative parenting should be more successful in promoting school readiness skills because such parenting relies on explanations, which fosters language skills, and reasoning skills. These skills then promote cognitive flexibility and perspective taking, which in turn fosters social skills.

Repeatedly, positive parenting has been linked to more sophisticated school readiness skills (e.g., Bower & Casas, 2016; Landry et al, 2002; Wasik, Hindman, & Snell, 2016). Parents who use appropriate levels of cognitive stimulation with their toddler aged children, such as explanations and encouragement, have children who demonstrate better executive functioning skills as preschoolers (e.g., Clark et al., 2013; Hughes & Ensor, 2009; Ursache, Blair, Stifter, & Voegtline, 2013, Kochanska, Murray, & Harlan, 2000; Landry et al., 2002; Raikes et al., 2007). For example, communicating rules for child behavior and enforcing consequences associated with rule violations teaches children inhibitory control (Kochanska et al., 1997; Kopp, 1982). Providing explanations for the reasons why rules need to be followed promotes cognitive flexibility when children need to apply the same rules to different settings (Vitiello, Greenfield, Munis, & George, 2011; Yaniad et al., 2014) and also supports receptive language skills (Cristofaro & Tamis-LeMonda, 2012; Tamis-LeMonda, Bornstein, & Baumwell, 2001).

Positive parenting which relies heavily on explanations and reasons, both increases children's exposure to language and enriches children's vocabularies (Praet, Titeca, Ceulemans, & Desoete, 2013). Moreover, mothers who respond to and reciprocate children's vocalizations and facial expressions motivate children to communicate more often (Sohr-Preston & Scaramella, 2006). Finally, positive parenting has been linked to better social competence. For example, parents who play with their children model and reinforce turn-taking, sharing, and compromise (Bower & Casas, 2016; Kiss et al., 2014), which are all skills important for social

success. Parents who set and consistently enforce rules for conduct also communicate to their children expectations for social behavior (Baer et al., 2015).

In sum, positive parenting has been associated with well-developed executive function abilities, language, and social competence (e.g., Raikes et al., 2007, Tamis-LeMonda, Bornstein, & Baumwell, 2001; Zhou et al., 2002). Particularly during early childhood, parents provide children with learning opportunities, scaffold learning experiences to challenge their children's abilities, and model appropriate behaviors to help support school readiness skills (Hammond et al., 2012). Conversely, negative parenting restricts children's choices and independence, limiting children's opportunities to develop and practice reasoning, language, and social skills. Given the importance of positive parenting on influencing children's academic readiness, understanding social contexts which may either interfere with parents' ability to use positive parenting or limit the impact of positive parenting on school readiness is critically important.

Clarifying how contextual stressors interferes with children's school readiness skills

Children residing in poverty are disproportionately likely to enter kindergarten with deficits in executive function (Hackman & Farah, 2009; Raver, Blair, & Willoughby, 2013), language (Luster et al., 2000) and social competence (Lengua et al., 2007) compared to their more affluent peers. Fewer than 50 percent of disadvantaged children enter kindergarten with essential skills needed to be successful compared to 75 percent of affluent children (Isaacs, 2012). Deficits in school readiness skills may escalate to problems in school with teachers and peers (Bettencourt, Gross, & Ho, 2016; Blair & Raver, 2015). Furthermore, economically disadvantaged children may be less prepared to enter kindergarten because contextual stressors associated with poverty affects the quality of parenting and, in turn, reduces opportunities which

supports the development of school readiness skills (Evans, Gonnella, Marcynyszyn, Gentile, & Salpekar, 2005; Raver, Blair, & Garret-Peters, 2015).

Contextual stressors include environmental conditions or events that cause biological stress responses (Blair et al., 2011; Boyce & Ellis, 2005). Socioeconomically disadvantaged families often experience an abundance of environmental stressors (Evans, 2004; Bradley & Corwyn, 2002). For instance, financial hardship places constraints on the type of housing families can afford and the quality of schools that children can attend (Duncan, & Brooks-Gunn, 1997). Impoverished families often reside in smaller, more crowded residences located in dangerous or violent neighborhoods (Evans, 2004; Evans & Kim, 2013; McLoyd, 1998). In turn, residential overcrowding and residing in dangerous neighborhoods increases the number of daily stressors and strains parents may be forced to manage (Heberle et al 2014; Sampson, Morenoff, & Gannon-Rowley, 2002). Importantly, as exposure to daily stressors increases, the ability to cope with these stressors likely diminishes (Rutter, 1979; Trentacosta, et al., 2008).

Beyond limiting the ability to cope with the actual stressors, repeated exposure to poverty-related contextual stressors has been found to interfere with parenting quality and childrearing efforts (e.g., Barajas-Gonzales & Brooks-Gunn, 2014; McGroder, 2000; Perkins, Finegood, & Swain, 2013; Puff & Renk, 2014). For example, in a study linking the association between contextual risk and school readiness (Lengua et al., 2007), parents with a history of negative life events demonstrated less positive parenting, which was associated with poorer executive functions and social competence. That is, as contextual stressors accumulated, the benefits of positive parenting on children's school readiness declined (Lengua et al. 2007). Quite possibly, when parents are coping with multiple stressors, parents' ability to recognize or capitalize on teaching opportunities diminishes.

Coping with many contextual stressors simultaneously may overwhelm parents and impair parenting efforts. That is, when parents have to cope and manage multiple stressors, such as coping with limited financial resources while residing in an overcrowded home located in a dangerous neighborhood, may leave parents with little time or energy to provide stimulating learning environments for children (Crnic, Gaze, & Hoffman, 2005; McLoyd, 1990; Puff & Renk, 2014). Little research has considered how exposure to contextual stressors interferes with children's acquisition of school readiness skills. One possible explanation is the accumulation of stressors model.

The accumulation of stressors approach assumes that the ability to cope with stressors diminishes as the number of stressors increase (Rutter, 1979). In this approach, all contextual stressors are equally "risky" in that no one stressor is more problematic than another (Appleyard, et al., 2005; Roy & Raver, 2014). Individuals may be able to manage one or two stressors simultaneously, but coping diminishes as stressors begin to accumulate. Residing in poverty and having too many people living in the home may be manageable, but adding low educational attainment, single parent status, and neighborhood danger may overwhelm mothers' ability to manage resources.

Estimating an accumulation of contextual stressors is rather straightforward. Contextual stressors are identified based on theoretical expectations. Each stressor is measured, and a threshold is established. These thresholds may be based on logical levels, such as identifying "single" marital status as "risk." Or, thresholds may be based on statistical distributions, like scores 1 standard deviation above or below the mean. Stressors are recoded "1" as meeting a risk criterion or as "0" for not meeting a risk criterion. An accumulation of contextual stressors index is computed by summing the risk criterion (e.g., Sameroff, Seifer, & McDonough, 2004;

Trentacosta et al., 2008). Variability in the number of met risk criteria has been found to predict adjustment, such that as the number of stressors increases, adjustment decreases (e.g., Rutter, 1979).

The use of the accumulation of stressors approach began with Rutter's (1979) Isle of Wright study. As an epidemiological study, Rutter naturally observed children (i.e., 9-to-12-year-old boys) and identified six factors which significantly correlated with childhood psychiatric disorders: marital discord, low socioeconomic standing, household overcrowding, parental criminality, maternal psychiatric disorder, and child involvement with foster care, which negatively impacted mental health. Rutter then created a "family adversity index" by combining the factors which reflected the number of risks present in the children's lives. The results indicated that an accumulation of stressors predicted later behavior problems such that children who experienced a single risk factor suffered little or no psychological harm. However, children experiencing multiple risk factors were more likely to experience psychological disorders later in life (Rutter, 1979, 1981). Results from Rutter's work indicated an exponential association between the number of risk factors and children's vulnerability to psychopathology. Rutter argued that individuals experiencing multiple stressors were more likely to suffer mental health problems as their exposure to stressors accumulated.

Rutter first derived the accumulation of stressors approach to examine the impact of contextual stressors on children's mental health, but more recent studies have used the approach to measure the effects of contextual stress exposure on parenting quality (e.g., Lengua, Honorado, & Bush, 2007; Trentacosta et al., 2008). Like Rutter's work, these studies demonstrate that increases in the number of contextual stressors diminish the quality of parenting (Burchinal et al., 2008). For instance, mothers experiencing more contextual risks were found to

be less engaged and harsher during mother-child interactions in a free play task when their children were 6 and 15-months of age (Burchinal et al., 2008). In turn, children who experienced more negative parenting at 6 months of age also had poorer cognitive development (i.e., scores on the Bayley Scales of Infant Development) at 15 months of age (Burchinal et al., 2008). The results suggest an indirect path from stressors and children's development through parenting.

The accumulation of stressors approach is not without limitations. First, the contextual stressors selected often vary across investigations. For instance, Trentacosta and colleagues (2008) used seven risk indicators to create an accumulation of stressors approach: teen parent status, educational level, single parent status, household overcrowding, household legal conviction, drug use problems, and neighborhood dangerousness. Conversely, Brown and Ackman (2011) defined contextual stressors as high school dropout, changes in residential partners, neighborhood safety, and serious medical problems. Although the studies used different markers of stress, results from both studies indicated that when the accumulation of stressors exceeded a manageable threshold, children's development was negatively impacted. Identifying key stressors should be guided by theory, but not all theories specify contextual stressors that may disrupt the impact of parenting on school readiness skills.

Second, the cut-off points for the "risk" category is arbitrary. Risk status defined as the top or bottom 25 percent of the sample distribution is sample dependent, making direct comparisons difficult. Third, an accumulation of stressors approach assumes that all stressors are equal, and problems are associated with increases in stressors. For instance, residing in a dangerous neighborhood is weighted the same as teenage parenthood. However, residence can change over time, but teenage parenthood cannot. Fourth, stressors associated with poverty cluster in meaningful ways. That is, impoverished families tend to be disproportionately single,

mother headed households who had their first child as a teenager (Lee & Gitterman, 2010; Lewin et al., 2012), hold a high school degree or less (Duncan & Brooks-Gunn, 1997), and work an hourly wage job (Jackson, Brooks-Gunn, Huang, & Glassman, 2000). While not all families who are impoverished reside in dangerous neighborhoods, most families residing in dangerous or disadvantaged neighborhoods are impoverished (Evans, 2004; Evans & Kim, 2013; McLoyd, 1998). Thus, the stressors associated with poverty are not distributed equally.

An alternative approach to consider is the constellation of stressors approach. Quite possibly, some constellations of stressors are more challenging than others (Denham et al., 2012; Rhoades et al., 2011). For instance, the combination of teenage parenthood and residential overcrowding may be less problematic, particularly if residents help with childrearing, than residing in a dangerous neighborhood, having less than a high school degree, and using substances. A constellation of stressors approach uses latent class analysis (LCA) to identify meaningful groups or constellations of risk based on categorical data. Groups that exist in a specified population describe differences across individuals based on the pattern of responses on a set of variables such as the presence of contextual stress risk (Lanza & Cooper, 2016). Because memberships to a group is data driven, the number of constellations in a given dataset is unknown as membership to a group is based on an individual's response probability (Lanza & Cooper, 2016)

While the constellations of stressors approach can be considered exploratory, unique constellations may provide additional information on how distinct groups of risk factors can help explain differences in the acquisition of school readiness skills (Pratt et al 2016). For instance, Rhoades and colleagues (2011) examined the role of early risk exposure during infancy and the development of executive function at 3 years of age. The researchers used household income,

marital status, partner status, teen mother status, maternal education, maternal mood problems, prenatal smoking, life stress, social support, and crowded household as measures of contextual stressors in infancy. Executive function was measured with working memory, inhibitory control, and attention flexibility tasks in toddlerhood. Using LCA, a six-group solution best captured the unique set of stressors families experienced. Based on item response for each contextual stress risk factor, item response probabilities were estimated that indicated the probability of exposure to a contextual stress risk factor given the membership in a particular risk profile group.

The first risk profile group was labeled *Married, Low Risk* as children had a low probability of being exposed to any of the risk factors. The second risk profile was labeled *Married, Stressed, and Depressed* as children had an increased probability of having a mother with mood problems and high level of stress. The third risk profile was labeled *Poor and Married* as children were more likely to live in poverty, live in a crowded home, and have a mother who gave birth as a teenager. The fourth risk profile was labeled *Poor and Unmarried* as children had a higher probability of experiencing poverty, teen mother at first birth, a mother who smoked while pregnant, have a parent with a partner (i.e., not married but living with a partner). The fifth risk profile labeled *Poor, Unmarried, and No Partner* had a higher probability of demographic risks such as living in poverty, having a single parent, unmarried mother, and teenager mother. The final risk profile labeled *Poor, Unmarried, and No Partner, Multi-problem* had an increased probability of being poor, having a single mother, having a teenager mother, having a mother with mood problems, and being exposed to high life stress and low social support.

Next, Rhoades and colleagues (2011) examined mean differences between children's executive function scores at 36 months across the six risk profiles, after controlling for children's

language skills. Results indicated that children's executive function skills varied across groups and race. Specifically, white children who were part of the *Poor and Unmarried* profile group consistently performed poorer on executive function tasks as compared to white children who were part of the *Married, Low risk* group. Moreover, for African American children who were members of any of the three higher risk groups (*Poor and Married*; *Poor, Unmarried, No Partner*; and *Poor, Unmarried, and Multi-problem*) during infancy, performed equally poorly on executive function tasks. Results indicated that deficits in executive function were associated with distinct patterns of risk. Specifically, poverty was a consistent predictor of poor executive function skills. However, for African American children, poverty continued to be a risk factor regardless of mother's marital status. While For white children, the association between poverty and poor executive function skills only applied to children in low-income, single-parent families. Results suggests that only for white children the presence of social support (i.e., married, living with a partner) could buffer the effects of poverty and that African American children are associated with different patterns of risk beyond poverty (Rhoades et al., 2011).

Finally, Rhoades and colleagues (2011) tested if the quality of parenting at 7 months mediated the association between early risk profiles and executive function skills at 36 months. Separate structural equation models (SEM) were estimated for five risk profiles for African American and White children. The *Married, Low Risk* group was used as a control. Results indicated that for African American children, membership in both single parent risk profiles (i.e., *Poor, Unmarried, and No Partner*, and *Poor, Unmarried, and No Partner, Multi-problem*) were significantly negatively associated with mother's positive engagement at 7 months when compared to *Married, Low Risk* profile. In turn, positive engagement was positively associated with children's executive function skills at 36-months. On the other hand, White children in the

Poor and Married and *Poor and Unmarried* risk profiles were exposed to lower maternal positive engagement and higher intrusiveness at 7 months, in comparison with the White children in the *Married, Low Risk* profile. In turn, White children exposed to greater maternal positive engagement and children exposed to lower maternal negative intrusiveness were more likely to have higher executive function skills. Rhoades and colleagues (2011) concluded that the quality of parenting differed based on the unique experience of different risk profiles. Moreover, the effects of unique constellations of social contextual stressors experienced in infancy on later executive functions were mediated by parenting quality (Rhoades et al., 2011).

In sum, while both methods may explain how contextual stressors affect parenting quality, each method varies in terms of the importance placed on individual stressors. The accumulation of stressors approach gives equal weight to all risk factors, such that quantity is valued over quality. Conversely, the constellation of stressors approach is a person-centered approach that assumes qualitatively different experiences based on constellations of stressors. That is, the constellation of stressor approach unpacks the effects of the total number of stressors present to examine the nature of the combinations of risk (Pratt et al., 2016). The current study will compare both approaches to evaluate the association of contextual stress on school readiness through parenting quality. Contextual stressors will be defined as mother's educational attainment, age at first child birth, single marital status, level of substance use, maternal mental health, home overcrowding, neighborhood violence, and violence experienced by family members. Both, the accumulation of stressors and the constellation of stressors approaches will examine the extent to which parenting quality mediates any direct association between contextual stress exposure and children's school readiness skills at child age 4. Comparisons between the accumulation of stressors index and LCA results will be discussed.

Summary and Hypotheses

The purpose of the present study is to consider mechanisms by which exposure to social-contextual stressors influence children's school readiness skills. Children were followed from toddlerhood (age 2) to the preschool (age 4) period. The longitudinal study will examine two mechanisms by which poverty-related contextual stressors may interfere with parenting (measured at child age 2) and, in turn, children's acquisition of school readiness skills. First, consistent with the accumulation of stressors approach, an accumulation of contextual stressors is expected to indirectly undermine school readiness skills by interfering with positive parenting and less positive parenting is expected to be associated with poorer school readiness (see Figure1, Panel A). Second, consistent with a constellation of stressors approach, the impact of positive parenting on children's acquisition of school readiness skills will vary based on different patterns of stressors (see Figure 1, Panel B). More specifically, the following hypotheses will be evaluated:

1. Positive parenting at age 2 will be positively associated with age 4 school readiness indicators.

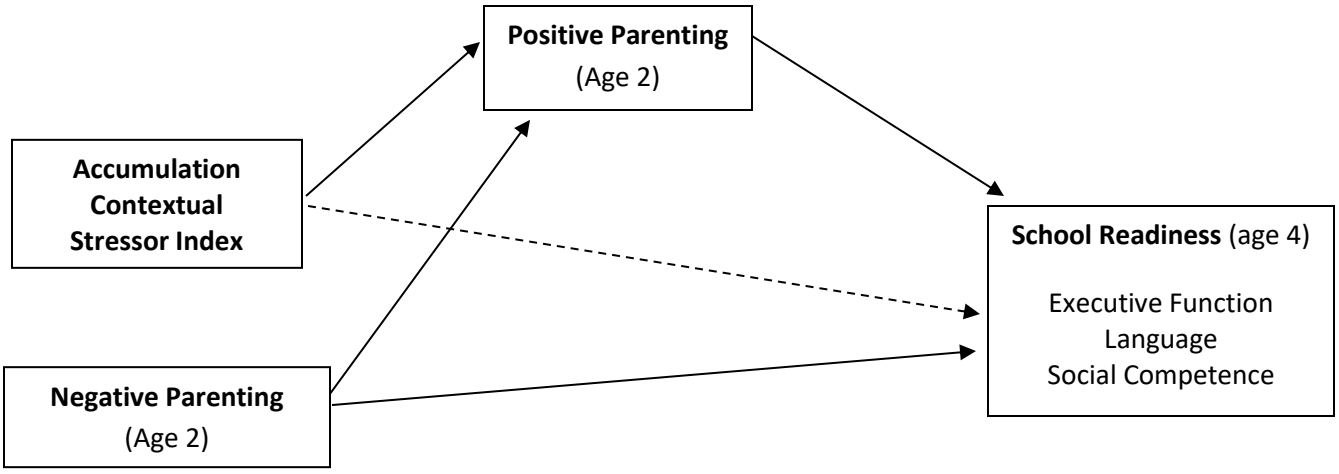
2. Each contextual stressor will be negatively associated with positive parenting and school readiness indicators.

3. Positive parenting will mediate the association between an accumulation of contextual stressors and school readiness indicators.

4. Using a person-centered data analytic approach, different constellations of stressors will emerge that do not simply reflect an accumulation of contextual stressors.

5. Positive parenting will mediate the impact of unique stressor profiles on school readiness indicators.

Panel A



Panel B

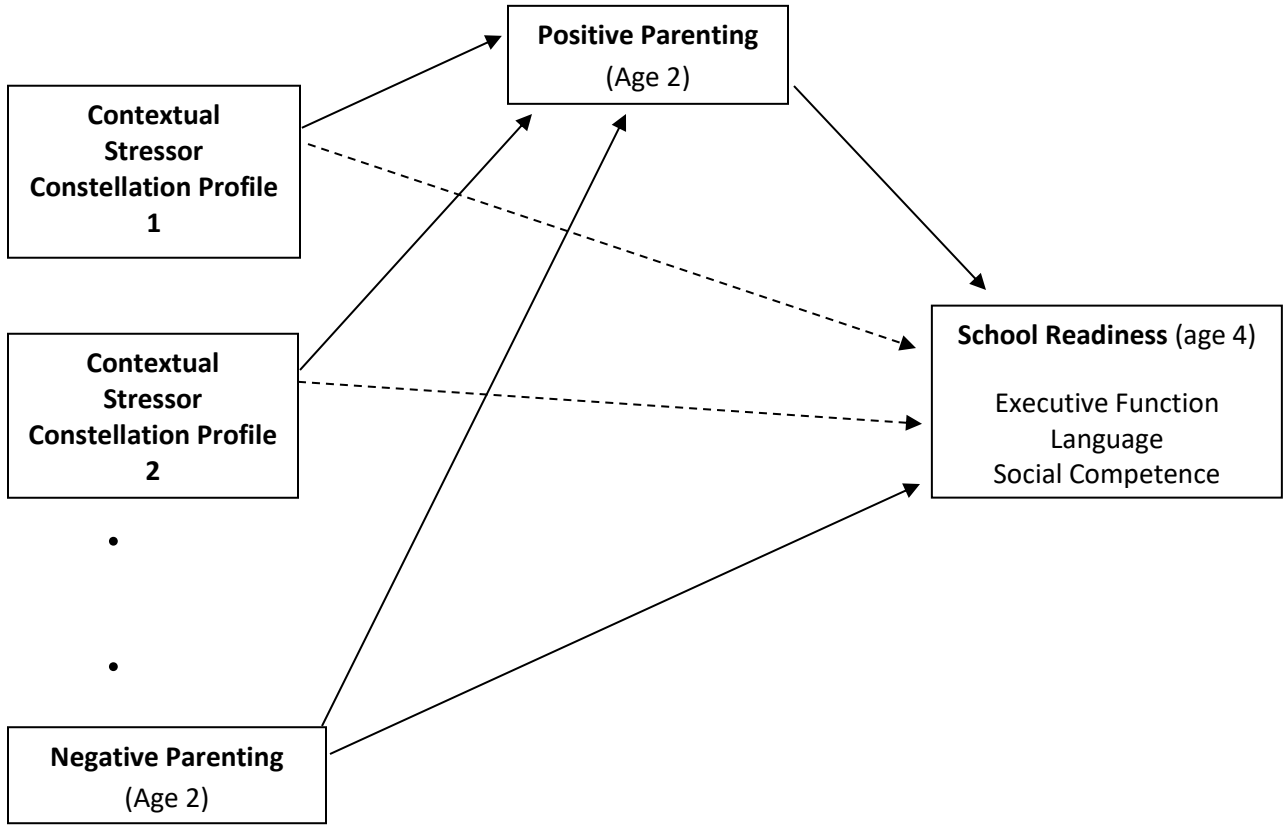


Figure 1. Theoretical models examining the impact of stress exposure on school readiness indicators.

Methods

Participants

Mothers with pre-school aged children enrolled in Head Start and a younger target child who turned 2 years of age during the study were recruited to participate. Families completed three annual assessments over a 2-year period corresponding with the younger children's second, third, and fourth birthdays. A total of 168 family triads participated; triads included mothers, their preschool-aged children, and their 2-year-old target children. One family was excluded because the target child was severely developmentally disabled, leaving a final sample of 167 families. All participating families resided in the greater New Orleans area and participated 1 to 3 years after Hurricane Katrina struck the Gulf Coast. Data collected from the first and third assessments was used in the current study.

At the first assessment, mothers averaged 25.31 years of age (*SD* = 3.57 years), preschool children averaged 49 months of age (*SD* = 7.63), and target children averaged 24.16 months of age (*SD* = 1.77 months). Children were primarily African-American (90.2%), with far fewer mothers identifying their children as White (4.9%) or Middle Eastern (1.2%). Over half of the target children were female (57.5 %). Mothers reported an average of 3.19 children (*SD* = 1.46) and the average household supported 4.35 people (*SD* = 1.55). Just under 53 percent of mothers reported graduating from high school and about 34 percent of mothers were either married or living with a romantic partner at the time of the interview. Families were very poor, with an average per capita income of $2,801.

When target children were about 4 years of age, permission from mothers was obtained to collect data about the target children from teachers or daycare providers. Of the 167 participating families, 155 families (92%) participated at the age 4 assessment. Of these 155

families, 18 children (12%) had no teacher data, dropping the final sample to 137. Of the 18 children who were excluded from the study, 4 mothers did not give permission to contact teachers and 14 children were not attending a center-based preschool, day care, or child care. Of the 137 children who were enrolled in school type setting, 54 percent attended Head Start, 31 percent were enrolled in a pre-kindergarten class, and 15 percent were enrolled in day care. All teacher reports were collected in the spring semester closest to their actual age 4 assessment so that teachers had adequate knowledge of the target children.

Procedures

Initial recruitment for the study occurred at Head Start parent orientation meetings and at Head Start registration. Interested mothers completed a brief recruitment screener to determine eligibility. Mothers with eligible children and who were willing to participate were contacted by project staff and the study was explained to them. Interviews were scheduled for interested mothers. Interviews mainly took place in the families' homes, but a few were conducted in a lab setting or at Head Start centers at mothers' request (first assessment only). All interviews lasted approximately 2.5 hours. At the age 2 assessment, all families completed a videotaped structured interview and mothers completed a questionnaire. In addition to these two components, at the age 4 assessment children completed language and executive function assessments. After completing each of the annual assessments, mothers received $100 and each of the two participating children received a small toy worth about $5. Teachers and teachers' aides each received $20 for completing questionnaires about target children. All interviews were scheduled within 1 month of the target children's second, third, and fourth birthdays. The same in-home assessment procedures were used at each of the three assessments.

Before beginning each interview, informed consent was obtained. Interviewers read the consent form to the mother slowly, stopping to answer questions as needed. Interviewers did not proceed until the informed consent had been signed and all questions had been answered. Mothers received a copy of the consent form which included all study contact phone numbers. While written consent was only obtained after the first assessment, prior to beginning each subsequent assessment informed consent procedures were reviewed. Once consent or approval was obtained, interviewers reviewed a list of activities that would occur during the interview. Each activity was explained to mothers and questions were answered before beginning the interview. Mothers received a copy of the activity list to follow along with the interview.

The structured interview included different activities, including activities designed to measure positive and negative parenting. Specifically, parenting was measured at the wave 1 assessment (child age 2) using a teaching activity and a competitive game. The teaching activity required mothers to supervise their children solving a puzzle that was too hard for them to complete on their own. Mothers were instructed to allow children to solve puzzles on their own, but offer any assistance deemed necessary. Mothers were instructed to continue to play with the puzzle if children finished before the allotted 5 minutes. Children rarely completed the puzzle before the end of 5 minutes.

Parenting also was measured using a competitive, concentration-style matching game. First, interviewers taught mothers how to play the game and then mothers were instructed to teach their children how to play the game. The game involved twelve pairs of Fisher-Price Oreo Cookie Game pieces. The cookies separated into two pieces, the cream side had a shape cut into the cream and the cookie side had a raised shape. The game was played by first dividing the cookie sides between the players. All the cream side cookies were put into a “cookie jar.” Play

involved taking turns selecting a cookie from the jar. A match occurred when the player selected a cookie and had the matching half. When matches occurred, the player snapped the two sides together and received a point. If the player did not have a match, then the cookie half went back into the jar. Then, the next player took a turn. The first player to match all his/her cookies won the game. Mothers were instructed to keep playing the game until the interviewer returned 3 minutes later.

Once the activity portion of the interview was completed, interviewers helped mothers complete a series of questionnaires regarding mothers' own experiences, their mood, and their children's behavior. Due to individual differences in mothers' reading level, interviewers offered to read all questions to the mothers. Most mothers completed the questionnaire on their own.

During the wave 3 assessment (child age 4), another research assistant worked with participating children to complete a picture version of the Stroop test (i.e., Day/ Night Stroop) and the Peabody Picture Vocabulary Test (PPVT) while mothers completed the questionnaires. First, children were administered the Day/Night Stroop task. Children were presented with different cards that had pictures of a sun or a moon. Interviewers showed children the sun card and asked children, "When do you see the sun?" Interviewers made sure that children knew that the sun comes out in the day. Then, interviewers showed children the picture of the moon card and asked children, "When do you see the moon?" Interviewers made sure that the children knew that the moon is seen at night. The interviewers flipped the instructions, telling children: "Now, we are going to play a silly game. When I show you the sun card I want you to say night and when I show you the moon card I want you to say day." After two practice trials to verify that children understood the instructions, the interviewer began the task. Children were shown 20

cards presented in a fixed order. There were no breaks or rule reminders during the test trials. The interviewer recorded children's answers after each card was presented.

The PPVT was designed to measure receptive vocabulary ability (Dunn & Dunn, 1997). The test consists of 480 stimulus words from different categories, such as animals, body parts, shapes, and symbols among others. Interviewers administered the test by presenting children with four-picture test plates and asking children to select one of the four illustrations that best represents the word spoken by the interviewer. Each set of drawings is progressively more difficult than the previous one. Children must complete a baseline of 6 words in a row and then continue until the child has 6 errors within 8 trials.

At wave 3, children's preschool or daycare teacher and their teacher aide completed questionnaires about the target children's behavior at school. Both teachers and aides completed questionnaires regarding children's behavior at school, including children's social competence.

Parenting behaviors were later coded in the lab by two independent teams of undergraduate and graduate student coders. Prior to coding the parenting tasks, coders received a minimum of 20 hours of training and achieved an average inter-rater reliability estimate of .80 on training interactions. Twenty-five percent of all tasks were double coded to monitor inter-rater reliability. Trained observational coders rated mothers' behavior directed towards children using a modification of the global coding system developed in the NICHD Study of Early Child Care and Youth Development (NICHD, 1999). Similar coding systems have been used in studies for observation of mother-child interactions (i.e., Adi-Japha & Klein, 2009; Barnett & Scaramella, 2013), including low-income African-American families (i.e., Zaslow et al., 2006). Seven different parenting codes were rated in terms of how characteristic each behavior was of mothers during each of the interactional parenting tasks. To monitor ongoing adherence to the coding

procedures, coders attended weekly reliability meetings, and disagreements in coding were resolved. All coders were blind to the identity of families and to study hypotheses. Separate teams of coders rated the teaching and competition tasks; these teams attended separate reliability meetings.

Measures

Social Contextual Stressors. Social contextual stressors are defined as demographic, mental health, and environmental characteristics that have the capacity to increase the number of daily hassles and burdens experienced by mothers. Social contextual stressors were measured using the data reported by mothers at the first assessment (i.e., child age 2). Demographic characteristics included: low maternal educational attainment, teenage motherhood, and single parent status. Income was not included as a stressor because all participating families were selected because of their low-income status. Maternal mental health included self-reported depression or anxiety symptoms. Environmental characteristics included: residential overcrowding, neighborhood danger, violence exposure, and maternal substance use. Like previous studies using multiple stressors as indicators of risk (e.g., Sameroff, Seifer, & McDonough, 2004; Trentacosta, et al., 2008), continuous stress indicators were dichotomized at 1 to reflect the top/bottom quartile of risk. The following section defines each stressor indicator, describes how each indicator was measured, and how indicators were dichotomized.

Demographic stressor characteristics. The first domain of social contextual stressors identified were demographic characteristics that are difficult to change and have the capacity to increase the number of daily stressors mothers' experience. Three stressors were identified: low educational attainment, teenage motherhood, and single parent status. First, *low educational attainment* was defined as not graduating from high school. Low educational attainment was

measured using mothers' reports of high school completion. Not graduating from high school was coded as a stressor (1), while graduating from high school was not considered to be a stressor (0). For this sample, 51 (31%) participants did not graduate high school.

Teenage motherhood was defined as mothers having their first child at the age of 19 or younger. To measure *teenage motherhood*, mothers' age at the birth of their first child was calculated. All mothers completed a roster listing all of their children and family members. This roster included family members' dates of birth. Mothers' age at first birth was computed by subtracting their oldest child's birthdate from their own birthdate. Mothers who were 19 years or younger at the time of their first child's birth was coded as a stressor (1). Mothers who were 20 years or older at the time of their first child's birth was coded as a non-stressor (0). For this sample, 85 (51%) participants were teenage mothers.

Single parent status was defined as residing without a romantic partner. To measure mothers' *single parent status,* mothers' reports of their marital status at the first assessment were used. Mothers who indicated a marital status of single, widowed, divorced or separated were coded as a stressor (1). Mothers who indicated that they were currently married or living with a romantic partner was coded as a non-stressor (0). For this sample, 93 (56%) participants reported single status.

Maternal mental health characteristics. Mothers' own symptoms of psychopathology also can add to the stress of daily life. Mental health stressors were defined by the presence of elevated symptoms of depression and/or anxiety. With regard to *maternal depression*, depressive symptoms were measured using the Beck Depression Inventory (BDI). This 21-item measure is routinely used to identify depressive symptoms among community samples (Antony, Bieling, Cox, Enns, & Swinson, 1998). The BDI has been shown to have a good internal consistency (α =

.91) in the general population (Beck, Steer, Ball, & Ranieri, 1996). The BDI also has been shown to have a high internal consistency ($\alpha = .90$) in low-income African American populations (Grothe et al., 2005). The BDI correlates with clinical depression diagnoses (e.g., Anthony et al., 1998; Steer, Clark, Beck, & Ranieri, 1999).

Completing the BDI involves reading a cluster of four statements that vary in their degree of a specific depressive symptom. Statements begin with neutral or benign feelings with each subsequent statement reflecting more severe feelings of depression. For each cluster of statements, mothers indicated how much each statement described their own feelings over the past week. For example, regarding feelings of sadness, mothers choose which of the following statements best described their own feelings of sadness during the past week: I do not feel sad (0); I feel sad (1); I am sad all the time and can't snap out of it (2); I am so sad or unhappy that I can't stand it (3). At the request of the IRB, one question tapping into suicidal thoughts was removed. An overall depression score was computed by summing the 20 items. Higher scores indicated endorsing more depressive symptoms and with greater intensity.

Scores at or above 17 on the BDI indicated moderate-to-severe levels of depression and that the symptoms are severe enough so that functional impairment is likely (Smarr & Keefer, 2011). In the current sample, 27 (16%) mothers had depressive symptoms scores at or above the moderate-to-severe depression level. The average score of 9.04 (*SD* = 8.99) indicated that the majority of mothers experienced rather low levels of depressive symptoms, although there was considerable variability around that mean.

Maternal anxiety was measured using the Beck Anxiety Inventory (BAI; Beck & Steer, 1990). The BAI involves rating 21 symptoms of anxiety on a 4-point Likert scale (0 = not at all; 1 = a little bit; 2 = some; 3 = a lot). Mothers indicated how much each statement described their

feelings over the past 2 weeks. Sample items include: “unable to relax” and “heart pounding or racing.” The BAI has been shown to have a good internal consistency ($\alpha = .92$) among clinical and general populations (Beck, Epstein, Brown, & Steer, 1988; Osman, Barrios, Aukes, Osman, & Markway, 1993). The BAI also has demonstrated good consistency among African American populations (Chapman, Williams, Mast, Woodruff-Borden, 2009). Scoring involves summing across the 21 items and higher scores indicated endorsing more symptoms of anxiety and experiencing more intense feelings of anxiety. The BAI has been found to correlate with clinical anxiety diagnoses (Beck, Steer, Ball, & Ranieri, 1996; Steer, Clsrk, Beck, & Ranieri, 1999).

Scores at or above 19 on the BAI reflect moderate-to-severe levels of anxiety with some functional impairment associated with anxiety symptoms (Julian, 2011). In the current sample, 22 (13%) mothers reported symptoms at or above 19 indicating moderate-to-severe levels of anxiety symptoms. Most of the mothers reported rather low levels of anxiety ($M = 7.49$), although the standard deviation of 9.21 indicates substantial variability around that mean.

Since the presence of elevated depression or anxiety symptoms was expected to represent stressful challenges for mothers, depression and anxiety scores were correlated to evaluate the extent to which these mental health dimensions were comorbid. Mothers anxiety and depression scores were positively and statistically significantly correlated, although the magnitude of the correlation was modest ($r = .47$, $p < .01$). Mothers who scored in the moderate-to-severe impairment range on either depression or anxiety were coded positively for *maternal mental health stressor* (1). Mothers’ with depression and anxiety scores below the moderate level were coded as having no mental health stressor (0). In the current sample, 57 (34%) of mothers were coded as experiencing either elevated depression or elevated anxiety symptoms.

Environmental stressors. Four different environmental stressors were used to measure the social contexts in which mothers' experienced challenges. These settings included: *residential overcrowding, neighborhood danger, violence exposure,* and *maternal substance use.* First, *residential overcrowding* was defined by the ratio of residents to bathrooms. When the number of residents far exceeds the number of available bathrooms, this may indicate that the house is not large enough to functionally accommodate all of the residents. The residential overcrowding stressor was computed by dividing the total number of individuals residing in the families' homes 4 days a week or more by the number of bathrooms in the home (Evans, et al., 1998; Regoeczi, 2008). A family size:bathroom ratio of 1 indicated that there is one bathroom for every resident in the home, while a ratio of 4 indicated that four family members share one bathroom. Thus, larger values indicated greater overcrowding. The top quartile was recoded as a stressor. On average participants averaged 3.6 family members per bathroom, with some variability in the ratio (*SD* = 1.56). Risk was identified as having a ratio of 4 or more and 75 (45%) families were coded as living in an overcrowded home.

Both *neighborhood danger* and *violence exposure* were measured using mothers' reports on the Me & My Neighborhood Questionnaire (Pittsburg Youth Study, 1991) at wave 1. Neighborhood danger was defined as events in or near their neighborhood that were unsafe. Violence exposure was defined as risky events that may have happened to members of their family but may not have occurred in their neighborhood. Mothers rated 20 items regarding how frequently different events occurred in their neighborhood or to members of their families during the past 12 months. Items were rated on a 4-point Likert scale (0 = never; 1 = once; 2 = a few times; 3 = a lot). Since less dangerous events likely happen with a greater frequency than more dangerous events, items were recoded to create an index of exposure to dangerous events in the

neighborhood and violent events directly affecting families. For instance, “hearing adults arguing loudly on your street” could occur more often than “seeing people deal drugs near your home.” Values of 1 or greater on an item was recoded to 1, reflecting that the family had experienced that event during the past year.

Neighborhood danger included 9 dangerous events which may or may not have occurred within their neighborhood during the past year (e.g., “You see or hear about a shooting near your home”). To create a neighborhood danger stress score, the neighborhood danger items were tallied. On average mothers reported 3.26 events (*SD* = 2.24) occurring in their neighborhood during the past year. From the continuous scores, a stressor indicator was created by coding scores in the top quartile as a stressor (1) and scores in the bottom three quartiles as a non-stressor (0). Stressor cut points were rounded down to the nearest whole number. In this sample risk was identified as having a score of 5 or more and 54 (32%) mothers were coded as living in a dangerous neighborhood.

The *violence exposure* included 8 events that may have happened to members of their family but may not have occurred in the neighborhood (e.g., “A family member got rubbed or mugged”). The number of violent events involving family members were tallied and the distribution was reviewed. On average mothers reported 2.15 events toward family (*SD* = 1.92) occurring in the past year. From the continuous violence exposure index, scores in the top quartile were coded as a stressor (1) and scores in the bottom three quartiles were coded as a non-stressor (0). Stressor cut-off points were rounded down to the nearest whole number. Risk was identified as having a score of 3 or more and 47 (28%) mothers were coded as having experienced stressful violence exposure.

Maternal substance use was defined as the risky use of legal and illegal substances. Maternal substance use was computed from mothers' reports at the first assessment. All mothers completed the Social Behavior Questionnaire (Huizinga, Menard, & Elliot, 1989) which included 10 items about mothers' own use of substances. Mothers rated the frequency of using of a variety of legal and illegal substances, including: tobacco, alcohol, prescription drugs for recreational purposes, and illegal drugs. Items were rated on a 5-point Likert scale (0 = never; 1 = 1 or 2 times a year; 2 = about once a month; 3 = about once a week; 4 = everyday). Scores were created by summing the 10 items. Higher scores indicated using more substances on a more frequent basis. Consistent with past research that has found that African Americans are less likely to engage in risky substance use (e.g., Keyes et al., 2015; National Survey on Drug Use and Health, 2013), in the present study mothers reported extremely low levels of substance use (M = 1.25; SD = .36). Scores in the top quartile were coded as a stressor (1) and scores in the bottom three quartiles were not coded a stressor (0). Stressor cut-off points were rounded down to the nearest whole number. In this sample risk was identified as having a score of 1.30 or more and 46 (28%) mothers were coded as frequent substance users.

Bivariate correlations among each of the contextual stressor indicators were generally positively correlated, indicating that the experience of one stressor was associated with an experience of another stressor (see Table 2). For instance, mothers with low education attainment were also likely to be teenage mothers (r = .21, p < .05). Teenage mothers endorsed more instances of neighborhood danger (r = .20, p < .01). Given that the individual contextual stressors were positively associated, a *social contextual stressors index* was created by summing across the dichotomously coded contextual stressors: low educational attainment, teenage motherhood, single parent status, mothers' mental health, residential overcrowding,

neighborhood danger, violence exposure, and substance use (See Table 1). The social contextual stressor index was used to test the study's hypotheses associated with the cumulative stressors approach.

Table 1.

Descriptive Statistics among Contextual Stress Index, Parenting, and Children's School Readiness

			Range			
	M	SD	Minimum	Maximum	Skewness	Kurtosis
1. Contextual Stress Index	3.05	1.62	0.00	7.00	0.24	-0.63
2. Positive Parenting	3.26	.86	1.67	5.83	.17	-.54
3. Negative Parenting	3.33	.89	1.75	6.75	1.07	1.81
4. Executive Function	5.40	5.70	0	20	.74	-.42
5. Language	84.37	11.99	52	114	-.12	.31
6. Social Competence	0.00	.91	-2.56	1.56	-.52	-.33

Positive and negative parenting. *Positive parenting* was defined as mothers' behavior toward their children that was emotionally pleasant, supportive, and engaged as well as respectful of children's autonomy. *Negative parenting* was defined as parenting that was emotionally harsh and behaviorally controlling or intrusive. In all statistical analyses, negative parenting was controlled to evaluate the unique effects of positive parenting on change in school readiness.

Both positive and negative parenting behaviors were measured using observational ratings of mothers' behavior towards target children during the teaching and competitive

Table 2.

Correlations among Indicators of Stress, Parenting, and Children's School Readiness

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Education Attainment	1.00													
2. Teenage Motherhood	.21*	1.00												
3. Single Parent	.11	.12	1.00											
4. Maternal Mental Health	.05	-.08	-.04	1.00										
5. Residential Overcrowding	.14+	.05	-.17*	.03	1.00									
6. Neighborhood Danger	-.01	.20**	-.03	.07	.09	1.00								
7. Violence Exposure	-.01	.06	.07	.25**	-.14+	.44**	1.00							
8. Maternal Substance Abuse	-.02	-.11	-.13	.12	.06	.21**	.14+	1.00						
9. Contextual Stress Index	.42**	.40**	.30**	.46**	.29**	.51**	.48**	.33**	1.00					
10. Negative Parenting	.01	.02	.11	.01	.00	-.06	-.11	.09	-.02	1.00				
11. Positive Parenting	-.16*	-.16*	-.20*	-.03	-.08	-.01	.07	-.06	-.13+	.61**	1.00			
12. Executive Function	.11	-.07	-.13	.19*	.17*	-.05	-.10	.04	.08	-.06	.02	1.00		
13. Language Skills	-.19*	-.11	-.16*	.04	.08	.10	.02	.07	-.08	-.15+	.18*	.13	1.00	
14. Social Competence	-.03	.01	-.10	-.10	-.05	-.02	.05	.02	-.09	-.07	.14	.16+	.23**	1.00

Note: + $p < .10$; * $p < .05$; ** $p < .01$.

activities measured at the wave 1 (child age 2) assessment. Each behavioral code was rated on a 7-point Likert scale, ranging from not at all characteristic (1) to highly characteristic (7) of mothers' behavior during the task. *Positive parenting* was measured using three codes: sensitivity/supportive presence, positive regard for the children, and stimulates cognitive development. The *sensitivity/supportive presence* code measured mothers' behaviors that reflect an awareness of their children's needs, moods, interests, and capabilities as well as mothers' well-timed, contingent responses to children's distress and non-distress. The *positive regard* code measured mothers' expression of positive feelings towards their children, including affection, liking, appreciation, care, praise, concern, or support. *Stimulates cognitive development* measured the degree to which mothers' support and encourage children's cognitive and language development. Behavioral indicators of stimulation of cognitive development included: labeling, encouraging children to speak, using of explanations, asking children questions, and responding to children's vocalizations.

Inter-rater reliability was computed using inter-class correlation coefficients separately for each task. Coder reliability in the teaching task was very good with inter-class correlation coefficient of .76 for sensitivity/supportive presence, .84 for positive regard, and .75 for stimulation of cognitive development. For the competitive task, inter-rater reliability also was excellent with inter-class correlation coefficients of .91 for sensitivity/supportive presence, .86 for positive regard, and .86 for stimulation of cognitive development.

A positive parenting score was created by averaging across the three indicators within the teaching and competitive tasks ($\alpha = .77$; $\alpha = .73$, respectively). On average, mothers demonstrated somewhat low to moderate levels of positive parenting during both tasks. Mothers' level of positive parenting was slightly higher during the teaching task ($M = 3.56$, $SD = .97$) than

the competitive task (M = 2.99, SD = .99), perhaps reflecting differences in the types of behavior each task elicited. Mothers' were playing the competitive game with their children, while coaching their children on how to complete the puzzle. Nonetheless, positive parenting scores for the teaching and competitive tasks were statistically significant and positively correlated (r = .51, p < .01) indicating that mothers who demonstrated positive parenting in one task were likely to demonstrate positive parenting in the other task.

To create an overall positive parenting score, a Cronbach alpha coefficient was computed using all 6 parenting codes. This procedure insures that positive parenting ratings on the individual codes were consistent across the two tasks despite the fact that different coders rated mothers' behavior during each task. Results indicated that ratings for mothers' parenting were highly internally consistent (α = .80). Codes generated from the two tasks were averaged to create a single indicator of positive parenting (see Table 1).

Negative parenting was measured using the intrusiveness and negative regard codes rated in both the teaching and competitive activities at wave 1. The *intrusiveness* code measured mothers' behaviors towards their children that were unwanted, unwelcomed, and interfering. Intrusive behaviors restricted children's efforts towards autonomy or independence. The *negative regard* code was defined by mother's negative emotion, anger, disapproval, irritability, coercion, rejection, or contemptuous behavior expressed towards their children. Inter-rater reliability generated from the teaching activity was acceptable with inter-class correlation coefficients of .70 for intrusiveness, and .64 for negative regard. Inter-rater reliability for codes from the competitive activity were excellent with inter-class correlation coefficients of .84 for intrusiveness, and .88 for negative regard.

Negative parenting scores were created by first averaging codes within the teaching activity and the competitive activity (α = .74; α = .69, respectively). On average, mothers demonstrated somewhat low to moderate levels of negative parenting during the teaching task (M = 3.3, SD = 1.12) and competitive task (M = 3.35, SD = 1.06). Next, negative parenting scores from the teaching and competitive activities were statistically significant and positively correlated (r = .31, p < .01). A Cronbach alpha coefficient computed with all 4 codes was acceptable (α = .68). With an acceptable alpha coefficient and strong correlation coefficient, the two negative parenting scores were averaged to create a single indicator of negative parenting (see Table 2).

School Readiness. School readiness skills were conceptualized to include children's executive function abilities, language skills, and social competencies during preschool (child age 4). Strategies used to measure each domain of school readiness will be described in turn. First, *executive function* was defined as children's ability to inhibit a dominant response for a subdominant response. Children's responses during the Day/Night Stroop task were used to measure executive function. Adult Stroop tasks often mix color words (e.g., orange) printed in colors. Participants then read the words and match it with colors in congruent (e.g., the word orange written in the color orange) and incongruent conditions (e.g., the word orange written in the color green). Such an approach is too difficult for preschool-aged children who lack the literacy skills needed for such a task (Quinn & Quinn, 2005; Van Mourik, Oosterlaan, & Sergeant, 2005). The Day/Night Stroop was designed for 3- to 7-year-old children and requires no literacy skills (Gerstadt et al., 1994). Children received a score of 1 for every trial where they labeled cards depicting "moon" as "day" and "sun" as "night." Children received a score of 0 for every trial where they labeled "moon" as "night" and "sun" as "day." A total of 20 trials were

administered and scores on each trial were summed. Higher scores indicated greater accuracy in inhibiting a dominant response and reflect more sophisticated executive function skill. Children who could not associate the sun with day and the moon with night during the teaching trial did not complete the task and received a score of 0. On average, children correctly re-labeled 5.40 of the 20 cards with variability in the scores (see Table 1).

Second, *language skills* were operationalized as children's ability to understand expressed language or as their receptive vocabulary ability. Children's receptive vocabulary was measured using the Peabody Picture Vocabulary Test (PPVT-III, Dunn & Dunn, 1997). The PPVT has been used widely to measure children's receptive vocabulary skills (e.g., Luu, et. Al., 2009; Marchman, et. al., 2016; Wolfe & Bell, 2003) and has demonstrated validity from ages 2.5 through 90 (Dunn & Dunn, 1997). Moreover, the measure has demonstrated validity among African American children (Campbell, Bell, & Keith, 2001; Qi, Kaiser, Milan, & Hancock, 2006, Washington & Craig, 1999). Raw scores were transformed to standardized scores which normalizes scores based on children's age (Dunn & Dunn, 1997). Age transformed PPVT scores were used to evaluate children's language level, such that higher scores indicated receptive language skills that are at or above age level. Three cases were removed from analysis as English was not the primary language and one child was nonverbal diagnosed with Autism. In the current study, the average PPVT score was 84.37 which is 1 standard deviation below the normed average of 100. In addition, there was substantial variability around the mean (see Table 1).

Finally, *social competence* was defined as children's socially skillful behavior evidenced in a preschool/daycare setting. Social behaviors were defined as children's level of cooperation, prosocial behavior, and ability to get along with other children and teachers. Three different indicators of social competence were used. First, classroom *sociability* was measured using the

expressive and compliant subscales from the Adaptive Social Behavior Inventory (ASBI; Hogan, Scott, & Bauer, 1992). Teachers and teacher aides completed the 30-item survey regarding children's expressive, disruptive, and compliant behaviors in the classroom. Items were rated on a 3-point Likert scale ranging from rarely/never (0) to almost always (2). The 13 expressiveness items tap into children's outgoing prosocial behaviors (e.g., being sympathetic to others' distress or comforting others). The compliant subscale includes 10 items and measures how well children obey and comply with teacher requests. Cronbach's alpha coefficients indicated a high degree of internal consistency in teacher and teacher aide's ratings for the expressive scales (α = .87; α =. 87, respectively) and compliance scales (α = .89; α =.87, respectively). The items were averaged within each rater to create two indexes of teacher and teacher aide reported expressiveness and compliance. The teacher and teacher aide scores were statistically significantly and positively correlated for expressiveness (r = .62, p < .01) and compliance (r = .65, p < .01).

Previous research has demonstrated that the 23 items which comprise the expressiveness and compliant subscales are internally consistent (e.g., α = .84; Hogan, Scott, & Bauer, 1992). In the current study, teacher (α = .90) and teacher aide (α = .88) ratings also demonstrated good internal consistency across the entire 23 items. Scores were computed by averaging across the expressiveness and compliant subscales separately for teacher and teacher aide. Next, the scores were correlated. Teacher and teacher aide sociability scores were statistically and significantly correlated (r = .61, p < .01). A final score was computed by averaging the teacher and teacher aide sociability scores. If scores from only teacher or the teacher aide was available only that score was used. On average children demonstrated moderate to high levels of sociability (M = 1.45, SD = .29).

Second, to measure children's prosocial behavior, teachers and teacher aides completed the *social competence* subscale from the Social Competence and Behavior Scale (SCBS; LaFreniere & Dumas, 1996). The social competence subscale measures children's prosocial behavior with peers in the classroom and included behaviors, such as accepts compromises and cooperates with other children. Teacher and teacher aide completed the 10 items using the same a 3-point Likert scale as was used to measure sociability (0 = not true to 2 = very true). Previous research has demonstrated strong internal consistency (α ranging from .80 to .92) and test-retest reliability for the SCBS (r ranging from .78 to .86; LaFreniere & Dumas, 1996). Items were scored such that higher scores indicated more social competence. Cronbach's alpha coefficients indicated good internal consistency of teacher and teacher aide ratings of social competence ratings (α =.78, α = .74, respectively). Teacher and teacher aide scores were created by averaging the items within reporter. Next, teacher and teacher aide scores were correlated; results indicated that the scores were statistically significantly and positively (r = .41, p < .01). The magnitude of the association was modest indicating some variability across teachers in observed socially competent behavior. When both teacher and teacher aide scores were available, scores were averaged to create a single social competence indicator (M = 1.35, SD = .29).

Finally, teachers and teacher aides rated children's *popularity* amongst their peers. Developed for use in the Mothers and Preschoolers Study, the inventory measures teachers' and aides' impressions of how children were regarded by their peers. For instance, each teacher rated the extent to which participating children were accepted by peers, liked by peers, aggressive to peers, and rejected by peers. Only the popularity dimension was used in the present study. Popularity reflected the extent to which teachers and teacher aides viewed the participating child as accepted by peers, socially skilled, a leader, cooperative, and engaged. Teachers and teacher

aides rated how well each statement described the child using a 5-point Likert scale ranging from not at all (1) to always (5). Items were scored such that higher scores indicated more popularity. Teacher and teacher aide ratings of children demonstrated good internal consistency (α = .83, α = .74, respectively). Moreover, teacher and teacher aide reports also were statistically significantly and positively correlated (r = .52, p < .01). When both teacher and teacher aide reports were available, scores were averaged to create a single popularity score (M = 2.93, SD = 0.61).

To create an overall score of social competence, the sociability, social competence, and popularity scores were correlated. The scores were statistically significantly and positively correlated (r ranged from.73 to .80; p < .01). Since items were rated on different rating scales, each subscale was standardized, and the three indicators were averaged to create a single social competence subscale (see Table 1).

The three dimensions of school readiness were expected to be related, but also reflect variability in children's readiness for school. That is, executive function, language skill, and social competence develop at different rates for different children (Hawa & Spanoudis, 2014, LaParo & Pianta, 2000). Consistent with this expectation, language and social competence were statistically significantly and positively correlated but the magnitude of the correlation coefficient was modest (r = .23, p < .01; see Table 2). In addition, executive function and social competence (r = .16, p < .10) demonstrated only a trend towards statistical significance. Contrary to expectations, executive function and language skills were not statistically significantly correlated (see Table 2). Given the low correspondence across the three indicators, each indicator of school readiness was evaluated separately.

Data Analytic Plan

Prior to testing any study hypotheses, the means, standard deviations, skewness, and kurtosis were examined for all study constructs. Hypotheses 1 and 2 were tested using correlations. Continuous indicators of social contextual stressors and positive parenting will be correlated with children's school readiness skills. Statistically significant and negative correlations between social contextual stressors and school readiness indicators and statistically significant and positive correlations between positive parenting and school readiness scores would support hypothesized expectations.

To test hypothesis 3, structural equation modeling (SEM) was used to evaluate the impact of the cumulative stressor index on children's school readiness by way of positive parenting. In order to isolate the influence of positive parenting, negative parenting was statistically controlled. Structural models were estimated using full information maximum likelihood estimation (FIML; Byrne, 2010). If any data are missing, FIML is generally recommended because it generates unbiased estimates using all available data (Allison, 2003; Byrne, 2001; Byrne, 2010). The method estimates the best possible value for missing data by comparing cases with missing data to other cases with complete data.

Three indices were selected to examine the model fit. The chi-square statistic estimates the degree to which data differ significantly from the estimated model (Byrne, 2010). A chi-square statistic that is not statistically significant indicated that the data did not differ from the estimated model. The root-mean-square error of approximation (RMSEA) statistic measures the discrepancy between the hypothesized model and parameter estimates (Byrne, 2010). RMSEA ranges from 0 to 1, where 0 implies perfect model fit. A model was considered well-fitting with a RMSEA of less than .05, meaning the model does not significantly vary from the data. Lastly,

the comparison fit index (CFI) was examined. The CFI rewards parsimonious models and a value greater than .95 was considered to be a well-fitting model (Kline, 2005).

To test hypothesis 4, Latent Class Analysis (LCA) was used to evaluate the extent to which dichotomously transformed indicators of social contextual stressors formed reliable clusters of groups. LCA models were estimated using Mplus 6.11. Analyses proceeded by computing different models which specified increasing numbers of groups, specifically, a two group, three group, and four group solutions. Then, the best fitting model was selected by comparing the Bayesian information criterion (BIC) generated for each model. The BIC rewards parsimony by penalizing more complicated models. Starting with the most parsimonious model (e.g., the one factor solution), the BIC from an increasingly more complicated model (e.g., a two-factor solution) is compared by subtracting the two BIC values. The difference in the BIC from the incrementally more complex model and the more parsimonious model is evaluated much like a chi-square statistic with one degree of freedom. Once difference between the two models fails to reach statistical significance, the more parsimonious model is selected as the best fitting model (e.g., Byrne, 2013). The person-centered analysis tested if stressors cluster together in meaningful ways that is distinct from simply tallying the number of experienced stressors. Scores reflected the probability of various group membership. Scores on the individual indicators of contextual stressors were reviewed to identify variations in levels of risk each stressor group experienced.

Tests of hypothesis 5 depended on the results of hypothesis 4. First, the group identified as “least risky” in hypothesis 4 served as the comparison group. Next, the probability of group membership in any of the “risky” clusters were used as the stressor score in the structural model. The SEM computed for hypothesis 3 was replicated for hypothesis 5, this time substituting the

stressor groups for the cumulative stressor index. If multiple risk groups emerged, then the probability of each of these risk groups would be included as an indicator of contextual stress.

Results

As shown in Table 1, descriptive statistics were computed for all study constructs to ensure all constructs met normality assumptions. Regarding the contextual stress index, scores ranged from 0-to-7. On average mothers reported experiencing 3.05 risk stressors with variability around the mean (*SD* = 1.62). The skewness and kurtosis scores were both within the acceptable range (e.g., all scores less than 3.00). Likewise, parenting scores and children's school readiness scores demonstrated good variability around the mean, acceptable range, and no evidence of skewness or kurtosis.

Hypothesis 1: Positive parenting at age 2 will be positively associated with age 4 school readiness skills. Positive parenting observed when children were 2 years of age was expected to be positively associated with each of the three school readiness indicators. Results of correlational analyses indicated observed positive parenting when children were 2 years of age was statistically significantly and positively correlated with children's age 4 language skills (r = .18, $p < .05$; see Table 2). Specifically, mothers who were observed to be more positive during parenting tasks had children who demonstrated better receptive vocabulary skills 2 years later. Contrary to expectations, positive parenting was not statistically and significantly correlated with either children's executive function or social competence (see Table 2). The correlation between positive parenting and executive function was close to 0 indicating no evidence that positive parenting impacted executive function as measured in terms of cognitive flexibility. The correlation between positive parenting and social competence did approach statistical

significance suggesting that positive parenting was associated with slightly higher ratings of social competence.

Hypothesis 2: Social contextual stressors are negatively associated with positive parenting and children's school readiness. To consider the extent to which exposure to early social contextual stressors were associated with positive parenting and children's school readiness, bivariate correlation coefficients were computed. First, correlations were computed using each of the stressors that comprised the overall contextual stressor indicator. These correlations were computed to ensure that even at the individual stressor level, the direction of the association between stress exposure and adjustment were in the expected directions. This step also used the continuous stressor indicators rather than the scores that were recoded to reflect the top quartile of risk. Next, correlations were computed between the total contextual stress index and parenting and adjustment. Positive correlations among individual indicators or the contextual stress index with parenting and school readiness would provide support for hypotheses.

As described in Table 2, contextual stressor indicators were generally unrelated to positive parenting, executive function, language and social competence scores. Some notable exceptions emerged. First, contrary to expectations, mothers' mental health (r =.19, p < .05; see Table 3) and residential overcrowding (r =17, p < .05) were positively correlated with better executive functioning. That is, mothers who reported more depression and/or anxiety symptoms and mothers who reported more residential overcrowding also had children who performed better on the executive function task two years later.

Second and more consistent with expectations, not graduating from high school (i.e., mothers' education attainment) was statistically significantly and negatively associated with positive parenting (r = -.16, p < .05; see Table 2) and children's language skills (r = -.19, p <

Table 3.

Results of T-Test Mean Differences among Categorical Contextual Stress Indicators, Parenting, and Children's School Readiness

Panel A	High School Education Attainment									
	No			Yes			95% CI for			
Outcome	M	SD	N	M	SD	N	Mean Difference	*t*	*df*	*p*
Positive Parenting	3.04	0.81	51	3.34	.87	112	0.01-0.58	2.05	161	.04
Executive Function	6.36	6.00	45	4.93	5.55	103	-3.43-0.58	-1.40	146	.16
Language	80.68	11.18	44	85.70	11.90	105	0.86-9.16	2.39	147	.01
Social Competence	-0.06	0.80	43	0.02	.98	93	-0.26-0.40	0.42	134	.67

Panel B	Single Parent									
	No			Yes			95% CI for			
Outcome	M	SD	N	M	SD	N	Mean Difference	*t*	*df*	*p*
Positive Parenting	3.45	.80	71	3.10	.87	93	.07-.60	2.56	162	.01
Executive Function	6.21	5.52	63	4.74	5.79	85	.94- -.40	1.55	146	.12
Language	86.48	12.30	63	82.56	11.35	86	.06-7.77	2.00	147	.04
Social Competence	0.09	1.00	61	-0.09	0.83	75	-.05-19	1.15	134	.25

Panel C	Teenage Mother									
	No			Yes			95% CI for			
Outcome	M	SD	N	M	SD	N	Mean Difference	*t*	*df*	*p*
Positive Parenting	3.40	.91	80	3.12	.79	85	.01-.53	2.05	163	.04
Executive Function	5.82	5.80	72	5.00	5.61	77	-1.0-2.6	.87	147	.38
Language	85.72	11.41	72	83.12	12.43	78	-1.2-6.4	1.33	148	.18
Social Competence	-0.01	.97	63	0.00	.87	74	-.32-.30	-.10	135	.94

.05). That is, less well-educated mothers were observed to use less positive parenting and had children with lower receptive vocabulary scores two years later. Independent t-tests were computed to examine mean level differences in parenting and language scores associated with mother's educational attainment. Like the correlational analyses, the means of the observed parenting scores were significantly lower for mothers who did not graduate high school than for mothers who did (see Table 3, Panel A). Similarly, children of mothers who did not complete high school had lower receptive vocabulary skills than children of mothers with a high school degree (see Table 3, Panel A).

Two other contextual stressors were associated with positive parenting and school readiness indicators. Single parenting status was statistically significantly and negatively correlated with positive parenting (r = -20, $p < .05$) and children's age 4 language skills (r = -16, $p <.05$, see Table 2). Mean comparisons of level of positive parenting and language skill again indicated that single parent status was associated with lower levels of positive parenting and less sophisticated language scores (see Table 3, Panel B). Teenage mother status was statistically significantly and negatively correlated with positive parenting (r = -.16, $p < .05$; see Table 2), suggesting mothers were less positive during their interactions with their children if they became a parent during the teenage years. Mean comparisons confirmed this interpretation (see Table 3, Panel C).

Finally, the overall contextual stress index was correlated with positive parenting and school readiness indicators (see Table 2). The cumulative stressor score was negatively correlated with positive parenting, but only at the trend level (r = -.13, $p < 10$). This negative correlation suggests that as the number of stressors to which families were exposed increased a general decline in positive parenting emerged (see Table 2). Contrary to expectations, the

contextual stress index was not statistically and significantly correlated with language, social competence, or executive function skill.

Hypothesis 3: Positive parenting mediates the association between an accumulation of each contextual stressor and school readiness. The lack of any statistical associations among the cumulative stressor index, positive parenting, and school readiness indicators provided insufficient evidence to test a mediational hypothesis. That is, positive parenting cannot explain a relationship between contextual stressors and school readiness skills if that relationship does not exist.

Hypothesis 4: Discrete and reliable constellation of stressors can be computed. LCA was used to identify the presence of reliable subgroups of families based on patterns of stress exposure. Using the same dichotomously coded indicators of contextual stressors from the cumulative stressors approach, this analysis considered whether patterns of stress exposure, more than quantity of stressors, distinguished levels of observed parenting quality and school readiness. Using Mplus 6.11 (Muthén & Muthén, 2012), a series of LCA models were estimated beginning with a two-group solution and increasing the number of groups until no improvement in model fit was achieved. Two primary indices of fit were used to evaluate the LCA models, entropy and BIC. Entropy measures the degree of randomness in the solution; a coefficient closer to 1 indicates less random error in the solution (Larose, Harel, Kordas, & Dey, 2016). The BIC coefficient is used to compare fit across models. The statistic generally rewards parsimonious models and penalizes more complex models. A relatively smaller BIC is preferred to a larger BIC. Two steps were used to evaluate model fit. First, the entropy coefficient was examined. Preference was given to the largest entropy statistic. Second, BIC coefficients were compared across progressively more complex models. That is, the difference between BIC coefficients that

are nested (e.g., 2 group solution compared to a 3 group solution) is computed. A negative difference indicates that the BIC is progressively larger (worse fit), while a positive difference indicates a progressively smaller BIC, or a better fitting model. In addition, the BIC is comparable to a chi-square statistic with 1 degree of freedom. When the difference is no longer statistically significant, the more parsimonious solution is deemed the best fitting solution.

Table 4 summarizes the estimates of model fit. The first model computed was a two-group solution. This model demonstrated a very strong entropy coefficient (.896) and a BIC coefficient of 1750.58 (see Table 4). Next, the three-group solution was computed. The entropy reduced, and the BIC coefficient increased (see Table 4). The difference between the two-group and three-group solution on the BIC was -16.83, indicating a significant decline in the model fit (see Table 4). Next, the four-group solution was computed. No meaningful change in the entropy emerged and the change in BIC from the three-group and four-group solution indicated a worsening of fit (see Table 4). Thus, the two-group solution was selected as the best fitting solution.

Table 4.

Fit Statistics for Latent Class Analysis Models

Model	Entropy	BIC	Difference
Two-group Solution	.89	1750.58	
Three-group Solution	.87	1767.41	-16.83
Four-group Solution	.87	1798.75	-31.37

Note: Lower BIC indicates more optimal model fit.
Higher Entropy indicates less random error.

The next step was to evaluate the characteristics of the two-group solution. Sixty-seven percent of the sample was categorized into group 1 (n = 112) and 33 percent into group 2 (n = 55). One-way Analysis of Variance (ANOVA) procedures were used to compare the likelihood of scoring positively for a stressor by group. As shown in Table 5, the prevalence of teenage mother status was substantially higher in Group 2 than Group 1. That is, 43 percent of the mothers in Group 1 were identified as teen mothers compared to 65 percent of the mothers in Group 2. The difference in the prevalence of teen parenthood was statistically significant (F = 7.16, p < .01). Mothers in Group 2 also were more likely to score positively for mental health problems (F = 4.75, p <.05), violence exposure (F = 29.65, p <.05), and maternal substance use (F = 6.79, p <.05; see Table 5). In addition, mothers in Group 2 also were slightly more likely to experience residential overcrowding than mothers in Group 1 (see Table 5). Quite surprisingly, neighborhood danger perfectly discriminated the two groups. That is, all of the families scoring in the risk range for neighborhood danger appeared in Group 2. As such, mean comparisons between Group 1 and Group 2 were not possible using the dichotomous variable. To further examine the level of neighborhood danger, one follow-up ANOVA was computed comparing the continuous scores of neighborhood danger across the two groups. Group 2 families experienced, on average, 5.92 (SD = .79) dangerous events in the neighborhood compared to the 1.97 (SD = 1.41) events experienced by families in Group 1 (see Table 5). In addition, the variance associated with the two groups was substantially greater for Group 1 than 2. The difference between the two groups was highly statistically significant (F = 363.78, p < .01). Groups were indistinguishable in terms of educational attainment and single parent status. Given the multiple risk indicators experienced by Group 2, this group was labeled the “multi-stressor” group, while group 1 was identified as the relatively “low stressor” group.

Table 5.

Summary of the mean comparisons of stressor indicators across the groups generated from the LCA.

	Group 1		Group 2		
	M	SD	M	SD	*F*
Education Attainment	.30	.46	.32	.47	.05
Teenage Motherhood	.43	.49	.65	.47	7.16**
Single Parent	.55	.49	.57	.49	.06
Maternal Mental Health	.28	.45	.45	.50	4.75*
Residential Overcrowding	.40	.49	.55	.50	3.51+
Neighborhood Danger	.00	.00	1.00	.00	N/A
Neighborhood Danger[1]	1.97	1.41	5.92	.79	363.78**
Violence Exposure	.16	.36	.53	.50	29.65**
Maternal Substance Abuse	.21	.41	.40	.49	6.79*

Note: + $p < .10$; * $p < .05$; ** $p < .01$.

[1]Continuous value was used rather than dichotomous value.

Hypothesis 5: Positive parenting mediates the impact of unique stressor profiles on school readiness. In order to test the mediation model, the probability of being assigned to the multi-stressor group was used as the measure of contextual stressor. The LCA solution generated a probability of being coded into Group 1 or Group 2. For this analysis, the probability of being coded into Group 2 (multi-stressor group) was used as the continuous indicator of contextual risk. The probability scores ranged from 0 to 1.0 with higher scores indicating a greater probability of being in the multi-stressor group.

Separate SEM models were estimated for each school readiness indicator. In each model, negative parenting was statistically controlled. Figure 2 depicts the structural model estimated. The multi-stressor group probability and negative parenting were correlated and the direct paths to positive parenting and to each school readiness indicator were estimated. Several indicators were used to evaluate model fit. The chi-square statistic measured the difference between the data and the estimated model. A chi-square that is not statistically significant indicates that the data does not vary significantly from the estimated model and indicates a well-fitting model fit. The RMSEA statistic measures the discrepancy between the hypothesized model and parameter estimates (Byrne, 2010). RMSEA scores of less than .05 indicated a well-fitting model. The CFI value greater than .95 was considered to be a well-fitting model as it indicated that the hypothesized model adequately described the data (Kline, 2005). In addition to estimating the full model depicted in Figure 2, models were estimated for each school readiness indicator separately. Since these individual models were fully saturated, no fit indices were generated. The individual models did not differ from the full model and so the full structural model (see Figure 2) is reported so that model fit can be evaluated.

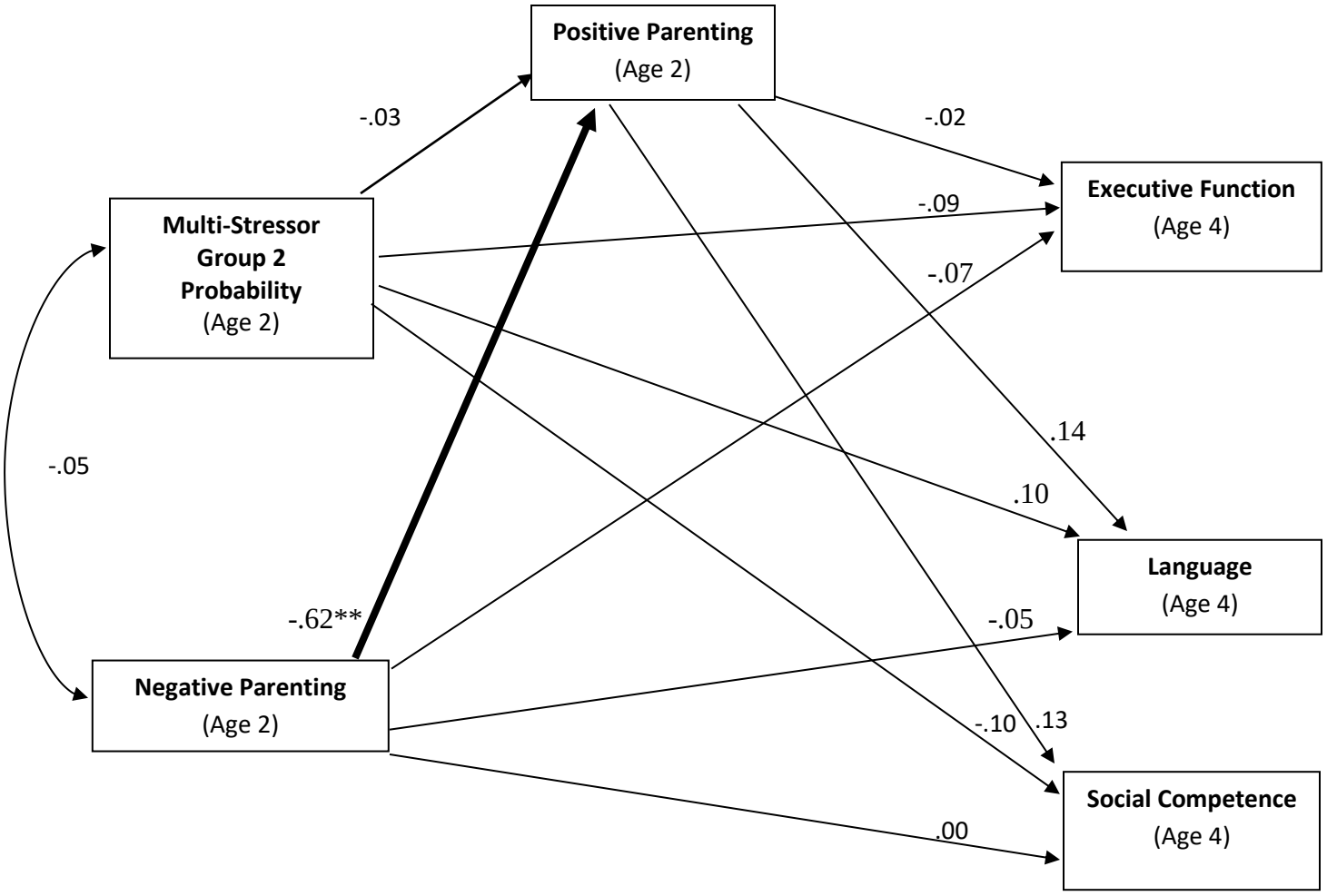


Figure 2. The structural model testing mediation effects of positive parenting on the association between the probability of group two membership and each indicator of school readiness. Standardized regression coefficients. χ^2 (3) = 11.22, p = .011; CFI = .899; RMSEA = .129; *p < .05. **p < .01.

The statistically significant chi-square (χ^2 [3] = 11.22, p <.01) indicated that the model did not fit the data well. In addition, other fit statistics (i.e., RMSEZ, CFI) suggested the model did not fit the data well. The RMSEA was .13, well above the .05 cutoff for good model fit. The CFI value of .89 also indicated a poor fit over the baseline model. When considering the influence of the multi-stressor group probability to each of the school readiness indicators, none of the path coefficients were statistically significant. In addition, the path coefficients from positive parenting to each indicator of school readiness skills were also not statistically significant. Finally, the path coefficient from multi-stressor group probability to positive parenting was not statistically significant. Thus, no statistical support for the hypothesis emerged. Only the control path coefficient from negative parenting to positive parenting was negatively and statistically significantly associated with positive parenting (β = - .62, p < .01; see Figure 2).

Discussion

The present study considered mechanisms by which social contextual stressors influenced toddler-aged children's acquisition of school readiness. Specifically, two approaches were used to examine how contextual stressors influence children's executive function, language, and social competence skills; the accumulation of stressors approach and the constellation of stressors approach. Although both methods can be used to measure contextual stress, each method varies in terms of the importance placed on individual stressors. The accumulation of stressors approach gives significance to the quantity of risk present while the constellation of stressors approach emphasizes the quality of the risk (e.g., Lanza & Cooper, 2016; Rhoades et al., 2011; Rutter, 1979; Trentacosta et al., 2008). The study compared both approaches to

evaluate the association between contextual stress and children's school readiness skills through parenting quality. Results of the study were mostly inconsistent with expectations.

First, positive parenting measured at age 2 was expected to be positively associated with each of the three school readiness indicators; executive function, language, and social competence at age 4. Consistent with expectations, positive parenting was associated with better language skills two years later. However, contrary to expectations, positive parenting was not associated with children's executive function or social competence skills. Second, each contextual stressor measured at age 2 was expected to be negatively associated with positive parenting and children's school readiness skills. Contrary to expectations, indicators of contextual stress were generally unrelated to positive parenting, executive function, language, or social competence skills. Third, different constellations of stressors were expected to emerge. Consistent with expectations, two distinct groups were identified that demonstrated qualitative differences in patterns of contextual stress risk experienced by the families. Finally, any direct link between contextual stressors and children's school readiness was expected to be mediated by observed positive parenting. Results did not confirm mediational expectations with either the accumulation of stressors approach or the constellation of stressors approach. The following sections will discuss study results and possible reasons for lack of empirical support.

Relationship between parenting, contextual stress, and children's school readiness skills

During early childhood, positive parenting has been associated with well-developed executive function abilities, language, and social competence (Raikes et al., 2007, Tamis-LeMonda, Bornstein, & Baumwell, 2001; Zhou et al., 2002). Consistent with expectations and previous research findings; positive parenting observed when children were 2 years of age was positively and statistically significantly associated with language skills at age 4. However, this

association was weak. Contrary to expectations, positive parenting was not associated with either executive function or social competence. Results suggest that mothers' positive parenting in this study had little influence on children's later school readiness skills.

One possible explanation for the lack of statistical association between parenting and children's school readiness could be the restricted range of observed positive parenting exhibited by mothers. That is, mothers in the current study displayed low to moderate levels of positive parenting. Given that mothers displayed lower levels of positive parenting, associations between parenting and school readiness may have been more difficult to detect. It is also possible that mothers were overwhelmed given the daily external stressors they experienced, which potentially affected positive parenting. Stressors associated with poverty, such as economic hardship or neighborhood danger among many other stressors, have been linked to less responsive parenting, and in turn, poorer cognitive and social skills in children (Brooks-Gunn & Kohen, 2002; Burchinal et al., 2006; Choe, Olson, & Sameroff, 2013). That is, under elevated levels of contextual stress, mothers may not have the time or energy to interact with their children and teach skills as other needs may take priority. Instead, staying vigilant and keeping their children safe may be more salient in a stressful environment than teaching school readiness skills. However, contrary to this conclusion, positive parenting has been found to be a protective factor for children in the face of stressful adversity. For example, Riley, Scaramella, and McGoron (2014) found children who received positive parenting at age 2, despite being exposed to elevated levels of risk (i.e., one standard deviation above the mean), demonstrated the highest level of social skills at age 4. These results suggest that positive parenting may protect or minimize the direct effects of contextual stressors on children's social adjustment.

Next, indicators of contextual stress were expected to be negatively associated with positive parenting and children's school readiness skills. Contrary to expectations, indicators of contextual stress were generally unrelated to positive parenting, executive function, language, or social competence skills. Two exceptions occurred. Unexpectedly, mothers who reported higher levels of mental health (i.e., depression and anxiety) and mothers who reported living in an overcrowded home had children who performed better on an executive function task two years later. The results are surprising given that previous researchers have consistently found that mothers, who experience mental health difficulties with depression and anxiety, tend to be withdrawn and less responsive to their children (e.g., Campbell et al., 2004; Palaez et al., 2008). Quite possibly, the development of executive function may be supported by other adults in the home. That is, for children living in a crowded residence, there may likely be other adults or older siblings that can play an active role in fostering the development of executive function.

As expected, dichotomous indictors of contextual stress exposure, including having low education, being a teenage mother, and single parent status were negatively associated with positive parenting. As expected, less well-educated mothers and single mothers had children with lower language skills at children's age 4. These results are consistent with studies that have found that low maternal education is associated with poor language skills and little cognitive stimulation in the home for low income families (Dollaghan et al., 2000; Gershoff, Aber, Raver, & Lennon, 2007; Green et al., 2009).

Mechanisms in the link between contextual stress exposure and acquisition of school readiness skills

The second set of analyses evaluated two approaches that can be used to understand the process by which contextual stressors influence the development of school readiness skills.

First, the accumulation of stressors approach gives equal weight to all experienced stressors, such that no one stressor is more impactful than another (Rutter, 1979). This approach assumes that as contextual stressors increase the ability to cope positively diminishes, thereby affecting children's adjustment (Ackerman et al., 2004; Lengua et al., 2007; Rutter, 1979). However, this method does not consider that some stressors may be more challenging than others. Second, the constellation of stressors approach proposes that the quality of contextual stressors is more salient than the quantity. This approach unpacks the effects of the total number of stressors present by examining the nature of the combinations of stressors experienced by families (Larose et al., 2016). Consistent with this theory, unique groups of stressors have been found that are qualitatively different (Rhoades et al., 2011). Variations of stressor groupings affect children's adjustment differently based on the configuration of stressors that are experienced (Rhoades et al., 2011; Pratt, McClelland, Swanson, & Lipscomb, 2016). The use of both approaches can expand the literature by exploring mechanisms that explain how exposure to contextual stress factors affects children's acquisition of school readiness skills, through their impact on parenting quality. The following paragraphs will discuss the mediational analyses for each approach.

First, a contextual stress index was created to examine the accumulation of stressors approach. Consistent with previous research, continuous scores for each identified stressor was dichotomized based on statistical sample distributions to reflect scores that were in the top or bottom quartile of contextual stress (e.g., Appleyard, et al., 2005; Rutter, 1979; Trentacosta et al., 2008). Stressors were coded "1" as meeting risk or "0" for not meeting risk. A contextual stress index was computed by summing the risk criterion (Sameroff, Seifer, & McDonough, 2004; Rutter, 1979). Contrary to expectations, the cumulative risk index was not significantly associated with executive function, language, or social competence skills. A negative trend

toward statistical significance was found in the association between positive parenting and the contextual stress index suggesting that as the accumulation of stress increased, positive parenting decreased slightly. Given the lack of significant statistical association among the contextual stress index, positive parenting, and school readiness skills, there was not enough evidence to test a mediation model using the accumulation of stressors approach. The lack of statistical support is in direct contrast to previous studies which have found that an accumulation of stressors is associated with poor school readiness skills and that parenting accounted for that risk (e.g., Lengua, et al., 2007; Trentacosta et al., 2008).

The second mechanism considered was the constellation of stressors approach. While the accumulation of stressors approach weighed all risk as equal, the constellation of stressors approach considered unique clusters or variations of stressor groups experienced by families in the study. The same dichotomously coded risk indicators of contextual stressors used in the accumulation of stressors approach were also used to consider unique groups of stress. Using LCA, consistent with expectations and previous research (e.g., Pratt et al., 2016; Rhoades et al., 2011) which has found distinct groups of contextual stressors; two clusters were identified in the current study: the "low-stressor" group and the "multi-stressor" group. Mothers in the multi-stressor group were more likely to be teenage mothers, experience mental health problems, reside in a dangerous neighborhood, have family or friends who were victims of violence, use substances, and reside in overcrowded homes than mothers in the low-stressor group. Unexpectedly, all mothers scoring in the high-risk range for neighborhood danger were part of the multi-stressor group. The probability of being in the multi-stressor group was then used as the measure of contextual stress exposure in the mediational model predicting executive function, language, and social competence. Results of the SEM models indicated failure to

estimate the effect of contextual stress on each school readiness skill by way of positive parenting, as none of the path coefficients were statistically significant. That is, the results of the constellation of stressors approach did not support the hypothesis that the association between the multi-stressor group membership and children's school readiness skills was mediated by positive parenting.

The results beg the question as to why the two approaches did not support the mediational hypotheses? Several explanations may exist for the unsupported theorized models. Quite possibly, families in the present study may have experienced substantially more stressors when compared to families in other studies. While comparing the scores of a cumulative stress index across studies may not be an exact match as cut-off points for risk can be sample dependent and can include the presence of several different demographic, mental health, and social risk factors (Holochwost et al., 2016; Pratt et al., 2016; Roy & Raver, 2014), exploring differences in stress exposure across research samples may help explain why the current study lacked statistical support.

As expected, a quick comparison indicated that independent studies included different stressors to create a cumulative stress index (Lengua, et al., 2007; Trentacosta et al., 2008). For example, Trentacosta and colleagues (2008) included 7 indicators of contextual stress (i.e., teenage motherhood, education attainment, single parent status, residential overcrowding, criminal conviction, drug/alcohol problems, and neighborhood danger). Lengua and colleagues (2007) included 9 indicators of contextual stress (i.e., ethnic/racial minority, poverty, residential overcrowding, single parent status, teenage motherhood, number of household moves in child's lifetime, negative life events, parental depression, and history of mental health or legal problems). The current study included 8 indicators of stress (i.e., education attainment, teenage

motherhood, single, parent status, maternal mental health, residential overcrowding, neighborhood danger, and violence exposure).

While the contextual risk indexes across studies are not identical, there are similarities. First, demographic stressors, such as teenage motherhood and being a single parent, and environmental stressors, such as residential overcrowding, were consistently used across the comparison studies as a measure of contextual risk (Lengua et al., 2007; Trentacosta et al., 2008). Second, studies used a similar number of individual contextual stressors to be included in the cumulative risk index, between 7-to-9 individual stressors. Given that the current study included a similar number of contextual stressors in the index as other studies using the same accumulation of stressors approach, a comparison of means was conducted which indicated the current sample had a much higher level of endorsed risk. On average, families in these previous investigations experienced one or two contextual factors in the high-risk cut-off range (Lengua et al., 2007; Trentacosta et al., 2008) compared to the families in the current study which experienced an average of three high-risk stressors. That is, families who participated in this study experienced more risk stressors than families in other studies using the accumulation of stressors approach (Lengua et al., 2007; Trentacosta et al., 2008), which placed them at even higher risk for negative mental and physical problems associated with elevated stress (Danese & McEwen, 2012).

Given that families in the current study experience higher risk for contextual stress, the second explanation for the unsupported mediational models could be that families may represent the extreme end of the distribution for the risk for contextual stressors. As such, significant association may be more difficult to detect as there is a restricted range. Future research exploring the effects of an accumulation of risk on children's school readiness should consider

recruiting diverse participants with more variability in their exposure to stressors as part of their methodology to detect significant associations, or new measures could be explored that are more sensitive to the stressors experienced by families in extreme poverty.

Although families who participated in this study may have experienced more contextual risk, two distinct stressor groups that differed qualitatively were found: a low-stressor group and a multi-stressor group. This is consistent with previous work with LCA models that has identified combinations of risk groups (Copeland et al., 2009; Lanza et al., 2010; Rhoades et al., 2011). However, a third explanation for the unsupported hypothesized models may be that regardless of group membership, families in the present study had already met the minimum threshold where risk is problematic making it difficult to capture the effects that the probability of being in the multi-stressor group could have on parenting quality and children's school readiness skills. A sample with a wider range of contextual risk may have yielded a better detection of multiple group combinations of risk and the effects of those groups consistent with expectations.

As a final explanation, children who participated in this study displayed low skills on all school readiness indicators. First, children's language skills were in the below average range. Second, ratings on the individual scales of social competence indicated children were rated low in popularity. Rating on classroom sociability and social competence were modest. Importantly, scores on executive function skills were very low as children displayed difficulty with the Stroop Task. While it was expected during the introduction of the task that children had the basic knowledge that the sun comes out in the day and the moon comes out at night, this was not the case. Instructions had to be modified to teach children this basic association before continuing with the administration. For children who could not associate the sun with day and the moon

with night during the teaching trials, the task was terminated with no points. If children were able to learn the association, then administration continued to teach the task that required children to label "moon" as "day" and "sun" and "night. Children then earned points for each correct answer. On average, children accurately identified 28 percent of the trials. The percentage is very low when compared to other studies who have reported an accuracy of 47 to 77 percent in children between the ages of 3.5 and 5.5 using the day/night Stroop (Gerstadlt, Hong, & Diamond, 1994; Montgomery & Koelzow, 2010). Given that the children in the present study were low in language, social competence, and executive function skills suggests that they were already at risk for poor school readiness skills. This could explain why a direct association between contextual stress and children's school readiness was not detected as there was little variability in children school readiness scores.

Strengths, Limitations, and Future Directions

The present investigation had a number of strengths. First, independent reporters were used for parenting and social competence measures overcoming concerns of shared method variance biasing the findings (e.g., Podsakoff et al., 2003). Positive parenting was rated by different groups of trained coders. Two behavioral tasks were used to increase variability of mothers' positive parenting across different contexts. Teacher and teacher aide ratings were used to measure social competence skills. Second, children's language was measured with a standardized instrument allowing direct comparisons across studies possible. Language was assessed using the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997). Third, executive function was assessed using a widely used procedure for children during early childhood. Executive function was measured using a picture version of the Stroop test (i.e., Day/Night Stroop; Montgomery & Koeltzow, 2010). Finally, negative parenting was statistically

controlled to evaluate the unique effects of positive parenting on change in school readiness. This is particularly important for the families in this study as mother's displayed low to moderate levels of positive parenting, which may influence the acquisition of skills.

The present study is not without limitations. First, families represent the extreme end of the distribution of risk for contextual stress. As such findings, while not statistically significant, are still unlikely to generalize to other populations whose contextual stress risk scores may be more normally distributed. Second, children in the present study had difficulties with the executive function task. While task administration assumed children understood the association between "day" with "sun" and "moon" with "night," many participating children never successfully completed the baseline, introduction trials. Given that the task is meant to measure children's executive function, children's difficulty with the task yielded low scores that may not be an accurate representation of their skill. Therefore, responses in the task may not be a valid indicator of children's executive function.

Despite these limitations, the results of this study have some implications for future research. While demographic stressors such as being a teenage mother at the time of first child birth does not change year to year, other stressors associated with poverty such as being a single parent, mother's level of education, mental health problems, multiple people living in the home, exposure to violence, and maternal substance abuse are likely to change over time (Ackerman et al., 2002; White & Rogers, 2000). For instance, a mother may remarry or move in with a partner such that she is no longer a single parent, or a mother may decide to go back to school to advance her education. These changes are not captured in a single point in time.

Given that some demographic, mental health, and environmental stressors related with poverty may fluctuate, future studies can use longitudinal investigations to capture change over

time and examine if this change in contextual stress exposure is associated to movement from one risk group membership to another. That is, will families fluctuate between low-risk and multi-risk stressors groups over time? Quite possibly, capturing the instability of stressors over time may provide insight into the impact risk factors have in children's development. Larger fluctuations of stressors could also affect parenting quality differently.

In conclusion, results from this study highlight the presence of risk profile groups that differed qualitatively, indicating that not all stressors are equal. Understanding how a unique combination of stressors affects the acquisition of children's school readiness is a major step toward modifying possible intervention programs. Informed intervention programs can target families with specific services based on their risk group profile. For example, families in a multi-risk profile could benefit from more intensive parent training programs aimed at improving the quality of parenting and promote school readiness skills. On the other hand, families in a low-risk profile could benefit from less intensive interventions such as material support that gives access to tangibles such as books that can promote children's cognitive and social competence by encouraging positive parent-child interactions in the home, which in turn increases school readiness skills (Burchinal et al., 2008; Green et al, 2009). That is, a constellation of stress approach can be a tool that can highlight unique combinations of stressors faced by high-risk families with implications for more person-centered intervention programs that promote the acquisition of school readiness skills during early childhood.

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Vita

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