PARENTING PRACTICES: RELATIONS TO CHILD SELF-REGULATION, PARENT FACTORS, AND CHILD ACADEMIC ACHIEVEMENT

By

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Human Development and Family Studies – Doctor of Philosophy

2024

ABSTRACT

Parenting is a well-established predictor of children's self-regulation, a critical skill which is associated with myriad adult outcomes and develops markedly across the preschool age. The literature highlights three major mechanisms through which parents may support preschoolers' self-regulation development: establishing routines and supporting transitions, providing opportunities for autonomy, and modeling regulated emotions and behavior. The current work seeks to present and validate a new parent survey designed to capture these mechanisms. Across fall datasets (2019-2021) with a fairly diverse sample, parents reported high frequencies of support, with low reports of using a job chart/visual schedule and providing items for children to track time. An Exploratory Factor Analysis was conducted on data from 2019 (N = 271), followed by a Confirmatory Factor Analysis on combined data from 2020 and 2021 (N = 473), and a final EFA on that same dataset. Linear regressions were conducted to assess relations between the latent construct and child-level variables (executive function skills and behavioral self-regulation), as well as parent-level variables (maternal education, parent stress, and parent self-regulation). A mediation was then conducted to examine child self-regulation as a mediator between parent support and child academic outcomes (math and literacy). Factor analyses revealed a single factor structure with four items pruned; models were similar across iterations and between EFAs. No relations were identified between the latent construct and child-level or parent-level variables, except for parent self-regulation which showed a positive relation. No mediation effects were identified. Reasons for these unexpected findings are discussed, such as social desirability bias and unmeasured variables. These strategies appear to represent a single cohesive aspect of parenting which may not be a driving force in children's self-regulation.

Future work would benefit from including an observational measure for comparison with parent report.

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ACKNOWLEDGEMENTS

First, I wish to express tremendous gratitude to my committee chair, Dr. Lori Skibbe, for her consistent support, insightful guidance, and mentorship across my years of graduate school and particularly during the completion of this dissertation. I am confident in the many skills you have helped me to foster, and that these competencies will serve me in both personal and professional ways. I am also deeply grateful to Dr. Hope Gerde for her kindness, compassion, and mentorship, which began from the moment I joined the lab as a project manager in 2015. Along with inspiring me with your passion and expertise in the field, you provided me with constructive feedback and guidance along with invaluable research and practitioner experiences that helped to shape my own passions and expertise. I view our wonderful time and efforts together on iWRITE as a core experience in my life that I will continue to draw from in all my future work. My sincerest appreciation goes also to Dr. Ryan Bowles, for his sense of humor, patience, and support through statistical coursework as well as early stages of planning and analysis for this work. I have you to thank for the quality and rigor of this study design. I also wish to express gratitude to Dr. Sarah Douglas, who generously joined my committee post-proposal to lend her expertise to the evaluation of this work. I am grateful to Dr. Jodene Fine as well, for her constructive criticism during the proposal stage, and for her provision of resources to apply that feedback.

It has been a true pleasure to work with Lori, Hope, and Ryan in the Early Language and Literacy Investigations (ELLI) Lab throughout my graduate career. Your combination of methodological rigor and kindness—both in grant-focused work and in coursework—facilitated my ability to think critically about research and enhanced my writing and presentation skills. I am truly appreciative of your availability, communication, and support across my years at MSU.

It was a pleasure to work across grants for each of you and I am incredibly grateful for the funding you provided through research assistantships. I also wish to express profound gratitude to the support and friendship provided by Haruka Konishi, Arianna Pikus, Tiantian Sun, Yatma Diop, Madison Chandler, and Burcu Tatar-Ozkum. You brought so much warmth, joy, and camaraderie to my graduate experience.

I am thankful as well to members of the HDFS department who scaffolded my journey, particularly Dr. Claire Vallotton for her critical program knowledge and high-quality graduate advising. I am grateful to have received scholarship and fellowship support beyond my research assistantships throughout the program. I feel lucky to have been a part of a department that prioritizes providing a supportive and academically rigorous environment for students. I am also appreciative of the many resources offered within the department and university more broadly; specifically, I am very grateful to Nicole Jess for her patience and support on some of the challenging aspects of the current work.

Finally, I owe a great deal of my progress and success to my friends and family, particularly my mother, who supported me in innumerable ways throughout my education. I am grateful to Leader Dogs for the Blind for giving me Jahi, my Little Lion, who has been a perpetual source of comfort, company, and stimulation throughout my PhD program. Many thanks as well to Haruka Konishi, Sheyenne Ridenour, Amanda Zelen, Haley Allgeyer, Anthony Andrus, and Beth Decker for their consistent love and friendship. I am profoundly grateful to have such kind, devoted, and encouraging individuals on my team.

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CHAPTER 1: INTRODUCTION

Parenting is a well-established predictor of children's socioemotional development (Healy et al., 2015; Hosokawa & Katsura, 2017), specifically behavioral self-regulation (Gardner et al., 1999; Hughes & Ensor, 2009; Piotrowski et al., 2013). Self-regulation is the ability to control one's own behavior (Barkley, 2011), a capacity that is related to numerous crucial child and adult outcomes spanning the areas of education, physical and mental health, income, financial management, criminal activity, and family planning (Moffitt et al., 2011; Robson et al., 2020). Individual self-regulatory skills include inhibitory control, working memory, and cognitive flexibility, which develop from infancy through toddlerhood and then rapidly into the preschool age, culminating in the integrated form of behavioral self-regulation (McClelland et al., 2014).

During this preschool period, self-regulation may be promoted through three major mechanisms of parenting practices: establishing routines and supporting transitions, providing opportunities for autonomy, and modeling regulated emotions and behavior. Specific parenting practices within these mechanisms are thought to target self-regulatory skills, based on abundant theoretical and empirical evidence. These include both proactive practices, in which parents anticipate children's need and behaviors to preclude potential issues and conflicts (e.g., offering choices, discussing schedule, scaffolding) (Denham et al., 2000; Gardner et al., 1999; Lengua et al., 2007; Shelleby et al., 2012), and select reactive practices, which occur after undesirable behavior with the aim of restoring regulation (e.g., redirection) (Cipriano & Stifter, 2010; Giordano et al., 2018; Pianta et al., 2008) or preparing the child to regulate more effectively in that scenario in the future (e.g., reasoning) (Knafo & Plomin, 2006; Krevans & Gibbs, 1996; Lansford et al., 2012).

Certain factors are known to influence the quality of parenting, and thus may affect parents' use of practices which target self-regulation. Specifically, mothers who have attained higher levels of education tend to engage in more overall beneficial parenting practices (Cuartas, 2021; Davis-Kean, 2005; Jeong et al., 2017; Lansford & Deater-Deckard, 2012; Prickett & Augustine, 2016), and show stronger specific proactive parenting skills (Carr & Pike, 2012; Harvey et al., 2016; Matte-Gagne et al., 2015; Raviv et al., 2004). Parents' own ability to regulate their behavior is another significant factor; stronger parent self-regulation is associated with more parenting interactions and positive and proactive practices (Distefano et al., 2018; Crandall et al., 2015; Obradovic et al., 2017). Finally, parent stress is important to consider, given that parents experiencing increased stress tend to engage in lower quality parenting, ranging from a lack of autonomy support to active yelling and hitting (Andreadakis et al., 2020; Black et al., 2001). As such, the current work examines how these factors may influence parents' use of self-regulation-promoting practices.

Parenting practices (and the factors that influence them) may be especially important for children's self-regulation given the benefits of self-regulatory skills for children's academic development (Duckworth et al., 2019). Stronger behavioral self-regulation in preschool is related to higher achievement in reading and math at kindergarten entry (Welsh et al., 2010), elementary school through high school (Blair & Raver, 2015; Duckworth & Seligman, 2005; Skibbe et al., 2019; Vitaro et al., 2005; Zhou et al., 2010), and college (Galla et al., 2019; Tangney et al., 2004). Although mediation models have explored pathways from parenting to academic performance through children's self-regulation (Kopystynska et al., 2016; Lee et al., 2012; Chan, 2021), very few have focused on the preschool period or parents' use of proactive parenting

practices (Devine et al., 2016; NICHD Early Child Care Research Network, 2003; Perry et al., 2018), leaving more to be explored.

Although surveys can be an efficient, economical, and accurate way to collect data (Korucu et al., 2019; McEachern et al., 2012; Parent & Forehand, 2017), few self-report surveys exist which (a) apply to the preschool age, (b) target children's self-regulation development, and (c) emphasize proactive practices. The current study provides a survey through which to explore how parents employ the previously discussed practices and further examines how these strategies might relate to children's self-regulation. The aforementioned factors relating to parenting practices (maternal education, parent stress, and parent self-regulation) are also examined with regard to their possible association with the self-report supports. Finally, the possible mediation pathway from parents' self-reported practices through preschool behavioral self-regulation to children's academic outcomes is evaluated. Altogether, this work strives to contribute to the ongoing and recent literature examining links between parenting and child self-regulation, with the goal of informing best practices for optimal child outcomes.

CHAPTER 2: LITERATURE REVIEW

Importance of Parenting for Child Development

Parenting is consistently, robustly related to young children's academic, cognitive, and emotional skills, and serves as a mechanism through which contextual factors such as SES influence child development (Hoff, 2003; Lengua et al., 2007; Lugo-Gil & Tamis-LeMonda, 2008; Merz et al., 2015). Since the genesis of parenting research in the 1930s, parenting has typically been measured as a broad construct defined by dimensions or styles (see Power, 2013). Dimensions and styles typically refer to the "how" of parenting; that is, the "emotional and relational climate" that parents create (Patrick et al., 2013, p. 74). Early research first identified parenting dimensions, including warmth and control. Warm parenting is characterized by responsiveness to children's cues, as well as supportiveness of children's interests and opinions to promote their individuality and independence. Parenting that is high on the dimension of warmth is well-established in the literature as supportive of positive outcomes in children, including emotional regulation and social skills (Hart et al., 2003; Garcia et al., 2019), behavior and cognition outcomes (Neel et al., 2018), and self-esteem and happiness (Garcia et al., 2020). The control dimension reflects parenting that is high in directive and critical behavior, exerting demands on children to become integrated into the family and society. Parenting characterized by high levels of the control dimension is associated with mixed outcomes in children, depending on the type of control, but still generally relating to a variety of child outcomes including internalizing and externalizing problems, academic achievement, social skills, substance use, and self-esteem (Gonzalez-Camara et al., 2019).

Over the years, research has combined the dimensions of warmth and control to create parenting styles. The most prominent styles include permissive, authoritarian, and authoritative

(Baumrind, 1967). Permissive-style parents are high in responsiveness but place few demands on children, while authoritarian parents are less emotionally supportive, providing fewer choices and requiring strict adherence to the rules imposed by their authority. In many Western cultures, authoritative parenting balances the two dimensions; these parents are both responsive and demanding, considerate of children's feelings while still providing structure and guiding children's behavior in accordance with developmentally appropriate expectations (Kuppens & Ceulemans, 2019).

Foundational (Baumrind 1967, 1971, 1978, 1991) and recent research (Kuppens & Ceulemans, 2019) has highlighted the importance of these styles for children's development. Specifically, the authoritarian parenting style—marked by strictness without warmth—is associated with negative developmental outcomes, including reduced prosocial behavior (Kuppens & Ceulemans, 2019), lower self-esteem (Pinquart & Gerke, 2019), internalizing problems (Rose et al., 2018; Steinberg et al., 1994) and externalizing behaviors (Pinquart, 2017; Thompson et al., 2003). Similarly, children of permissive parents tend to have high levels of both internalizing (Williams et al., 2009; Wolfradt et al., 2003) and externalizing (Pinquart, 2017; Steinberg et al., 1994) behavior problems. The most desirable outcomes are observed in children of parents who fit the authoritative parenting style which combines warmth and strictness; these children consistently show positive developmental outcomes in comparison to those raised with other styles (e.g., Lamborn et al., 1991; Steinberg et al., 1994). Specifically, children of authoritative parents tend to have higher self-esteem (Pinquart & Gerke, 2019), stronger academic performance (Masud et al., 2015), and fewer internalizing and externalizing problems in toddlerhood, early childhood, and adolescence (Eisenberg et al., 2009; Paulussen-Hoogeboom

et al., 2008; Pinquart, 2017; Querido et al., 2002; Rinaldi & Howe, 2012; Steinberg et al., 1994; Steinberg et al., 2006).

Clearly, given these associations, parenting dimensions and styles are tapping into relevant mechanisms for child outcomes. However, focusing exclusively on styles and dimensions in isolation of specific parenting behaviors has limitations. For example, several studies indicate that the specific set of parenting styles identified and applied in Western cultures may not exist in other countries (Dwairy et al., 2006; Kim & Rohner, 2002); moreover, the styles determined to promote healthy development in White, American and European families may be less effective for that purpose in different cultural environments (Checa & Abundis-Gutierrez, 2018; Pinquart & Kauser, 2018). Furthermore, these domains typically focus on the "how" -- or general emotional context -- of parenting, rather than what parents actually do. As Williams and colleagues (2009) put it, "A parenting style is an attitude that is expressed toward the child across a wide range of situations, whereas practices or behaviors are expressed toward the child's behavior in specific situations" (p. 3). As such, parenting practices are often referred to as the "what" of parenting - that is, the observable behaviors that parents engage in when parenting children. This includes specific behaviors such as establishing routines, using modeling to promote target behaviors, and providing scaffolding to ensure an optimal challenge. Focusing on these behaviors as important in and of themselves is valuable.

Compared to styles and dimensions, less research has focused on parenting practices, even though they are undeniably important for development (Power, 2013). Research indicates that parenting practices across early childhood are associated with myriad outcomes including internalizing behavior problems (Rose et al., 2018), physical aggression (Brotman et al., 2009), executive function (Lucassen et al., 2015), healthy eating (Sleddens et al., 2014), social skills

(Takahashi et al., 2015), physical activity (Xu et al., 2015), and developmental delays (Cprek et al., 2015). Furthermore, recent research is pushing for a movement away from global parenting styles and towards more discrete aspects of parenting such as practices, arguing that style and dimension categorizations are too simple and that parents are likely "flexibly deploying different practices depending on their goals, children's needs, and the types of behaviors towards which parenting is directed" (Smetana, 2017). Similarly, in an introduction to a recent special issue in *Developmental Psychology* on emotion and self-regulation, Spinrad and colleagues (2020) stress that "we should move beyond a focus on global parenting styles and to a more specific focus on emotion-related socialization behaviors and in-the-moment parenting practices" (p. 388). Accordingly, the current work focuses on parenting practices.

Parenting practices have been studied across a variety of domains, spanning from nutrition (Vollmer & Baietto, 2017), to literacy (Hindman & Morrison, 2012), and physical activity (Hutchens & Lee, 2018). The current work focuses on parenting practices in relation to children's socioemotional development, given the strong influence of parenting on numerous social skills such as interacting positively with peers, regulating emotions, and minimizing aggressive behavior (Healy et al., 2015; Hosokawa & Katsura, 2017). Together, these socioemotional skills represent capacities that are crucial for school readiness and predict a range of adult outcomes (Fergusson et al., 2005; High, 2008; Jones et at., 2015; McClelland et al., 2007; Rimm-Kaufman et al., 2000). Parenting behaviors may be especially important for development of a core aspect of socioemotional development known as self-regulation, which refers to children's ability to control their own behavior. Although research into parenting styles indicates that parents adhering to authoritative discipline tend to have children with stronger self-regulatory skills (Piotrowski et al., 2013), little is known about which specific parenting practices

may play a role in children's self-regulation development. The current work seeks to elucidate this topic, particularly given the importance of self-regulation for a variety of child outcomes.

Importance of Self-Regulation

Self-regulation is a domain-general skill that allows children to control and direct their behavior in adaptive ways in response to the context provided (Barkley, 2011). Typically used as an umbrella term and closely aligned with executive function (Liew, 2012), "self-regulation" involves the coordination of inhibitory control, working memory, and cognitive flexibility (McClelland et al., 2014). Inhibitory control allows children to resist predominant impulses in favor of more appropriate behaviors. Children use working memory to store and reference information as they are completing a task or solving a problem. Cognitive flexibility is required for children to adapt to changing rules or information. These three skills are thought to work in concert to support children to self-regulate.

As stated by Posner and Rothbart (2000), "Understanding self-regulation is the single most crucial goal for advancing the understanding of development" (p. 427). This popular stance stems from strong relations between early self-regulatory skills and myriad adolescent and adult outcomes that impact society at large. For example, early deficits in self-regulation are consistently associated with problematic behavior in older childhood and adolescence such as delinquency at ages 10-13 (White et al., 1994) and criminal offending at age 18 (Henry et al., 1996) and 21 (Wright et al., 1999). Furthermore, having behavior problems in preschool has been identified as the single best predictor of antisocial disorders at age eleven (White et al., 1990). Indeed, self-regulation during the preschool period appears particularly influential; children poorly regulated at age three tend to continue to struggle with self-regulation by age 26

(Caspi et al., 2003), indicating that early development of self-regulation is paramount for preventing societal detriment.

Young children with higher levels of self-control, an important aspect of early self-regulation, scored significantly higher on five clinical measures of physical health by 32 years of age (Moffitt et al., 2011). Similarly, these better-regulated children developed into adults who were more financially savvy and stable, and less likely to be involved in crime. In contrast, children from this study who struggled with self-regulation tended to become adults who had an elevated risk for substance dependence, became single parents, accumulated credit problems, and were more likely to be convicted of a criminal offense, even after accounting for SES and IQ. This groundbreaking Moffitt et al. 2011 study was later replicated with the results adjusted to account for childhood conduct problems as a confound (Fergusson et al., 2013). Although some associations were reduced, self-regulation still proved predictive of central adult outcomes by age 30, including violent offending, welfare dependence, educational attainment, and income level. Consistent with Moffitt's findings, childhood self-regulation was associated with healthy, wealthy, and beneficial outcomes in adulthood, regardless of gender, SES, or IQ (Fergusson et al., 2013). A very recent study extended these findings to demonstrate that higher self-control in childhood even predicts slower aging by 45, as well as stronger ability to manage health, financial, and social demands (Richmond-Rakerd et al., 2021).

A recent meta-analysis examining 150 studies confirmed that self-regulation in preschool is positively associated with school-aged children's social competency, school engagement, and academic performance (Robson et al., 2020). Furthermore, self-regulation at age eight predicted academic achievement, employment status, aggressive and criminal behavior, depression and anxiety, obesity, alcohol and substance abuse, as well as physical illness by 38 years of age.

Importantly, this meta-analysis included several large, international studies with sample sizes ranging from 1000 to 16,000 children. Among these, several studies in Australia identified relations between self-regulation and executive function, school engagement, academic achievement, sleep problems, internalizing problems, obesity, self-harm, drug and alcohol use, and criminal behavior (Howard & Williams, 2018; Sawyer et al., 2015). Similarly, research in the UK has linked self-regulation to academic achievement and behavior problems (Edossa et al., 2018; Flouri et al., 2014). Many large studies from the Netherlands further show associations between self-regulation and healthy living (de Winter et al., 2016), behavior problems (Veenstra et al., 2010), academic achievement (Backer-Grøndahl et al., 2018), internalizing and externalizing problems (Oldehinkel et al., 2004), adulthood anxiety disorders, mood disorders, disruptive behavior disorders, and substance abuse (Althoff et al., 2010). Benefits of higher self-regulation have also been identified in Singapore and China, showing reduced addictive behavior (Liau et al., 2015) and higher social popularity (Liu et al., 2016) respectively. As such, across the globe, the criticality of early self-regulation abilities for healthy development and societal profit cannot be understated.

Self-Regulation Development

Infancy

Precursors to self-regulation are evident as far back as infancy and toddlerhood. The earliest forms appear as reactive reflexes, such as self-soothing after experiencing distress (Kopp, 1982). Neural networks relating to regulatory function at this age prioritize orientation to sensory stimuli (Calkins, 2007; Posner et al., 2012; Rothbart et al., 2011). This is the foundation of attention regulation, a key aspect of self-regulation that manifests early in development and is thought to pave the way for the defined components and their eventual integration for volitional

action (Posner & Rothbart, 2005). At this stage, infants' success at regulation depends almost entirely upon adult (e.g., parent, teacher) supports, such as awareness, flexibility, and responsivity to children's communications and needs (Calkins, 2007).

Toddlerhood

Between one and three years of age, the components of self-regulation become more evident, but are still distinct and relatively rudimentary. As such, children remain heavily reliant on caregiver support for regulating their behavior, particularly in contexts which require strong exertion of a single underdeveloped self-regulatory skill (e.g., working memory) and contexts which require children to integrate multiple self-regulatory skills. Although children in this window are thought to gradually become aware of social expectations based on social reactions and use early self-regulatory skills to direct their actions, they remain limited to tasks that don't require integration of skills. That is, children under three struggle to coordinate self-regulatory skills simultaneously to produce a behavioral response (Carlson et al., 2002; Diamond 2002; Zelazo et al. 2003). This idea is supported by research demonstrating toddlers' ability to comply with an inhibitory instruction (e.g., don't touch the toys) but less adherence to a persistence instruction (e.g., clean up the toys) which requires the child to execute and coordinate multiple skills (Calkins, 2007). As such, though simple caregiver instructions and prohibitions are typically manageable, more cognitively demanding tasks require significant adult guidance. Similarly, toddlers at this age are unable to generate regulatory strategies, and it is not until age three that children are thought to use internal representations (e.g., rules) to exert control over their behavior (Kochanska et al., 2001; Kopp, 1982). Caregiver communication and signals are still required to cue appropriate behavior.

Preschool

By three years of age, children first begin to utilize distinct self-regulatory skills independent of caregiver direction; they are able to effectively and more fluently use working memory and inhibitory control, and these skills continue to strengthen rapidly during the preschool period. Given the transition to more independent self-regulation at this developmental level, expert guidance may be especially valuable to promote effective, autonomous use of self-regulatory skills and strategies. As such, it is particularly important to understand what supports children are receiving from caregivers during this critical time.

Given the rapid development of self-regulatory skills during preschool as well as the strong relations between this ability and academic outcomes, much of the literature on self-regulation has focused on this period (see McClelland & Cameron, 2012). Children improve quickly in their ability to accurately recall information on picture memory and other basic recollection tasks from preschool through kindergarten entry (Diamond et al., 1997), although variation is observed based on the target of recall (i.e., words, numbers, or objects; Garon et al., 2008). Strong gains in inhibitory control are evident in children's performance on tasks such as waiting for a reward, slowing down motor activity, controlling voice volume, and taking turns (Kochanska et al., 1996). Acceleration in inhibitory control development appears particularly notable between ages three and four (Clark et al., 2013). During this period, children's ability to inhibit a physical response commanded by a toy animal they had been instructed to ignore increased from 22% to 91% (Jones et al., 2003). Closer to age four, children in this task also showed slower reaction time following an error, indicating a stronger spike of inhibitory activity versus children under 39 months who showed no such slowing. As a part of their examination, Jones and colleagues also observed a variety of strategies that children would employ to support

their ability to exert inhibitory control. The majority of children used physical strategies, such as clasping or sitting on their hands, and the use of these supports increased from 18% to 55% between 36 and 41 months of age. By 48 months, use of these strategies decreased to 29%, although their performance on the task was higher than ever. This likely indicates that—at least within the context of that task—children's development had advanced to a point at which they no longer required an additional support to successfully apply inhibitory control.

Across the preschool period, most children experience a shift from reactive or co-regulated behavior to higher-level cognitive behavioral forms of self-regulation which require the integration of multiple skills (e.g., Diamond, 2002; Kopp, 1982). Preschool children's ability to coordinate separate self-regulatory skills in service of a task has been demonstrated in a variety of measures. For instance, the Day/Night Stroop task requires children to say "day" when presented with a black card showing a moon and stars, and "night" when shown a white card with a sun (Diamond & Taylor, 1996). This task requires both inhibitory control to resist the prepotent urge to say the more associated word and instead voice its opposite, as well as working memory to recall and apply the rules of the game. At age three, children consistently fail, but by age four children show 80% accuracy across trials. Regardless of the behavioral response required by the task (e.g., verbal, motor), many other tasks show a similar performance spike between ages three and five (Calkins, 2007; Diamond et al, 1997; Rueda et al., 2005).

It is not until four years of age that children begin to demonstrate the third aspect of self-regulation, cognitive flexibility. Given that this skill builds on attention, working memory, and inhibitory control, it is thought to develop last; children who struggle with self-regulation in general tend to perform worst on cognitive flexibility tasks, lending support to the previously discussed developmental progression of self-regulatory skills (Caughy et al., 2013). The

development of cognitive flexibility is most famously depicted by the Dimensional Change Card Sort task (Zelazo et al., 1996) in which three-year-olds can successfully sort picture cards by shape or color, but tend to perseverate when instructed to sort by the other dimension. Fascinatingly, these children are still able to articulate the new rules if asked (demonstrating aspects of working memory and inhibitory control), but are unable to use that information to guide their behavior. By age four, children are able to switch dimensions and sort accordingly (Zelazo et al., 2003; Zelazo, 2006), indicating that the third component of self-regulation has finally joined the set.

Behavioral self-regulation in its fully integrated form—available to most children around four to five years of age—is typically defined as the deliberate application of multiple self-regulatory skills simultaneously to behavior in real world contexts (McClelland et al., 2014). Across home and school settings, demands are frequently placed on children to attend to instructions, recall information, resist impulses, and persist at completing learning tasks – all of which would require this integrated form of behavioral self-regulation. Measuring this kind of self-regulation with a single task, rather than a composite score from tasks testing individual components, is still relatively new to the field. Perhaps the most popular assessment is the Head Toes Knees Shoulders (HTKS), designed for diagnosing growth across or between school years for children ages 4 to 8 (Ponitz et al., 2009). In this measure, children are required to perform physical responses that have been deemed the "opposite" of what the assessor prompts (e.g. "touch your head" requires the child to touch their toes). This task is designed to tap each of the components of self-regulation simultaneously: working memory to remember the rules of the game, inhibitory control to perform the opposite behavior, and cognitive flexibility to change rules. It is considered by some to be the most comprehensive measure for assessing the

integrative nature of self-regulation, and its authors argue that it uniquely taps aspects of this construct that reflect the behaviors required of children in learning contexts (McClelland & Cameron, 2011). Consistent with the previously discussed developmental trajectory, children ages three to four struggle mightily with this task, but their performance improves dramatically through school entry and they typically hit ceiling around age eight.

Clearly, the preschool period is a crucial stage of the development for self-regulation. This development can be helped or hindered by the strategies parents employ to support and address behavior (Karreman et al., 2006; Morawska et al., 2019). The current work focuses on how specific parenting practices may promote healthy self-regulation development.

Proactive and Reactive Parenting Practices

Most parents use a variety of strategies to manage their children's behavior. Some of these are proactive, in which parents anticipate children's needs and behaviors, which allows them to structure their environment and interactions to preclude potential issues and conflicts. Proactive techniques typically include strategies such as preemptively scaffolding, structuring, and reasoning with children before the child begins to struggle or behave inappropriately (Gardner et al., 1999). Other strategies are reactive, in which parents respond to misbehavior after it has occurred. This might include a previously mentioned practice such as explaining consequences and using reasoning, or a more punitive method such as yelling or hitting, but most importantly a reactive strategy is utilized after an inappropriate behavior.

Proactive Practices

Although many parents may use a mix of reactive and proactive approaches, research suggests that parents who favor proactive practices can benefit children's development. Several theories provide possible explanations for this relation. First, proactive parenting may improve

child outcomes through positively affecting parent emotions. Parents who favor proactive strategies tend to prevent misbehavior (e.g., Gardner et al., 1999), which may then reduce the frequency of parent-child conflicts. Fewer conflicts can reduce parental frustration that can lead to the use of forceful discipline going forward (Campbell et al., 1991), which is known to relate to myriad issues across development (Gershoff & Grogan-Kaylor, 2016). Similarly, reduced conflict can boost parents' feelings of competence (Holden, 1983), and thus their self-esteem (Patterson, 1980). As such, proactive parenting may facilitate parent-child cooperation and harmony. Another explanation is that proactive parenting strategies inherently involve greater constructive and instructive communication between parents and children. This influx of language as parents engage children in conversation and demonstrate sensitivity to their needs would in turn promote children's socioemotional development. Finally, proactive parenting may benefit children by teaching them which behaviors are appropriate in different contexts, rather than relying on corrective feedback.

Proactive parenting, in contrast to more reactive strategies, appears particularly beneficial for children's self-regulation development. As far back as the 80s, research has indicated that parents who favor the use of proactive practices to preempt child misbehavior tend to have children who regulate their behavior more effectively than children of parents who rely on reactive techniques (Gardner et al., 1999; Holden, 1983; Holden & West, 1989; Pettit & Bates, 1989). Gardner and colleagues (1999) examined mothers' use of proactive or reactive strategies during a clean-up task and discovered that 80% of children whose mothers used proactive strategies showed behavioral regulation by complying with every directive throughout the task. This was in stark contrast to the 24% of children who complied with directives given by mothers using reactive strategies. Furthermore, the authors found that reactive strategies at age three

predict age five behavior problems, even after controlling for problems at age three. Interestingly, the frequency and positive nature of practices used by mothers in this study's "tidy up" task were irrelevant; rather, the timing of the practice was the crucial factor. That is, mothers of children with conduct problems used the same frequency of positive strategies as mothers of children without behavior problems, but implemented them after misbehavior had occurred. This difference in timing best discriminated parents with and without children with conduct problems. As such, it appears that the timing of the strategies—that is, their proactive nature—is of particular importance to support children's self-regulation.

Several possible explanations exist as to why strategies that are proactive in nature would be especially beneficial for young children's self-regulation. First, these strategies may keep children at or under their threshold of arousal beyond which they would not be able to learn or think adaptively (Thompson, 1994). Proactive strategies may provide children with structured opportunities that allow them to practice successfully exerting their self-regulation. For example, a parent who structures the environment to control the types of arousing situations to which a child is exposed may promote development of adaptive behavioral control. Similarly, given that these practices are proactive, they engage children's higher cognitive processes while they are still available, prior to interference from the more reactive emotions that typically follow a self-regulatory struggle (Blair & Raver, 2012; Calkins, 2007). That is, proactive strategies allow children to bring self-regulatory capacities online more gradually and when children are in a more receptive state. As such, learning and self-regulating are easier when children are not coping with high levels of arousal. For example, a five-minute warning prior to a clean-up task may support a child's ability to self-regulate in comparison to a sudden announcement of clean-up time. Furthermore, parental proactivity may provide children with valuable information they

can apply to the challenges they face in the future; consider, for example, the benefits of proactive parental modeling of problem-solving techniques (Cole et al., 1994). Parents can also proactively discuss emotions with children, both their own and others', as a way to support development of emotional regulation and behavioral control when conflicts do arise (Katz & Windecker-Nelson, 2004). It has also been suggested that proactive strategies may be more effective at promoting self-regulation than reactive strategies because the latter—even when positive—may reinforce challenging behavior by providing attention and engagement after misbehavior, and thus they may encourage the development of regulation-related problems (Gardner et al., 1999; Patterson, 1982).

Several studies have identified relations between proactive practices and self-regulation in both toddlerhood and preschool periods. When 12-to-15-month-old toddlers were faced with a challenging problem-solving task, proactive practices including scaffolding and providing choices were shown to relate to children's behavioral self-regulation both at 18 and 26 months (Bernier et al., 2010). Similarly, Lengua and colleagues (2007) found that mothers' scaffolding and encouraging independent decision-making at age three predicted higher self-regulation six months later. Looking further across time, similar findings have been identified with maternal scaffolding at age two predicting individual differences in children's self-regulation at age four (Hughes & Ensor, 2009). This predictive relationship remained significant even when controlling for children's self-regulation at age two, verbal ability at four, family background, and other social interaction measures. The same study also indicated benefits of other proactive strategies like modeling for children's self-regulation. In a more comprehensive study, Shelleby and colleagues (2012) examined a wider variety of proactive practices, including using reasoning for behavior change, scaffolding, giving choices, and redirecting behavior to a more appropriate

outlet prior to a conflict or rule violation. They found that more frequent use of these practices from age two to three were significantly related to better self-regulation at age three, which was then significantly negatively associated with growth in behavior problems from ages two to four (such that greater self-regulation was related to reduced growth in behavior problems). Examining that same set of practices, Chang and colleagues (2015) extended these findings by demonstrating that proactive parenting at age two significantly and directly predicted higher self-regulation at age five.

Proactive practices further appear valuable for children with behavior problems relating to self-regulation deficits. Proactive parenting practices including discussing emotions, modeling prosocial behavior, and scaffolding or simplifying task information with aggressive, disruptive 2-year-olds predicted fewer behavior problems by kindergarten, particularly for mothers with depression (Zahn-Waxler et al., 1990). The same study showed that mothers who used reasoning with their children tended to have children who were less aggressive. Similarly, a parenting intervention found that improvements from ages two to three in proactive parenting (specifically providing appropriate activities, reasoning, and simplifying tasks prior to misbehavior) predicted reduction in child destructive behavior for children with conduct problems (Gardner et al., 2007). At the preschool age, mothers who reported that they were more proactive (and were observed to be more proactive) had children who demonstrated fewer externalizing problems two and four years later (Denham et al., 2000). This effect was strongest for children who initially had many behavior problems, highlighting the value of these practices.

Reactive Practices

Although the evidence clearly indicates that proactive practices are preferable, there are several reasons why it is important to consider reactive practices in the context of self-regulation

supports. First, it is of course impossible for parents to perpetually preclude every possible undesirable behavior from their child. Reactive practices are necessary given that no parent can perfectly prevent all misbehavior. Fortunately, it is not the case that all reactive practices are problematic; rather, certain reactive practices may be more beneficial for children's self-regulation than others. Indeed, certain reactive practices are considered best practice if a behavior was not prevented. For example, when a child is already engaging in undesirable behavior, research promotes the use of reasoning to help the child understand why a behavior is not appropriate (Knafo & Plomin, 2006; Krevans & Gibbs, 1996; Lansford et al., 2012), and redirection to a more appropriate behavior (Cipriano & Stifter, 2010; Giordano et al., 2018; Pianta et al., 2008). Finally, based on the research, the main issue with using reactive practices seems to stem from relying heavily on these practices, rather than working to prevent undesirable behaviors through proactive strategies (Clunies-Ross et al., 2008; Gardner et al., 1999). As such, reactive practices are not inherently bad; it is simply more valuable to approach parenting predominantly with a proactive lens, and use only specific best practice reactive strategies as needed for problematic behavior that was not (or could not be) prevented.

Practices that Promote Self-Regulation

The current work focuses on three mechanisms for promoting children's self-regulation which are predominant in the literature. The vast majority of these strategies fall under the proactive parenting model, where parents preemptively provide structure and support to prevent the dysregulation that leads to misbehavior. A small subset focuses on responding to undesirable behavior, given the inevitability of these situations and the importance of reacting in ways known to support self-regulation. The mechanisms below contain the core practices that

informed the creation of the Self-Regulation Home Environment survey discussed in the current work.

Establish Routines & Support Transitions

First, parents can enhance the amount of predictability and structure in children's lives. More frequent daily routines have been shown to relate to preschool children's self-regulation, which then relates to behavior problems; routines may even buffer children's self-regulation from the detrimental effects of negative parenting practices (Bater & Jordan, 2017). In particular, substantial empirical evidence exists in support of the link between consistent bedtimes and aspects of children's self-regulation. Children with regular bedtimes have been shown to self-regulate more effectively and were less likely to become obese at age eleven (Anderson et al., 2017). Regular routines at bedtime also appear important and have been shown to predict academic performance over time (Guidubaldi et al., 1986). Positive bedtime routines in particular are beneficial (Moore et al., 2007). The establishment of such routines also necessitates clear rules, expectations, and guidelines for children, which is thought to support their self-regulation (Grolnick, 2009; Stormont & Reinke, 2009). Accordingly, lack of routine in the homes of two-year-old children predicted lower self-regulation at age five (Martin et al., 2012).

Parents can further foster children's self-regulation by ensuring that children routinely have access to a calm, quiet environment for reading and learning. This is supported by extensive literature examining the detrimental effects of chaos at home, and the contrasting benefits of quality learning environments. Particularly in early childhood, environmental stressors such as household chaos can predict children's future outcomes (Deater-Deckard et al., 2009). Household chaos is typically defined by high levels of noise and disorganization within the home

(e.g., Matheny et al., 1995). This lack of structure and stability has been consistently associated with adverse outcomes at the child, parent, and family level (see Marsh et al., 2020 for a review). In particular, noisy, disordered homes appear to reduce children's social skills (Hur et al., 2015), increase problem behaviors (Coldwell et al., 2006; Fontaine et al., 2011), and impair children's self-regulation (Crespo et al., 2019). For example, higher levels of household chaos have predicted preschool children's cognitive functioning even when socioeconomic status was controlled, leading researchers to speculate that "a child growing up in a well-ordered home is able to explore and interact in that environment in ways that stimulate cognitive advances" (Petrill et al., 2004, p. 457). This was supported in a study by Maxwell and Evans (2000) examining the effect of noise on learning in preschool classrooms; children in classrooms with sound-absorbent panels scored higher on language, literacy, and task persistence than children in classrooms with no noise-reduction equipment, suggesting that noisy environments impair children's ability to pay attention and learn. Home chaos has further been associated with poorer parenting skills, increased behavior problems, and reduced cognitive and social skills in preschool and school-age children (Dumas et al., 2005), suggesting that there may be a pathway through parenting. Indeed, in a large, longitudinal study of low-income children, Vernon-Feagans and colleagues (2016) found that household chaos and disorganization negatively affected parenting behaviors and preschoolers' executive function skills, which then predicted behavioral regulation in kindergarten. As such, providing a quiet place for learning at home is likely to support children's self-regulation.

Another structural support that parents can provide is a job chart or visual schedule, which has been shown to improve preschool-aged children's social and behavioral skills (Marchant et al., 2004). Hodgon (1995) specifies four reasons why visual cues are helpful for children at home

and across environments: visuals increase predictability, promote reliable repetition of desired behavior, encourage independence, and provide a sense of stability by increasing orderliness in the environment. Accordingly, visual supports are commonly recommended to foster behavioral self-regulation in typically developing young children (Breitfelder, 2008; Hemmeter et al., 2008; Thelen & Klifman, 2011) as well as children with ASD (Bryan & Gast, 2000; Dettmer et al., 2000; Lequia et al., 2012), with consistent reductions observed in behavior issues and improvements in transitions and on-task behaviors. As children develop, parents may go beyond the concept of visual schedules by talking to children about the schedule for the subsequent day, preparing them well in advance for planned upcoming events and thus enhancing their sense of stability. By age three to four, children begin to use "tomorrow" accurately, indicating that discussing the schedule for the next day may be valuable as early as preschool (Busby & Suddendorf, 2005; Quon & Atance, 2010). These schedule-related strategies are highly related to that of advance notice, such as providing a five-minute warning prior to a transition, given that both strategies foster a sense of predictability and structure which can support children to self-regulate through a transition (Lequia et al., 2012).

Given that many transitions occur in any child's home—and young children are still developing the self-regulatory skills necessary to effectively transition between activities—parents can support children to move between tasks or events. This might include a five-minute warning prior to transitions, or a discussion of important aspects of an upcoming transition that might be relevant to the child such as sensory adjustments (Thompson et al., 2013). In a foundational study of the effect of advance notice on child behavior, Zeece & Crase (1982) compared a group of preschoolers who received a 2-minute warning prior to a clean-up transition to a group that received no warning. The two-minute warning prior to clean up of toys was found

to support preschool children to self-regulate more effectively to comply with the transition, and to transition more successfully to the next activity (Zeece & Crase, 1982). Although much of the more recent research on advance notice has focused on children with developmental disabilities (Brewer et al., 2014; Schmit et al., 2000; Wills, 2018), finding reductions in undesirable behaviors and increases in compliance, these supports may also be applicable for children with typical development.

Signals prior to a transition are frequently cited as effective strategies to prevent challenging behaviors in preschool children (Banerjee & Horn, 2012; Coleman et al., 2013; Hancock & Carter, 2016; Olive, 2004; Thelen & Klifman, 2011). Interestingly, however, the evidence base for this area consists largely of small case studies, and several of these indicate no effects or even detrimental effects when using these warnings (e.g., Wilder et al., 2007; Wilder et al., 2010). A deeper look at the literature reveals that warning signals alone are likely insufficient to support children's behavior; many studies have stressed that providing advance notice as a single isolated strategy is not likely to increase compliance and decrease problem behavior, but is effective when combined with other proactive and positive practices (Cote et al., 2005; Mace et al., 1998; McCord et al., 2001; Wilder et al., 2006). Of note, all studies that reported no effects or detrimental effects of advance notice lacked a potentially critical feature: choice. Research indicates that children regulate their behavior more effectively during transitions where autonomy supports (e.g., providing choices) are high; specifically, problem behaviors during transitions have been shown to decrease when children are permitted to choose the order of less desirable tasks (Kautz et al., 2014; Kern et al., 2001; Smeltzer, et al., 2009). A parenting example of this might be offering children the opportunity to choose the sequence of necessary but non-preferred tasks prior to bedtime (e.g., brushing teeth, putting on pajamas, etc.). Accordingly, the

next section discusses the value of promoting autonomy for children's self-regulation development.

Provide Opportunities for Autonomy

The second mechanism is to provide children with opportunities for autonomy, which refers to children's sense of volition. Autonomy support is a strong predictor of later self-regulatory abilities in infants (Bernier et al., 2010), preschoolers (Cadima et al., 2019), and older children (d'Ailly, 2003). Longitudinal work even indicates that autonomy supportive practices over the first three years of life predict higher executive functions in preschool (Ravindran et al., 2021), which then predict academic achievement in elementary and high school (Bindman et al., 2015). These relations are most notable in Western cultures and especially the United States, although links between autonomy support and regulated child behavior have also been identified in various other countries including Portugal (Cadima et al., 2019), Ghana (Marbell & Grolnick, 2013), South Korea (Ju et al., 2021), and Germany (Sosic-Vasic et al., 2015). Particularly recently, a longitudinal study in China examined how mothers would respond when their child expressed "defeat" (frustration or withdrawal) during a challenging puzzle task (Chen et al., 2024). When mothers provided more autonomy support in response to their child's struggle, their child showed lower levels of externalizing problems 6 months later. Providing opportunities for autonomy includes techniques such as scaffolding to ensure an optimal challenge, providing choices, and encouraging independent functioning and decision-making.

Decades of research have linked scaffolding to children's budding executive function skills (see Mermelshtine, 2017 for a review). When parents use scaffolding, they provide accessible, appropriately-paced support during problem-solving tasks (Stright et al., 2001). This includes helping children to break down difficult tasks into more manageable parts (Gauvain &

Perez, 2008). Parental scaffolding during various problem-solving tasks has been repeatedly associated with higher self-regulation in young children (Distefano et al., 2018; Bibok et al., 2009; Lengua et al., 2007; Matte-Gagne & Bernier, 2011) and has remained significantly related when controlling for children's language and prior self-regulation (Bernier et al., 2010; Hammond et al., 2012). This holds true in longitudinal work, where maternal scaffolding at age two has been shown to predict individual differences in children's self-regulation at age four (Hughes & Ensor, 2009). One study showed that scaffolding–but not warmth, negativity, or responsiveness–predicts higher levels of self-regulation between age three and six above the effects of cognitive skills, family income, and cumulative risk factors (Lengua et al., 2014); importantly, this study revealed a protective effect of scaffolding on children's self-regulation from the negative effects associated with low-income environments and cumulative risk factors. Particularly high levels of maternal scaffolding even appear to play a role in the transfer of self-regulation from contexts with parent support to independent problem-solving (Robinson et al., 2009).

The benefits of scaffolding for self-regulation development also appear in cross-cultural work. For example, one study examined a low-income sample of Latina mothers (predominantly born in Mexico) as they guided children through a difficult motor task, revealing that only nonverbal maternal scaffolding--compared to more directive and restrictive strategies--at age four-to-five predicted performance on a gratification delay task at five-to-six years of age while controlling for original performance, highlighting scaffolding as an important strategy for promoting children's self-regulation (Power et al., 2020). Scaffolding research has also extended to China; children ages 3-5 in China found that maternal scaffolding during problem-solving tasks positively predicted children's self-regulation (as tested immediately after the joint

problem-solving sessions), indicating that mothers who tend to engage more in scaffolding also tend to have children who are better-regulated than those of mothers who use this strategy less often (Sun & Tang, 2017). In further international recognition of this benefit, many Japanese preschools not only prioritize teacher scaffolding but also group peers of different ages together to increase scaffolding opportunities for younger children (Izumi-Taylor, 2013).

Providing choices (among appropriate options) is another autonomy supportive strategy that appears to promote young children's self-regulation development (Green et al., 2011), and as such has been the focus of many interventions for behavioral issues. A review of 14 articles published between 1975 and 1996 that evaluated choice making as an intervention concluded that choice making can effectively reduce problematic behaviors and increase both the quantity and quality of appropriate behavior (Kern et al., 1998). More recently, many studies have identified consistent decreases in disruptive, challenging, and aggressive behavior following choice-making interventions for toddlers (Reinhartsen et al., 2002), kindergarteners (Carter, 2001), and school-age children (Cole & Levinson, 2002; Kern et al., 2001) with and without disabilities. Several of these interventions also observed improvements in language, social skills, and academic performance (Carter, 2001; Jolivette et al., 2001). Furthermore, a meta-analysis of studies on choice-making as an intervention for problem behavior found that offering choices resulted in clinically significant reductions in the frequency of challenging behaviors for both children and adults (Shogren et al., 2004). Four years later, Patall and colleagues (2008) conducted another meta-analysis of 41 studies demonstrating that providing choice enhanced not only children's task performance, but also their intrinsic motivation (i.e., persistence, interest, enjoyment), effort, learning, and perceived competence.

When examined in larger populations of typically-developing young children, choice making is often grouped with other autonomy supportive practices (e.g., scaffolding) in which it is consistently found to relate positively to children's self-regulation (Bernier et al., 2010; Distefano et al., 2018; Shelleby et al., 2012). Still, several studies have examined this strategy with more specificity with regard to parent involvement. For example, Bindman and colleagues (2013) found that parental statements that provide choices or offer ideas (as measured just before preschool entry) predict child self-regulation at age three, in contrast to more directive language. Similarly, an experimental study demonstrated that parents trained to provide their three-year-old children with more choices during a challenging puzzle task tended to have children exhibiting higher self-regulation (Meuwissen & Carlson, 2019).

Parents can also promote children's autonomy by providing them with tools to help them cope with waiting periods, which can move them toward autonomous regulation. For example, a parent may provide toys for a child to engage with while waiting at the doctor's office. Engaging with toys—even if they are less preferred—while waiting for a previously selected valuable food reinforcer has been shown to be effective for enhancing self-control in typically developing preschool children (Newquist et al., 2012; Juanico et al., 2016). In a similar delay of gratification task, children at age 2.5 whose parents provided a distraction (e.g., engaged the child in other aspects of their environment) outperformed children whose parents relied more on reasoning, bargaining, or commands (Putnam et al., 2002). Indeed, parents' role in guiding children's ability to build such inhibitory control is crucial given that young children are typically not yet aware of strategies to support themselves, but can learn these strategies over time with parental guidance. Less than 40% of 4-year-old children indicate awareness of strategies like distraction to support waiting, but by eight years of age children widely recognize the value of this tool (Mischel &

Mischel, 1983; Yates et al., 1987). Interestingly, parents of young children may also be unaware of the benefit of providing supports for waiting; mothers of preschool-aged children ranked distraction lowest when asked to consider strategies that would support their children to wait for a food incentive (Hom & Knight, 1996). These parents perceived distraction to be less effective than thinking about and tasting the treat, and actually equated it to providing no attentional strategy at all.

As children develop, parents can further support autonomy by providing children with tools to track time themselves, such as a timer. In an intervention study examining the benefits of such tools for behavior in children ages two to four, the use of a timer to self-regulate during play and reading periods was associated with improvements in self-regulation and engagement in target activities (Pistorio et al., 2017). Importantly, these improvements were rapid and were maintained up to four weeks post-intervention. Preschool children have even been observed independently using timers as an effective self-regulatory support during free play periods while waiting for a turn to use a valuable resource (Arnott, 2018).

Finally, parents can support children's autonomy by providing a meaningful rationale for the behaviors they wish children to internalize (Grusec & Goodnow, 1994). This might include providing an explanation when asking a child to stop doing something, or helping a child understand logical consequences of their behavior (e.g., if you throw your toy it might break). In a foundational study on parental use of reasoning, Bates and colleagues (1976) found that when parents denied their children's requests for items in a store, even an extremely minimal explanation for that denial resulted in less conflict than if the parent simply said "no." When provided with logic, children can also build a sense of cause and effect which may support them to adjust their behavior or pursue their goals more autonomously and effectively (Perret, 2015).

Indeed, parents who use reasoning to address behavior have children who tend to be more prosocial (Knafo & Plomin, 2006; Krevans & Gibbs, 1996) and less aggressive and oppositional than children whose parents use punishment (Lansford et al., 2012; Trickett & Kuczynski, 1986). Chang and colleagues (2011) found that parents' high scores on a reasoning subscale were significantly negatively associated with children's externalizing problems, and positively associated with children's attentional focus and inhibitory control. In contrast, discipline in the absence of reasoning is related to impaired self-regulation in preschool and school-age children, such as impulsivity and emotional eating in adolescence (Baumrind et al., 2010; Topham et al., 2011). Furthermore, reasoning is often included in measures of proactive parenting, which are then typically associated with reduced behavior problems in preschool children over time (e.g., Denham et al., 2000). Children whose parents use autonomy supportive practices such as reasoning, discussing emotions, promoting independent decision-making, and involving children in making family plans even tend to be more socially preferred by their peers than children of parents who don't use these practices (Dekovic et al., 1991; Denham et al., 2000).

Parents can talk to children about how to problem-solve and support children through this process as a way to build their autonomy and foster self-regulatory functioning. When facing a problem, challenging and conflict-related behaviors are common for young children and can lead to violence without adult support to guide children toward resolution (Chen, 2003; Chen et al., 2001). Conflict is an opportunity to teach children how to regulate their behavior; unfortunately, parents (Perozynski & Kramer, 1999) and preschool teachers (Silver & Harkins, 2007) tend to perceive conflict negatively and often use more controlling strategies to address it such as cessation rather than mediation. In cessation strategies, adults simply impose judgment or action on children in an attempt to quickly terminate conflicts, which likely fails to instill foundational

self-regulatory behaviors in children as discussed previously. Often, cessation boils down to assigning blame and coercing apology, which is thought to preclude the potential of conflict resolution to benefit children's development (Blank & Schneider, 2011). In mediation, however, adults serve as neutral guides who engage calmly with children, identify their behavior and the problem at hand, and support children's progress through several steps towards a solution. Unsurprisingly, the latter method is related to children's self-regulation development (DeVries et al., 1991; Vestal & Jones, 2004), perhaps because it empowers children to learn problem-solving steps that they can then apply independently to future conflicts.

Conflict mediation for young children often includes steps such as approaching calmly, acknowledging feelings, gathering information, restating the problem, brainstorming solutions, and providing follow-up support (Evans, 2002; Schweinkart et al., 1986). Preschool children in Head Start classrooms where teachers were trained in mediation tended to problem-solve more effectively during conflict and were less likely to use force than children whose teachers were not trained in mediation (Vestal & Jones, 2004), suggesting their self-regulatory abilities were enhanced by the intervention. Kindergarten children trained in mediation show similar skill gains, and further use their skills to act as mediators themselves in disputes between other peers (Stevahn et al., 2000). In general, children who possess problem-solving and conflict resolution skills have lower risk of adjustment difficulties, even when they are from low-income and troubled families (Goodman et al., 1995). All together, this research indicates that discussing how to problem-solve with children is an effective strategy through which adults can promote children's self-regulation. Mediation during conflicts may be especially helpful to move young children toward true self-regulation, given that young children trained in mediation procedures adopted the belief that they could and should resolve recurring disputes independently (Siddiqui

& Ross, 2004). This further reflects promotion of autonomy as a mechanism through which discussing problems can support children's self-regulation.

Although not a proactive strategy in comparison to the others discussed, redirection of undesirable behavior to a replacement behavior is another common practice utilized with preschool children to support self-regulation. This "reactive" practice may promote children's autonomy—and thus their self-regulation—by guiding them to identify appropriate replacement behaviors independently in the future, to either prevent themselves from engaging in an inappropriate behavior or to support them to change course when recognizing participation in an ongoing undesirable behavior. Although much of the literature on redirection stems from small case studies and research on children with disorders, demonstrating that interruption and redirection is effective to reduce undesirable behaviors and increase desirable behaviors (Ahearn et al., 2007; Ahrens et al., 2011; Boyd et al., 2011; Cassella et al., 2011; Hagopian & Adelinis, 2001; Spencer & Alkhanji, 2018), the efficacy of redirecting behavior applies to preschool children with typical development. Redirection has been shown to successfully reduce negative behaviors, especially for children with low self-regulation (Macina, 2001). Similarly, typically-developing toddlers whose mothers more often used redirection in a positive tone scored higher on effortful control at 4.5 years of age (Cipriano & Stifter, 2010).

Relatively little literature exists on redirection in education or behavior research, particularly for typically developing children, yet it remains a recommended practice in early childhood settings. Redirection of inappropriate behavior to a more appropriate outlet is included as an important strategy in practitioner recommendations for promoting self-regulation in preschool (e.g., Giordano et al., 2018). Redirection is also one of the strategies defining the classroom management category of the CLASS, a well-established and widely-used measure of

classroom quality (Pianta et al., 2008). Rimm-Kaufman and colleagues (2009) found that kindergarten children in classrooms that had higher ratings of classroom management (as measured by the CLASS) demonstrated greater behavioral self-control, cognitive self-control, positive work habits, and engagement in learning, and spent less time off task than children in classrooms with lower quality classroom management. This remained significant while controlling for emotional and instructional support. Given these findings from teacher-child interactions, it follows that this strategy could also be beneficial in parenting interactions.

It is important to note that some studies indicate that maternal redirection of child attention during play and parent-child problem-solving tasks has been shown to be intrusive and hinder self-regulation as it necessitates a taxing attentional shift (e.g., Landry et al., 2000). However, this hindrance appears to be the case only if the parent interrupted when the child was already on task (Conway & Stifter, 2012). In situations where children are engaging in inappropriate behaviors, parental redirection of behavior can support self-regulation. Indeed, the famous Chicago School Readiness Project—which successfully targeted low-income preschooler's self-regulation as a way to promote their school readiness—highlighted redirecting negative behavior in the strategies covered by the teacher training (Raver et al., 2011). It appears that redirection may also fail if the replacement behavior is inadequate to support the necessary attentional shift. Ideally, the replacement behavior to which the child is redirected is developmentally appropriate, accessible to the child given the context, and desirable or reinforced by the parent (Menzies & Lane, 2011; Wilder et al., 2007).

Model Regulated Emotions and Behavior

Social modeling is a powerful method through which parents can influence children's behavior (Cruwys et al., 2015; Harbour et al., 2015). Parents can model regulated emotion as a

means to promote regulated behavior. A wealth of research indicates that emotion regulation is a powerful mediator of children's self-regulatory skills (Durlak et al., 2011). As such, fostering children's emotion regulation by engaging children in discussions of emotion—a practice often called emotion coaching—is an effective means for promoting their behavioral self-regulation.

In emotion coaching, parents model healthy discussions and regulation of emotion, specifically by acknowledging children's emotions and guiding them to understand, express, and cope with their emotions in appropriate ways (Gottman et al., 1996, 1997). Emotion regulation difficulties in children have long been linked with reduced behavior regulation given that an inability to cope with negative emotions often provokes a non-adaptive behavioral response; children who react with strong emotional negativity in anger-evoking situations tend to behave more aggressively (Eisenberg et al., 1993) and struggle to use attentional and working memory capacities during tasks (Blair, 2002; Denham, 2006; Raver at al., 2007). Similarly, children who are socially aggressive and rejected tend to have lower emotional and behavioral regulation (Sutton & Wheatley, 2003; Wilson et al., 2014). Indeed, the regions of the brain responsible for cognition and emotion are integrated and perpetually interact (Dolcos et al., 2011; Immordino-Yang & Damasio, 2007; Pessoa et al., 2019), so it is not surprising that promoting emotional competence would in turn influence self-regulation.

Emotion coaching has been shown to have indirect effects on children's behavior outcomes by directly affecting emotion regulation (e.g., Ramsden & Hubbard, 2002). The behavioral benefits of emotion coaching have been widely studied; it appears to promote self-regulation in typically-developing preschoolers (Katz & Gottman, 1997), preschoolers with ADHD (Chronis-Tuscano et al., 2016), children with conduct issues (Havighurst et al., 2013; Katz & Windecker-Nelson, 2004), children with ASD (Wilson et al., 2013), children with

Oppositional Defiant Disorder (Dunsmore et al., 2013), and children exposed to home and community violence (Cunningham et al., 2009; Katz et al., 2008). An extensive meta-analysis by Durlak and colleagues (2011) demonstrated that school-based programs targeting emotion regulation appeared to increase prosocial behaviors, reduce behavior problems, and improve academic performance for students in kindergarten through high school, with effects remaining statistically significant for at least 6 months post-intervention. Although emotion coaching has been studied more extensively in mothers, paternal emotion coaching has also been shown to account for significant variance in kindergarten children's attention regulation (Wilson et al., 2013). More specifically at the preschool age, young children whose parents provide them with emotion coaching were more able to identify strategies for coping with anger, which then predicted stronger self-regulatory behaviors when facing a frustrating task alone (Cole et al., 2009).

Emotion coaching can be considered a proactive practice given that it aims to teach children to identify their emotions and control their reactions, and thus prevent children from engaging in problem behavior when upset. Importantly, even though emotion coaching highlights discussions of feelings and expressivity, this is a practice, not a parenting style; it remains within the realm of "what" rather than "how" (Spinrad et al., 2020). It is also important to note that recent research indicates that social-emotional competencies alone (e.g., as promoted by emotion coaching) are insufficient to support successful transitions from preschool to elementary school; even with moderate social-emotional skills, low levels of preschool self-regulation predict behavior issues at school (Rademacher et al., 2021). As such, although parental discussions of emotion with children is clearly a valuable practice for promoting self-regulation, it should be utilized alongside the other practices discussed in the current work.

Although it is valuable for parents to provide a healthy model for children to learn emotion regulation, modeling useful strategies may be especially effective to promote effective problem-solving behavior (Hmelo-Silver, 2004). Research from early childhood classrooms indicates that modeling of self-regulatory capacities can promote children's self-regulated learning (Paris & Winograd, 2003; Peeters et al., 2014), especially when this modeling is accompanied by verbally explaining the strategies used (Dale & Zimmerman, 2007; Pintrich, 2002). Modeling by explaining one's own process may further support young children to use self-talk, which has been shown to improve their performance when used during difficult tasks (Brace et al., 2006) and appears especially beneficial for children with behavior problems (Winsler et al., 2007).

Involving children in planning gives children further opportunities to learn self-regulatory skills. Planning inherently requires the integration of self-regulatory skills: inhibitory control to focus and attend to the process, working memory to track and update parts of the plan, and cognitive flexibility to mentally shift between plan components (Crook & Evans, 2014; McCormack & Atance, 2011). As such, children's ability to plan is often used as a measure of their self-regulation (see McCormack & Atance, 2011 for a review). Research on children's ability to plan indicates that preschoolers are capable of planning ahead, and these skills improve markedly between three and five years (Moffett et al., 2018). However, to this author's knowledge, only one study has examined the effects of parenting practices on children's planning skills, indicating that mother-child interactions coded higher for "parenting quality" (a combination of "supportive presence, hostility (reverse scored), and respect for autonomy") in preschool relate to higher school-age regulation and planning ability (Friedman et al., 2014).

Little to no research exists on how to promote planning skills in young children; most research is limited to exploring the developmental trajectory of planning skills and emphasizing the criticality of these skills for self-regulation (Crook & Evans, 2014; Hudson et al., 1995; Moffett et al., 2018). As with many other important skills, planning may be best taught initially through modeling. Although young children tend to act more on impulse than thoughtful or planful action, they may be guided by appropriate models to develop planning skills. This is supported by the fact that several high-quality curricula include and highlight planning as a self-regulatory support. The Vygotskian inspired curriculum *Tools of the Mind* requires teachers to engage children in planning their activities during free choice periods, specifically drawing or writing their own "play plans", as a method of promoting children's self-regulation during play (Bodrova & Leong, 2019). As the authors specify, "First modeled by the teacher, planning later becomes a child-initiated activity. The process of planning by itself engages children in a self-regulatory activity… Modeling how to plan the play is particularly useful for parents and teachers and can be easily adapted to real life" (p. 47-51). Similarly, the High/Scope curriculum holds teacher-led planning sessions prior to free play. In these sessions, children discuss their plans with the teacher and children as part of a "plan-do-review" process aimed at fostering self-regulatory skills (Schweinhart & Weikart, 1997). As such, inviting children to help make plans for the family may provide children with opportunities to observe parental modeling and engage children in the process.

Factors Linked to Parenting Practices

Maternal Education

Research consistently demonstrates links between maternal education and parenting quality. A particularly comprehensive study found that higher levels of maternal education were

related to more beneficial health investment behaviors (e.g., wellness pediatrician visits, providing healthy nutrition, family dinners, daily exercise) at 9 months, 2 years, 4 year, and 5 years of age (Prickett & Augustine, 2016). Mothers with higher levels of education also tend to be more responsive and stimulating, and less punitive during parent-child interactions (Cuartas, 2021; Lansford & Deater-Deckard, 2012; Raviv et al., 2004). These more educated mothers also tend to engage children more often in generally beneficial practices such as reading, playing, and singing than their less-educated peers (Davis-Kean, 2005). The increased use of these general positive practices by mothers with higher education in comparison to those with lower education has also been observed across 44 low- and middle-income countries, and was further shown to predict early child development across areas of literacy, math, socioemotional, and learning (Jeong et al., 2017). With regard to practices relating more to children's behavior and self-regulation, more highly educated mothers also show stronger skills in areas of proactive parenting such as scaffolding and modeling (Carr & Pike, 2012; Harvey et al., 2016; Matte-Gagne et al., 2015; Raviv et al., 2004). This relation has been observed even when mothers rated their children to be behaviorally challenging (Neitzel & Stright, 2004).

Maternal education is commonly used as a proxy for socioeconomic status, so it is important to mention relations between SES and parenting practices here. Poverty and its associated risks (e.g., low parental education) are related to lower levels of general positive parenting, including reduced responsiveness and elevated harshness and control, which are in turn linked to lower self-regulation for young children (Blair & Ursache, 2011; Bocknek et al., 2009; Ceballo & McLoyd, 2002; Lengua et al., 2014; Lengua et al., 2007). The majority of these studies utilize a cumulative risk factor which includes maternal education level, consistently finding lower quality parenting when cumulative risk is high. Furthermore, major models of self-

regulation development suggest that low SES factors largely operate through effects on parenting to influence child self-regulation (Blair & Raver, 2012). The mechanisms through which low income is thought to influence parenting practices chiefly include reduced time, fewer resources, and increased stress.

Beyond the influence of income, theorized reasons for the link between higher maternal education and higher quality parenting practices have been deeply explored, and boil down to increased access to cultural, social, and human capital (Harding & Morris, 2015). Greater cultural capital allows highly educated parents to have certain preferences and behaviors that cause them to be more valued and recognized by the various gatekeepers of society, affording these parents the tools to access more resources that might support healthy parenting. Higher educational attainment further promotes parents' social capital, increasing the number of social connections that have high quality and value with regard to both parents' sense of support and further access to the knowledge, skills, and resources of others in their social network. Mothers with higher education levels also tend to have higher human capital given that they have a stronger ability to develop skills and acquire knowledge, which may contribute to more advanced knowledge regarding child development and appropriate practices, as well as increased ability to regulate their own behavior in parenting interactions. These three forms of capital are thus thought to contribute to the understanding of how maternal education may relate to parent practices (Harding & Morris, 2015).

Parent Self-Regulation

The use of positive and especially proactive parenting strategies inherently necessitates strong self-regulation on the part of the parent (Sanders & Mazzucchelli, 2013). As Chang and colleagues (2015) put it, "Proactive parenting is a unique aspect of positive parenting in that it

highly resembles the process of self-regulation on the part of the parent, the very ability that the child needs to learn" (p. 24). Applying these kinds of strategies requires important self-regulatory capacities including planning ahead, inhibiting unhelpful impulses, and adapting to the child's needs in the moment.

Research demonstrates that parents' ability to regulate their behavior is directly related to their parenting practices. Parents with stronger self-regulatory skills tend to spend more time in interactive caregiving activities and use more positive parenting practices such as scaffolding, while weaker self-regulation is related to harsh parenting spanning from reducing child autonomy (e.g., revoking choices) to yelling, physical abuse, and neglect (Azar et al., 2017; Bridgett et al., 2011; Chico et al., 2014; Deater-Deckard et al., 2010; Deater-Deckard et al., 2012). A 2015 review reiterated these findings, consistently reporting these links between maternal self-regulation and parenting quality (Crandall et al., 2015). Mediation studies have further specified that maternal self-regulation operates through caregiving behaviors to influence child self-regulation at 36 and 48 months of age (Cuevas et al., 2014). Several intervention efforts have even targeted parent self-regulation through which to promote parenting skills and thus child self-regulation in recognition of the importance of parent self-regulation for effective and appropriate parenting (Coatsworth et al., 2010; Crandall et al., 2015; Sanders et al., 2007).

Although studies have found links between self-regulation skills and general responsive parenting (Shaffer & Obradovic, 2017), relations have also been identified between maternal self-regulation and more specific practices such as scaffolding (Obradovic et al., 2017). In one such study, mothers with higher levels of self-regulation tended to engage in more autonomy-supportive practices with their preschool-aged children during a puzzle task, such as providing more choices and scaffolding-related supports (Distefano et al., 2018). These parenting practices

then predicted children's self-regulatory skills. Stronger maternal self-regulation has also been associated with increased structural parenting practices such as maintaining routines; specifically, mothers with better self-regulatory skills tend to have less chaotic homes (Bridgett et al., 2013; Valiente et al., 2007), and poor maternal executive functioning is associated with increased chaos at home (Deater-Deckhard et al., 2009; Deater-Deckard et al., 2012). Several particularly recent studies further demonstrate that stronger maternal executive function skills may be particularly important in chaotic households to help mothers refrain from harsh parenting in response to child noncompliance (Geeraerts et al., 2021; Park & Johnston, 2020).

Maternal Stress

Parenting inherently incurs increased stress for any parent. As with maternal education and self-regulation, parental stress has a well-established relation with parenting quality (Shea & Coyne, 2011; Black et al., 2001). Stressed parents tend to interact with children less (e.g., playing, reading, or singing; Farmer & Lee, 2011) and in ways that are either overly harsh and punitive (Black et al., 2001), or overly lax and inconsistent (Barry et al., 2009; Cunningham & Boyle, 2002; Guajardo et al., 2009). This reduced parenting quality then detrimentally affects children's self-regulation development (Choe et al., 2013).

Research has sought to understand the mechanisms through which parent stress may affect parenting quality (see Morgan et al., 2005). One possibility is increased sensitivity to aversive stimuli; that is, an overwhelmed parent might respond to a child's distress or challenging behavior with negativity or harshness faster or more frequently than a less-stressed parent. Stressed parents may also associate their stress with their child or their parenting role, resulting in a more negative perception of their child and parenthood (Neff & Karney, 2004; Respler-Herman et al., 2012) that may increase severe parenting tactics. Furthermore, parents

suffering from high stress levels may have less time and fewer resources to dedicate to their household, resulting in increased chaos at home (Coldwell et al., 2006). Given that higher chaos is related to lower child self-regulation (Martin et al., 2012; Vernon-Feagans et al., 2016), parents may then be facing household chaos as well as more challenging child behavior than before, further increasing their stress in a detrimental cycle (Williford et al., 2007). Finally, stress is known to impair our ability to use higher cognitive processes like those required to use positive and proactive strategies (Crandall et al., 2015). This may also serve as a reason for overly lax or inconsistent parenting; instead of becoming harsh, some parents withdraw from their role. These parents may be too cognitively or emotionally taxed to provide high-quality parenting, or may doubt their competency, resulting in less engagement, responsiveness, and inductive discipline (Pesonen et al., 2008).

More specifically, the research has identified relations between parent stress and the mechanisms of study in the current work. Research on toddlers—using the same parent stress measure as the current work—found stress to be negatively associated with autonomy-supportive practices (Andreadakis et al., 2020). Work with school-age children also finds this association, with the stress of both mothers and fathers individually associated with reduced autonomy support and increased psychological control (e.g., guilt induction and love withdrawal; Aunola, et al., 2017; Van Der Kaap-Deeder et al., 2019). Diercks, Lunkenheimer, and Brown (2020) examined maternal stress as part of a larger cumulative risk construct (including education, relationship status, income, family size, alcohol use, and mental health problems) and found that higher cumulative risk was associated with a lower likelihood of scaffolding use when their preschoolers engaged in off-task behaviors. With regard to modeling regulated emotions and behavior, mothers' stress also appears to have a detrimental effect on levels of emotion coaching

provided to preschool children (Wu et al., 2019). Relations have also been identified with structural supports (i.e., establishing routines and supporting transitions); maternal stress is related to increased household chaos in homes of preschool children (Kracht et al., 2021). Altogether, this research indicates that parent stress is likely related to the target mechanisms in the current work.

Child Self-Regulation and Academic Performance

Parenting practices (and the factors that influence them) can be considered especially important for children's self-regulation given the benefits of self-regulatory skills for children's academic development. Strong links exist between childhood self-regulation and academic outcomes (Duckworth et al., 2019), so the aforementioned practices may operate through improvements in children's self-regulation to promote academic skills. Young children with higher levels of self-regulation tend to also have higher achievement in preschool, even when controlling for a host of demographic and background variables (McClelland et al., 2007). The same pattern has been identified from preschool to kindergarten, with self-regulation predicting reading and math (Welsh et al., 2010). Similarly, well-regulated children perform better in early primary grades (Blair & Raver, 2015; Normandeau & Guay, 1998; Skibbe et al., 2019) and later primary grades (Zhou et al., 2010). Specifically, kindergarten children with lower self-regulation performed worse than their better-regulated peers through sixth grade, with gaps between these groups widening or at least persisting (McClelland et al., 2006). Earlier development of self-regulation is associated with higher achievement from preschool through second grade, and is even related to earlier development in some academic domains (Skibbe et al., 2019). The academic benefits of greater self-regulation extend further to middle school (Duckworth & Seligman, 2005; Hofer et al., 2012), high school (Vitaro et al., 2005), and college (Galla et al.,

2019; Tangney et al., 2004). Particularly for young children, associations have even been identified across the globe (Wanless et al., 2011).

The relation between self-regulation and academics is not surprising, given that learning is a challenging process for children (Bjork & Bjork, 2011) and often entails some level of frustration and confusion (D'Mello & Graesser, 2012). Stronger self-regulatory abilities may mitigate some of these challenges by promoting adaptive behaviors, such as attending to adult direction, transitioning between activities more easily, and engaging with academic instruction (Blair & Diamond, 2008; Duncan et al., 2007; Lonigan et al., 2017; McClelland & Cameron, 2012). Similarly, children who struggle with self-regulation tend to exhibit behavior problems and impaired social skills (McCabe & Brooks-Gunn, 2007; Montroy et al., 2014), which may further degrade their academic engagement and increase the likelihood of negative interactions with teachers (Blair & Diamond, 2008). Overall, impairment in behavioral self-regulation is thought to disrupt children's ability to engage with academic instruction and build skills across domains (Montroy et al., 2016; Skibbe et al., 2012).

Although this general view regarding the benefits of self-regulation for engaging with educational opportunities is widely accepted, it is also thought that self-regulation may support children to succeed specifically and directly within the content of an academic domain, such as empowering the more involved problem-solving associated with mathematics skills (Fuhs et al., 2014) or the complex coordination required in reading comprehension (Birgisdóttir et al., 2015; Zelazo et al., 2016). Consistent with this notion, specific relations between self-regulation and various academic domains have been identified. Particularly strong evidence exists between self-regulation and the domains of mathematical concepts and early literacy. As such, the current

work explores how parenting practices that target children's self-regulation may further support children's math and literacy skills.

Math

Generally, it is argued that mathematical concepts are more demanding of self-regulation than other academic domains, as these concepts build on each other and become increasingly complex requiring stronger focus and persistence as children face new and more challenging problems in kindergarten (Blair et al., 2008). Logically, math also inherently precipitates self-regulation, as children need to use skills like working memory, inhibitory control, and cognitive flexibility to assess which strategy (e.g., addition or subtraction) is best for a particular math problem, track progress and persist through the problem, and determine when/whether to switch strategies as information changes (Bull & Scerif, 2001). It follows then, that parenting behaviors which promote self-regulation may benefit children's mathematical development as well.

Substantial evidence has linked self-regulation and mathematical ability in young children. Persisting effects from self-regulation to math have been repeatedly identified even when controlling for other aspects of cognitive ability (Bull & Scerif, 2001; Espy et al., 2004; Welsh et al., 2010). Specifically, children's self-regulation at age four has been shown to account for substantial variability in children's math achievement at school entry, even when accounting for reading achievement and other cognitive abilities (Clark et al., 2010). Self-regulation and math achievement even appear uniquely associated; Brock and colleagues (2009) found that the relation between self-regulation and math was distinct from learning-related behaviors, engagement, other cognitive abilities, prior math knowledge, and family risk factors. Brain imaging studies align with the notion of a unique association, as regions of the prefrontal cortex responsible for children's understanding of math concepts overlap with regions associated with

self-regulation development (Blair et al., 2007). A closer look at this relation reveals that self-regulation may bolster children's math skills specifically by supporting them to attend to discrete quantity and number sets rather than irrelevant information in a word problem (Fuhs et al., 2013).

Research suggests that the link between self-regulation and math may be stronger than that between self-regulation and emergent literacy (Birgisdóttir et al., 2020). Growth in self-regulation from preschool through kindergarten has been shown to predict growth in math but not literacy skills (McClelland et al., 2014). Looking across countries and cultures, self-regulation consistently predicts early math, but relations to emergent literacy have been inconsistent (Wanless et al., 2011). Controlling for background variables and previous performance seems to play a role in this discrepancy; McClelland and colleagues (2007) found that self-regulation uniquely predicted preschool children's spring scores on early literacy and math after controlling for fall scores, but Ponitz and colleagues (2009) found this relation only for math. Similarly, in a large, longitudinal sample of low-income communities, Blair and colleagues (2015) found that self-regulation predicted both initial level and growth in math and reading (letter-word identification) from preschool through second grade, but the effects persisted only for math when including other preschool-level factors such as other cognitive abilities, vocabulary, and processing speed. This may indicate that the importance of self-regulation depends upon the nature of the academic task, supporting children to handle the complex cognitive demands of mathematics that are less present in other domains. However, other studies continue to show relations across the board, particularly when literacy measures of varying complexity are utilized, indicating that further exploration into this area is warranted (Birgisdóttir et al., 2015).

Early Literacy

The National Early Literacy Panel (NELP) highlights the importance of certain skills developed during preschool which are strong predictors of children's later reading and writing competency. Among the strongest predictors is the ability to identify particular letters (letter knowledge); an additional moderate predictor is word identification (early decoding) (Shanahan & Lonigan, 2010). As such, the current work focuses predominantly on these skills within the context of parenting and children's self-regulation.

Relations between self-regulation and children's early literacy skills are identified with relative consistency (Skibbe et al., 2019). Self-regulation in preschool has been found to relate to children's concurrent phonological awareness, letter knowledge, and rudimentary word-decoding skills (Lonigan et al., 2017). Similarly, self-regulation at the beginning of preschool has been shown to predict letter-word identification at the end of preschool (Fuhs et al., 2014), when measured directly or through teacher report (Fuhs et al., 2015). McClelland and colleagues (2007) have further demonstrated that behavioral regulation not only predicts letter-word identification, but growth in self-regulation also predicts growth in letter-word identification, even when controlling for a host of background variables. More recent work using non-linear growth curve models found that children who developed self-regulation earlier also developed decoding skills earlier, and had higher letter-word identification skills through second grade (Skibbe et al., 2019). Overall, the relations between self-regulation and early literacy may be best explained by the hypothesized general influence of self-regulation on promoting attention and engagement with learning opportunities occurring either at school with teachers or at home with parents (Blair & Diamond, 2008).

Parenting, Child Self-Regulation, and Academic Performance

As previously discussed, strong links exist between parenting and child self-regulation, and child self-regulation and academic performance. Given these relations, several researchers have sought to examine child self-regulation as a mediator between parenting and children's academic skills. However, most of these studies focus on toddlers, school-aged children, and adolescents--not preschool-aged children. For example, toddlers' effortful control has been shown to mediate the relation between maternal behaviors (including redirection and inductive reasoning) and academic functioning in kindergarten (Kopystynska et al., 2016). In school-aged children, parenting behaviors influenced academic performance through the mediating effect of children's self-regulation (Lee et al., 2012); parental autonomy supportive practices appear particularly important for this pathway (Grolnick et al., 1991). A study on junior high school students in China found self-regulation to play the largest role among several factors found to fully mediate the relation between parenting styles and academic performance (Chan, 2021). Furthermore, self-regulation has been shown to mediate the effects of parental involvement and autonomy support on students' academic performance--including math, science, language arts, and history--for adolescents in high and low risk circumstances (Wong, 2008).

Very few studies have examined this mediation pathway for preschool children, although existing findings do appear promising. Primary support comes from two reports based on data from the NICHD Study of Early Child Care; first, the relation between parenting quality (resources at home, ratings of sensitivity and cognitive stimulation) at 4.5 years and academic achievement (reading and math) at age six was partially mediated by executive functions relating to attention and inhibition at age 4.5 (NICHD Early Child Care Research Network, 2003). Second, in this same sample, planning ability at ages six and eight mediated the relation between

parenting quality in preschool and academic performance at eight and 10 years of age (Friedman et al., 2014). Additional support for this mediation model comes from the UK, demonstrating that parenting at age two related to inhibitory control at age five, which in turn was associated with children's academics and behavior at school by age ten (Perry et al., 2018). Another study in England found preschoolers' executive function skills to mediate the relation between parental scaffolding and children's early literacy (phonological awareness, letter-sound awareness, letter reading skills) and mathematics skills (counting, identifying numbers, solving simple problems) (Devine et al., 2016). This last study is perhaps the closest to measuring specific parenting practices--verses more general styles or dimensions--within this mediation model for preschool children; as such, there is more to be explored with regard to the potential role of child self-regulation as a mediator between parenting practices (particularly proactive practices) and children's academic outcomes.

Measures of Parenting Practices targeting Child Self-Regulation

In order to examine whether certain parenting practices relate to children's self-regulation--which might then relate to children's academic skills--it is first necessary to measure the target practices. Parenting is typically measured via observational coding or survey data. Observational coding schemes exist to examine parents' use of practices that promote self-regulation, and the vast majority of studies assessing proactive parenting have relied on observational data (Bernier et al., 2010; Chang et al., 2015; Gardner et al., 1999; Hughes & Ensor, 2009; Lengua et al., 2007; Shelleby et al., 2012). However, this method is limited by several factors. Observational coding of parent behaviors is intensive work, demanding significant time and resources on the part of the researcher and imposing a similar burden on the participant. In addition, observational coding whether live or based on recordings necessitates a

structured (or at least a scheduled) session to capture parent-child interactions, limiting the variety of parenting behaviors and contexts therein that can be observed. Similarly, these sessions may interact with parents' social desirability, causing parents to change how they interact with children under the pressure of observation (Mâssee & Watts, 2013; Shelton et al., 1996). This is in contrast to the indirect questioning prompted by a self-report survey, which given its unobserved nature may subsequently elicit more accurate information on what parents may perceive as sensitive issues (Fisher, 1993; Jo, 2000). The majority of previous studies examining proactive practices in the context of child behavior rely on observational data; a survey that could capture these practices would be far more efficient and less costly. As such, the current study focuses on the use of surveys for collecting data on parent practices.

Survey data has many established benefits. Perhaps the most prominent is that data can be gathered from large samples in a relatively short amount of time. Many surveys are relatively short and can be completed in just a few minutes by parents, and do not require the expensive equipment and extensive training necessary for observational measures. Parent surveys also allow for the capture of information across multiple contexts and periods, whereas observations are restricted to a particular context and window of time. Surveys in which parents report on their own behavior have been shown to be reliable and valid forms of measurement (Korucu et al., 2019; McEachern et al., 2012; Parent & Forehand, 2017).

Although surveys generally boast these benefits, existing parent report surveys are limited in several ways. First, the majority of surveys applicable to the preschool age measure the more traditional aspects of parenting such as dimensions and styles (e.g., the Parent Behavior Inventory; Lovejoy et al., 1999); as previously discussed, these are largely limited by their focus on the "how" or general emotional climate of parenting rather than the "what" or specific

parenting practices. Second, although certain parenting surveys--including those which do measure practices--may be related to aspects of child behavior, most do not explicitly target children's self-regulatory skills. Furthermore, existing parent surveys can be exceptionally long, over a hundred items, and thus quite burdensome for parents to complete (e.g., the Parenting Practices Questionnaire; Robinson et al., 1995). Finally, very few surveys exist that specifically focus on proactive parenting practices as they relate to promoting self-regulation development in preschool children.

To this author's knowledge, only two established surveys exist that are relevant to the current work: a subscale of the Parenting Young Children survey (PARYC), and the Home Executive Function Environment scale (HEFE). The former is a 7-item subscale of the PARYC (McEachern et al., 2012) which asks parents to report how often they engage in providing choices, advance notice, reasoning, and scaffolding behaviors. One goal of the PARYC is to assess relations to general problem behavior, but it does not explicitly target children's self-regulation, no direct measures of child self-regulation were used in evaluating it, and the subscale represents a somewhat narrow set of proactive practices. Perhaps some of these reasons account for the lack of relations observed in that study between the proactive subscale and alternative caregiver reports of problem behaviors. Indeed, the lack of direct assessment of child self-regulation and the use of overly narrow self-report measures are common limitations in studies on existing proactive practice surveys (Breitenstein et al., 2021; Roos et al., 2021).

The recently developed Home Executive Function Environment scale (HEFE; Korucu et al., 2019) is another existing parent report survey specifically designed to target child self-regulation supports that could be considered proactive, although those supports do not fall under the list of proactive practices typically defined by the literature and the researchers make no

mention of this lens. The goal of the HEFE scale was predominantly to examine parents' use of "concentration games," or activities that parents may engage in with their children that are related to growth in executive functioning. This short 5-item scale asks parents to report how often they engage their child in memory games and impulse control games like red light/green light, promote daily physical activity for the child, and sing songs with the child that become increasingly complex. The researchers examined the HEFE scale alongside a subset of items from the Parenting Practices Questionnaire (PPQ; Robinson et al., 1995; Robinson et al., 1996), which contrary to its name is actually designed to target Baumrind's original parenting styles. A confirmatory factor analysis on that larger parenting survey which included the subset HEFE scale indicated that these activities comprise a factor distinct from other general aspects of parenting including stimulation, sensitivity-responsivity, control-discipline, and warmth. Unexpectedly, the study found no relations between children's self-regulation and the subset of PPQ items reflecting authoritative parenting practices. However, the study did identify relations between the HEFE scale and children's self-regulation, although no relations with individual EF components were identified. Although this study and its associated scale contribute to the field by suggesting that self-regulatory games, complex songs, and regular physical activity are valuable for children's self-regulation, the scale's narrow focus affords only a glimpse at a sliver of parenting practices that may promote self-regulatory skills.

The Current Study

Certain parenting practices appear to play a critical role in self-regulation development. Given this, it is important to understand how parents are using—or not using—these practices. As such, the field could benefit from a parent report survey that broadly captures parents' use of the specific, proactive practices thought to support self-regulatory skills.

The current work presents a survey designed to capture parents' use of these self-regulatory supports. The following research aims are pursued:

1) Describe (using relevant proactive and reactive strategies) how parents are supporting preschool children's self-regulation at home, as guided by extant literature in this area. To complete this aim, I created a survey based on mechanisms with strong theoretical and empirical evidence that are most represented in the field; item fit is evaluated to determine whether all items should be included and internal consistency is evaluated to provide evidence of reliability. I hypothesized that the items would form three factors in accordance with the three mechanisms discussed, there would be variability in how parents use these supports, and parents would be more likely to use supports related to routines than supports related to modeling or autonomy.
2) Examine whether parents' supports, as measured by their survey responses, relate to children's self-regulation and executive function skills; this would provide evidence for concurrent validity. I hypothesized that parents' more frequent use of self-reported supports would relate to higher levels of child self-regulation and executive function skills.
3) Examine how factors known to influence parenting including maternal education, parent stress, and parents' own self-regulation relate to parents' supports, as measured by their survey responses. I hypothesized that higher maternal education would predict higher frequency of these parental supports for child self-regulation. I hypothesized that higher parent stress would predict lower frequency

of parental supports. I hypothesized that higher parent self-regulation would predict higher frequency of parental supports.

4) Assess whether parents' supports might promote children's behavioral self-regulation (integrated form), which would then benefit children's academic skills (math and literacy). I hypothesized that self-regulation would mediate the relation between parent supports and child academic skills, such that higher parental supports predict higher self-regulation which predicts higher academic outcomes.

CHAPTER 3: METHODS

Data were obtained from three extant data sets as part of a larger project headed by Dr. Lori Skibbe which include data from fall 2019, 2020, and 2021. All three data sets included the experimental instrument (survey); the 2020/2021 datasets further included a variety of other behavioral and academic measures described later in this section. Data from 2020 and 2021 were combined for substantive analyses. These choices were made in order to maximize sample sizes to ensure appropriate amounts of data for the present analyses. More specific decisions regarding using the waves of data in analyses are included in the Analytical Plan section.

Participants, Fall 2019

Data from fall 2019 included parents of 271 children (Male = 51.1%) who were enrolled in state-funded preschool programs in one midwestern U.S. state. Children ranged from 45 to 68 months of age (M = 52.27 months, SD = 4.01 months). Parents reported on children's race and ethnicity, with 49.1% identified as Black/African American, 47.9% White/Caucasian, 1.9% Asian/Pacific Islander, and 1.5% American Indian/Alaskan. Parents reported children as 9.8% Hispanic/Latino of any race. The vast majority of children (93.5%) were reported to understand and speak English like a native speaker. Approximately 82.5% of mothers did not complete college (1.5% reported no school attended, 8.0% some high school, 32.3% graduated high school, 40.7% some college), with 12.2% of mothers reporting completing an undergraduate degree, and 5.3% attending graduate or professional school. About 34% of children had some medical or developmental concern as reported by their parents, but teachers confirmed that all children were able to participate in the assessment process. A moderate number of parents (31.6%) reported being food-insecure and about 24% of participants reported running out of food

during the past 12 months. For the sake of the current study, data from 2019 included only the Self-Regulation Home Support parent survey.

Participants, Fall 2020

Data from the 2020 preschool fall semester included 97 children (Male = 46) enrolled in state-funded preschool programs in one midwestern U.S. state. Children ranged from 46 to 62 months of age (M = 53.2 months, SD = 4.4 months). Parents reported on children's race and ethnicity, with 55% identified as Black/African American, 33.7% White/Caucasian, 7.9% biracial, 2.2% other, and 1.1% Asian/Pacific Islander; 7.2% of children were Hispanic/Latino of any race. For 94.6% of children, English was the primary language spoken at home; 12% also spoke another language. Approximately 72% of mothers did not complete college (3.3% reported no school attended, 5.4% some high school, 23.9% graduated high school, 39.1% some college), with 16.3% of mothers reporting completing an undergraduate degree, and 12% attending graduate or professional school. About 35% of children had some medical or developmental concern as reported by their parents, but teachers confirmed that all children were able to participate in the assessment process. Eighteen percent of participants reported being food-insecure and 15% of participants reported running out of food during the past 12 months.

Participants, Fall 2021

Data from fall 2021 include 376 children (Male = 166) enrolled in state-funded preschool programs in one midwestern U.S. state. Children ranged from 34 to 75 months of age (M = 51 months, SD = 8.45 months). Child race as reported by parents was somewhat diverse, with 39.7% identifying as White/Caucasian, 38.7% Black/African American, 3.7% Asian/Pacific Islander, and 17.9% other/multi-racial. Ethnicity data showed 6.6% as Hispanic/Latino. The vast majority of children (95%) were reported to understand and speak English like a native speaker.

For maternal education, 6.2% attended some high school, 28.7% completed high school, 32.5% some college, 16.6% hold an undergraduate degree, and 15.9% have completed graduate or professional school. About 29% of children had some medical or developmental concern as reported by their parents, but teachers confirmed that all children were able to participate in the assessment process. About 20% of participants reported being food-insecure and 15.2% of participants reported running out of food in the past 12 months.

Procedures

Across waves, consent forms were provided to teachers, who then recruited parents by encouraging them to consider participating. Parents were asked to fill out a paper/pencil demographic survey (2019) or a demographic survey in Qualtrics (2020/2021) and additional questionnaires, receiving $20 (2019), $25 (2020), or $50 (2021) for completing these. In 2019, trained assessors tested children on all measures in person at their schools. Given the restrictions caused by the COVID-19 pandemic for 2020 and 2021, trained assessors tested children on both academic and EF measures remotely. In fall 2020, children were assessed remotely via tablets that had been provided by the school to promote virtual attendance. Children remained at home, assisted by their parents to engage with the tasks and to use and move the tablet as needed. In fall 2021, children were also tested remotely but mostly assessed in schools with the assistance of a proctor to support use of the tablet, which was provided by the HighScope organization.

Assessors conducted testing sessions lasting about 1 hour via Zoom Video Communications web conferencing services. All child measures were adapted for remote administration, with visual stimuli transferred into Microsoft PowerPoint format. Tasks requiring non-verbal responses (e.g., pointing) from children were administered using the remote control functions in Zoom.

Measures

Parent Surveys

Self-Regulation Home Support. A new survey was created for this study to examine how parents report supporting children's self-regulation at home; specifically, the frequency with which they engage in certain behaviors known to support self-regulation at the preschool age. The conception of this survey resulted from a lack of extant surveys which comprehensively and specifically tapped practices known to target children's self-regulation development (as previously mentioned). My goal for the initial item pool was to take a broad, comprehensive approach to considering the proactive (and certain select reactive) strategies that parents could use when supporting children's self-regulation within their homes. Based on what was highlighted by the literature, I focused on the following domains: establishing routines and supporting transitions, providing opportunities for autonomy, and modeling regulated emotions and behavior. For initial identification of core survey items, I consulted with an expert in early education and assessment, and further cross-checked drafted items with the research literature (e.g., is it important to include separate items for bedtime and bedtime routine?). To minimize completion time and reduce the cognitive burden on parents, we aimed for the survey to be no longer than 20 items total. The initial survey consisted of 15 items when it was provided to additional experts for review. All items were phrased positively (in one direction such that a higher score would indicate greater support); no reversed items were included. This decision was made given that reversed items are more difficult to answer due to cognitive taxation (Steenkamp & Burgess, 2002; Swain et al., 2008).

Several response options were considered based on guidance from the literature (Taherdoost, 2019; Weijters et al., 2010). Regardless of sample size (ranging from 50 to 500)

and varying item correlations (0.2-0.9), the ideal number of response categories for a rating scale (ranging from 2-9) is between four and seven; fewer than four options tends to reduce reliability (alpha coefficient) and validity (factorial; percent variance explained), and seven or more options does not significantly improve these psychometric properties (Lozano et al., 2008). Although this may suggest that seven response options would be optimal, the discriminative capacity of the subjects must also be considered; too many alternatives can cause confusion for respondents. It has been suggested that 5-point rating scales can minimize confusion and increase the response rate compared to increased alternatives (Bouranta et al., 2009; Devlin et al., 2003). Response options ranging from 2-4 have been rated highest for quick to use, and 5-7 rated highest for ease of use (Preston & Colman, 2000). Given all of these considerations, we chose a 5-point rating scale to promote ease, clarity, and speed of use for parents, without sacrificing reliability and validity. Although a 5-point scale necessitates a midpoint, the benefits and drawbacks of which have been disputed for decades (Garland, 1991; O'Muircheartaigh et al., 2001), research indicates that including a midpoint can reduce frustration related to the forced choice required when midpoints are omitted, and respondents are less likely to default to a midpoint if the item clarity is high (Velez & Ashworth, 2007). We prioritized minimizing parent frustration and strove to ensure items were clear to prevent over-endorsement of the midpoint response.

Research further indicates that the labeling of categories can reduce confusion (Weijters et al., 2010) and increase variability as intermediate options become more salient and respondents are thus not drawn to the extreme categories (Simonson, 1989); given that reliability is equal to the variance of the true score divided by variance of the observed score, these formats are associated with higher reliability (Weng, 2004) and can support both researchers and respondents to effectively interpret the scale (Rohrmann, 2007; Wildt & Mazis, 1978); as such,

we labeled all response options (*never, rarely, sometimes, frequently, always*). Keeping in mind that parents may struggle to identify specific values representing frequency of behavior (e.g., five times per day), we opted for the more accessible scale from *never* to *always*. We chose these frequency options rather than Likert categories of agreeableness given that respondents tend to be biased toward agreeableness in survey research (McClendon, 1991), and because agreeing with a statement (e.g., "I talk to my child about other people's emotions") does not provide information about how often the parent engages in the behavior. Based on the theoretical mechanisms discussed in the present work, the frequency of these target behaviors is crucial to the supportive effect on child self-regulation; this is consistent with recent and previous work examining similar parenting behaviors (Korucu et al., 2019; McEachern et al., 2012).

Apart from the chief expert and myself, four other experts reviewed the 5-point rating scale survey. All experts had expertise in child development. Two experts had expertise in psychometrics (one of these had additional expertise in parenting interactions). The other two experts had expertise in early education, early interventions, and family risk factors. Experts were asked to identify gaps in the item pool, critique the content and phrasing of items, and provide thoughts regarding the length and comprehensiveness of the item pool. Experts were consulted sequentially, such that the survey was revised following feedback from one expert and the updated version was provided to the next expert. In addition to the expert review, a small pool of six preschool teachers who worked in a large, urban US city were consulted in a focus group. Based on their knowledge of the parents in the present population, they provided insight into how the survey might be received. Specifically, the teachers were asked to rate the usefulness of the survey (1-4 scale), to rate how easy the survey was to understand (1-4 scale), to estimate how long the survey would take a parent (<5min, 5-10min, 10-15min, >15min), and

finally to note what they think the survey tells us about children/parents, which (if any) items might seem confusing, and which (if any) items they did not like.

Including the initial version, this review resulted in 6 total iterations. The majority of expert feedback focused on adjustments to phrasing and vocabulary (either for clarity or to ensure accessibility to parents), although some suggestions also resulted in items being split (e.g., if one item appeared to represent two distinct behaviors) and changes to the order of items (to support reading ease and accuracy). Overall, experts provided strong praise for the item pool. Based on the feedback provided during this process, the phrasing of the instructions to parents was determined; we deliberately chose a relatively general prompt for parents to report how often they engaged in each item's behavior (vs. phrasing specific to supporting self-regulation, which may have biased parents' responses). From the teacher focus group, particularly strong praise was provided for the survey, specifically with regard to the clarity and positive phrasing of items (vs. items in which parents may have to admit participating in a behavior that might reflect poorly on them; teachers were concerned that such negatively-phrased items could be viewed by parents as a personal attack, racial judgment, or attempt to deem them unfit parents and take their child). This further confirmed our decision to exclude reversed items. Teachers offered a few phrasing suggestions but were predominantly enthusiastic for this survey to be used with families who are eligible for subsidized or free early childhood education. They consistently rated the survey as either "very useful" or "somewhat useful", rated the survey as either "very easy" or "somewhat easy" to understand, and estimated completion time could take as little as five minutes.

Based on these cycles of feedback, the final item pool included 20 empirically derived items. These items span the strategies and supports discussed in the current work, such as

scaffolding, modeling, redirecting, and induction. Table 1 provides the final items with the primary citations in support of each. Parents were asked to report how often they used these strategies on a 5-point rating scale ("Please report how often you do each of the following"), with *1 = never, 2 = rarely, 3 = sometimes, 4 = frequently,* and *5 = always*.

Scoring for this survey was guided by the results of the factor analyses presented in the Results section. Item fit was evaluated to determine whether all items represent the construct of interest and should be included; adjustments were made accordingly. Although three factors were expected in alignment with the three major mechanisms discussed in the work (establishing routines and supporting transitions, modeling regulated emotions and behavior, providing opportunities for autonomy), it was possible that a single factor or different factors would emerge. Factor analyses yielded a latent variable which was used in subsequent analyses to test relations between the latent construct, children's self-regulation skills, and standardized tests of literacy and math achievement. Additional details regarding factor analyses run on the survey are provided in the Analytical Plan section.

Table 1

Self-Regulation Home Environment Survey Items, Primary Citations, and Target Mechanisms

Item	Major Citations	Mechanisms
I talk to my child about his/her schedule for the next day.	Bater & Jordan, 2017; Busby & Suddendorf, 2005; Quon & Atance, 2010	Establish Routines & Support Transitions
My child has a set bed time for week nights.	Anderson et al., 2017; Grolnick, 2009; Martin et al., 2012; Stormont & Reinke, 2009	Establish Routines & Support Transitions
My child has a set bedtime routine for week nights.	Grolnick, 2009; Guidubaldi et al., 1986; Martin et al., 2012; Moore et al., 2007; Stormont & Reinke, 2009	Establish Routines & Support Transitions

Table 1 (cont'd)

Item	Major Citations	Mechanisms
My child has a calm, quiet environment for reading and learning (outside of school).	Crespo et al., 2019; Deater-Deckard et al., 2009; Dumas et al., 2005; Marsh et al., 2020; Matheny et al., 1995; Vernon-Feagans et al., 2016	Establish Routines & Support Transitions
I let my child know at least five minutes before we have to switch activities.	Banerjee & Horn, 2012; Coleman et al., 2013; Hancock & Carter, 2016; Olive, 2004; Thelen & Klifman, 2011; Zeece & Crase, 1982	Establish Routines & Support Transitions
I talk to my child before we go places that might be stressful to him/her.	Banerjee & Horn, 2012; Coleman et al., 2013; Hancock & Carter, 2016; Olive, 2004; Thompson et al., 2013; Thelen & Klifman, 2011; Zeece & Crase, 1982	Establish Routines & Support Transitions
My child has a job chart or other visual schedule.	Breitfelder, 2008; Hemmeter et al., 2008; Hodgon 1995; Marchant et al., 2004; Thelen & Klifman, 2011	Establish Routines & Support Transitions
I offer my child choices about what s/he wears, eats, or plays with whenever possible.	Bindman et al., 2013; Carter, 2001; Copple & Bredekamp, 2009; Green et al., 2011; Kern et al., 1998; Meuwissen & Carlson, 2019; Pattall et al., 2008; Reinhartsen et al., 2002	Provide Opportunities for Autonomy
I bring toys or activities my child likes when I know s/he will need to wait for a while.	Juanico et al., 2016; Newquist et al., 2012; Putnam et al., 2002	Provide Opportunities for Autonomy
I let my child know at least five minutes before we have to go somewhere.	Banerjee & Horn, 2012; Coleman et al., 2013; Hancock & Carter, 2016; Olive, 2004; Thelen & Klifman, 2011; Zeece & Crase, 1982	Establish Routines & Support Transitions

Table 1 (cont'd)

Item	Major Citations	Mechanisms
I talk to my child about other people's emotions.	Chronis-Tuscano et al., 2016; Cole et al., 2009; Durlak et al., 2011; Katz & Gottman, 1997; Ramsden & Hubbard, 2002	Model Regulated Emotions and Behavior
I give my child items to help him/her keep track of time (e.g., timer, clock).	Arnott, 2018; Pistorio et al., 2017	Provide Opportunities for Autonomy
I help my child break down larger tasks, like getting dressed, into smaller parts.	Bernier et al., 2010; Bibok et al., 2009; Distefano et al., 2018; Hammond et al., 2012; Hughes & Ensor, 2009; Matte-Gagne & Bernier, 2011; Mermelshtine, 2017; Lengua et al., 2007; Power et al., 2020; Sun & Tang, 2017	Provide Opportunities for Autonomy
I talk aloud when I'm solving a problem so my child will learn from my process.	Dale & Zimmerman, 2007; Hmelo-Silver, 2004; Paris & Winograd, 2003; Peeters et al., 2014; Pintrich, 2002	Model Regulated Emotions and Behavior
I help my child talk about what s/he is feeling.	Chronis-Tuscano et al., 2016; Cole et al., 2009; Durlak et al., 2011; Katz & Gottman, 1997; Ramsden & Hubbard, 2002	Model Regulated Emotions and Behavior
My child and I discuss how to solve problems together.	DeVries et al., 1991; Evans, 2002; Goodman et al., 1995; Schweinkart et al., 1986; Stevahn et al., 2000; Vestal & Jones, 2004	Provide Opportunities for Autonomy
When I ask my child to stop doing something, I talk with my child to help him/her understand why.	Bates et al., 1976; Chang et al., 2011; Grusec & Goodnow, 1994; Knafo & Plomin, 2006; Krevans & Gibbs, 1996; Lansford et al., 2012; Trickett & Kuczynski, 1986	Provide Opportunities for Autonomy
If my child is behaving in a way I don't like, I help him/her find something else to do instead.	Cipriano & Stifter, 2010; Giordano et al., 2018; Macina, 2001; Pianta et al., 2008; Raver et al., 2011	Provide Opportunities for Autonomy

Table 1 (cont'd)

Item	Major Citations	Mechanisms
I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	Bates et al., 1976; Chang et al., 2011; Grusec & Goodnow, 1994; Knafo & Plomin, 2006; Krevans & Gibbs, 1996; Lansford et al., 2012; Trickett & Kuczynski, 1986	Provide Opportunities for Autonomy
I invite my child to help me make plans for our family.	Bodrova & Leong, 2019; McCormack & Atance, 2011; Moffett et al., 2018; Schweinhart & Weikart, 1997	Provide Opportunities for Autonomy

Parent Self-Regulation. The Short Self-Regulation Questionnaire (SSRQ; Carey et al., 2004) is a 31-item survey in which parents report on their own self-regulation; this short form was adapted from the original Self-Regulation Questionnaire (Brown et al., 1999). Items are scored on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). Based on work by Neal and Carey (2005), the SSRQ has acceptable reliability and validity, and further appears to have two distinct factors: impulse control and goal-setting. Impulse control items include "I am able to resist temptation" and "It's hard for me to notice when I've 'had enough' (alcohol, food, sweets)." Goal-setting items include "I am able to accomplish goals I set for myself" and "I set goals for myself and keep track of my progress." After reverse-coding appropriate items, this questionnaire yields a total sum score used in analyses such that higher scores indicate greater self-regulatory capacity, with scores ranging from 31 to 155 (Carey et al., 2004).

Parent Stress. The Perceived Stress Scale (PSS; Cohen, 1988) is a widely used scale that measures the degree to which respondents experience certain life situations as stressful. It includes ten items on a 5-point rating scale ranging from 0 (never) to 4 (very often). Example items include "In the last month, how often have you felt that you were on top of things?" and

"In the last month, how often have you felt nervous and stressed?" After reverse-coding appropriate items, this survey yields a total sum score used in analyses such that higher scores indicate greater stress, with scores ranging from 0 to 40. This scale is psychometrically sound and superior to its longer and shorter versions (Lee, 2012).

Direct Child Measures

Behavioral Self-Regulation. The revised version of the Head-Toes-Knees-Shoulders (HTKS; McClelland et al., 2014) task was used to assess children's self-regulation. Similar to Simon Says, this task first prompts children to speak the opposite word from that spoken by the assessor (e.g., "head" prompts child to say "toes"). Then, the child is required to perform a movement opposite from that spoken by the assessor (e.g., "touch your toes" requires the child to touch their head). Children who score four or higher on this part move on to learn another two prompts (shoulders and knees), and are then asked to perform both pairs of opposites together. In the final part of the task, the rules are changed such that head is paired with knees and toes with shoulders. Evidence for the construct validity, predictive validity, reliability, and inter-rater reliability of the HTKS is strong (McClelland et al., 2014). For remote assessment, parents were asked to hold the tablet such that the camera captured the child's entire body. In order to demonstrate required movements, assessors would put their laptops on the floor where the webcams could capture them fully, then return to their desks for scoring. Scores range from 0 to 74 and were summed across all testing blocks to yield a total score used in analyses, with higher scores indicating greater self-regulation.

Executive Functions. Children were assessed on each of the individual components of self-regulation, including inhibitory control, working memory, and cognitive flexibility.

Inhibitory Control. The Day-Night Stroop Task (Gerstadt et al., 1994) was adapted from the original Stroop task (Stroop, 1935) for use with children ages 3 to 7 years. In this task, children presented with a black card showing a moon and stars must say "day," and when presented with a white card showing a sun must say "night." After two practice trials, children are tested with 14 pre-randomized items, half requiring the child to say "day" and the other half "night." A score of 2 is given for a correct response, 1 for self-correct or similar (e.g., "sun" instead of "day"), and 0 for incorrect. In remote format, children were shown images of the cards on PowerPoint slides advanced by the assessor. The Day-Night Stroop has demonstrated good internal reliability (Chasiotis et al., 2006; Rhoades et al., 2009; von Stauffenberg & Campbell, 2007), test–retest reliability (Thorell & Wahlstedt, 2006), and convergent validity (e.g., Carlson & Moses, 2001). Scores for this task range from 0 to 28 to yield a total score used in analyses, with higher scores indicating greater inhibitory control.

Working Memory. The Digit Span task (Wechsler, 1991) requires information storage, maintenance, and manipulation; the forward span part was used to assess children's short-term and working memory capacity. In this task, children listen to strings of numbers spoken by the assessor and are asked to recall and repeat them aloud (Conway, 2005; Lipsey et al., 2017). Two blocks are provided, and the string of numbers increases by one digit for every correct response. Two incorrect responses in a row prompted the assessor to move to the next section. This measure demonstrates acceptable test-retest reliability (r = .73; Lipsey et al., 2017). Scores for this task reflect the maximum number of digits children were able to recall, with higher scores indicating greater memory.

Cognitive Flexibility. The Dimensional Change Card Sort Task (DCCS; Zelazo, 2006) can assess cognitive flexibility for children ages three to five. This task presents children with

cards (red rabbits and blue boats) which they must sort by one dimension (e.g., shape), and then switch to sorting by another dimension (e.g., color). After two practice trials, children respond to six testing items for the shape game and then six for the color game. In remote format, children were shown images of the cards and sorting boxes on PowerPoint slides, and then used the remote control function to select the box into which each presented card should be sorted. The DCCS shows excellent test-retest reliability in childhood (Beck et al., 2011). Scores for this task range from 0 to 12 to yield a total score used in analyses, with higher scores indicating greater cognitive flexibility.

Academics

Early Mathematics Skills. Data on math skills came only from fall 2021. Children's mathematical knowledge was assessed using the Number Sense subtest of the Woodcock-Johnson IV Tests of Early Cognitive and Academic Development (ECAD; Schrank & Wendling, 2015). This subtest includes items with word problems, pictures, and numbers, with increasing difficulty as the task progresses. External validation efforts have demonstrated excellent reliability (Cronbach's $\alpha = .93$) for the academic achievement battery among young students and very high test-retest reliability ($r = .95$; Woodcock et al., 2001). For remote assessment, items were presented to children on PowerPoint slides advanced by the assessor. Recent research has demonstrated that the Letter-Word Identification and Applied Problem (similar to Number Sense) subtests of Woodcock-Johnson tests of Achievement (WJ-IV; Schrank, et al., 2014) show equivalency between in-person and remote testing administration (Wright, 2018). This task outputs *W* scores, which incorporate Rasch-based measurement techniques to account for item difficulty and children's age (age 3 mean = 408.93, age 4 = 426.15, age 5 = 441.10; Wendling et al., 2020).

Early Literacy Skills. Data on literacy skills came only from fall 2021. The Letter-Word Identification subtest of the ECAD (Schrank & Wendling, 2015) was used to assess children's letter knowledge and word decoding skills, with difficulty increasing across the task. Reported reliabilities for this subtest are excellent (*Range* = .92-.94). This task was adapted for remote assessment in the same way as the Number Sense subtest of the WJ-IV. As with the Number Sense subtest, this task outputs *W* scores (age 3 mean = 319.07, age 4 = 344.70, age 5 = 380.36; Wendling et al., 2020)

Analytical Plan

Descriptive statistics were conducted using IBM SPSS Statistics version 26 (IBM Corp. Armonk, N.Y., USA), and substantive analyses were conducted with Mplus (version 8.1; Muthen & Muthen 1998-2018). Missing data was addressed with full information maximum likelihood (FIML), which does not estimate missing data but rather fits the covariance structure model directly to observed raw data for each participant, allowing for the use of all available data (Enders, 2001). Sample size details and justifications are provided alongside their planned analyses below. The fall 2020 data from 97 children were treated as missing at random (MAR) for the ECAD assessments, given they were assessed with different measures of academic achievement; MAR is used when the probability of data being included depends on a known property, as is consistent with this case. Maximum likelihood estimators with robust standard errors (MLR) were used in analyses in which data are skewed (asymmetrical) or kurtotic (flat or peaked), to protect against error contamination; ML was used if data are normal (Asparouhov & Muthen, 2016), as is appropriate given that ML assumes data to be "complete, precise, and free of errors" (p. 1, Bertsimas & Nohadani, 2019). Given issues with treating indicators as continuous (e.g., not all categories are represented appropriately) and lack of target fit statistics

from Mplus when using ML with categorical indicators, data were analyzed both as continuous and categorical, using ML and WLSMV estimators. Treating the data as continuous is acceptable given that the survey has five categories, and a minimum of five categories is required for continuous methodology to perform as effectively as (or more effectively than) categorical methodology (Rhemtulla et al., 2012).

To address the first research aim, frequency distributions and coefficients of skewness and kurtosis were examined to understand the degree to which the survey is normally distributed; coefficients between -0.5 and 0.5 typically indicate no notable skew and values between 2 and 4 indicate no notable kurtosis. This assessment was supplemented by the popular Shapiro-Wilk test (values range between 0-1; p-values above 0.05 indicate normality; Razali & Wah, 2011) and examination of histograms. Central tendencies (i.e., mean, median, and mode) of the survey along with standard deviations, ranges, and variances were provided to understand the dispersion of values around the central tendency. Internal consistency of the survey, which reflects to what extent the components overlap in what they measure (high inter-item correlations indicate that all items are measuring the same thing), were also evaluated using coefficient omega as is appropriate for a congeneric model (vs. alpha which assumes tau-equivalence); a value was reported to reflect the reliability if the composite score were created. Coefficient omega should be a minimum of 0.50, but 0.75 is preferred and will indicate strong reliability (Reise, 2012; Watkins, 2017). Then, an exploratory factor analysis was conducted to examine the factor structure of the survey.

Although extensive literature exists in support of the domains behind the items created, an EFA was chosen first over a CFA given that the items were not pulled from previously used or validated measures; the current scale is new and thus its dimensionality needs to be explored.

In an EFA, the model is unrestricted; all variables are allowed to load on each factor. I began validation of this scale by conducting an EFA on the 2019 parent survey data. A sample size of 271 (2019 data) was used for this first EFA, which is consistent with best practice recommendations of a minimum of 200 (Howard, 2016).

For EFA, a principal axis extraction was conducted; this method uses a reduced correlation matrix in which diagonals contain the communalities (item variance explained by the factor structure) of observed variables, and through iterations continues to estimate communalities until they do not change. This was performed with oblique rotation as this rotation type allows factors to correlate (as is theoretically expected; Osborne, 2015); rotation is performed to achieve simple structure (factor loadings close to 0, 1, or -1). Oblique rotation was selected over orthogonal because the latter forces factors to be uncorrelated, which can distort factor loadings; if factors are truly orthogonal, this would be indicated by the oblique-rotated factor loadings. Mplus defaults to geomin for oblique rotation, but all methods (direct oblimin, quartimin, promax) tend to produce similar results and none are recommended significantly above others (Osborne, 2015).

To identify distinct factors, the Kaiser-Guttman criterion (i.e., minimum eigenvalue greater than one criterion) and VSP analysis (visual scree plot) were used, along with an assessment of interpretability. Eigenvalues are calculated by summing the squared factor loadings (Kline, 2014), and represent the amount of variance accounted for by each factor out of the total variance; the sum of eigenvalues is equal to the number of variables. This indicates that a factor with an eigenvalue of 1 accounts for at least as much variance as a single variable, and as such the Kaiser-Guttman rule states that an eigenvalue greater than 1 represents a notable factor worth keeping. The scree plot plots the eigenvalues (y-axis) against the components (x-axis) thus

depicting the amount of variance explained by each factor. Factor solutions were evaluated two factors below and above the perceived elbow, or where the slope of the curve most obviously levels off (Osborne, 2014). As previously mentioned, three factors were expected in alignment with the three major mechanisms discussed in the work (establishing routines and supporting transitions, modeling regulated emotions and behavior, providing opportunities for autonomy), although other factor solutions are certainly possible. Certain factors may contribute more information than others, although this is not necessarily expected. I expected I may see cross-loadings between items on multiple factors that are theoretically related. For example, providing structure through predictable routines and supportive transitions (e.g., items such as "I talk to my child about his/her schedule for the next day") may also serve to promote children's autonomous functioning, thus I expected this item may cross-load onto the routines and transitions factor as well as the autonomy factor. Similarly, modeling regulated behavior (e.g., items such as "I talk aloud when I'm solving a problem so my child will learn from my process") can empower children with strategies to regulate their own behavior, thus also supporting their autonomy; I expected this may be reflected in cross-loadings as well.

The literature provides several cutoff suggestions to determine the factor loadings; that is, the extent to which each variable represents each emergent factor. Howard (2016) reviews the literature and subsequently offers the .40-.30-.20 rule; that is, satisfactory variables must "1) load onto their primary factor above 0.40, 2) load onto alternative factors below 0.30, and 3) demonstrate a difference of 0.20 between their primary and alternative factor loadings" (p. 55). Tabachnick and Fidell (2007), however, follow Comrey and Lee (1992) in recommending more stringent cutoffs as follows: 0.32 (poor; 10% overlapping variance), 0.45 (fair; 20% overlapping variance), 0.55 (good; 30% overlapping variance), 0.63 (very good; 40% overlapping variance),

and 0.71 (excellent; 50% overlapping variance). The current work strives to employ these more rigorous suggestions for factor loading cutoffs, although as Tabachnick and Fidell (2007) point out, cutoffs for loading sizes may ultimately be determined based on the interpretability of factors yielded by the analysis. Furthermore, if parents respond similarly to survey items such that scores are more homogeneous, a lower cutoff is warranted to interpret factors (Tabachnick & Fidell, 2007).

Several fit indices are highlighted by the literature as effective to assess model fit; these were used for the EFA, CFA, and final EFA (the mediation required Bayes estimation, which provides different metrics, as discussed later). First, the comparative fit index (CFI) was used; this index measures the relative improvement in fit from the baseline model (null, with all observed variables uncorrelated) to the specified model. CFI is a normed fit index (range 0-1), with higher values indicating a better fit, and the typical criterion indicating a good fit is CFI ≥ .95 (Hu & Bentler, 1999; West et al., 2012). Next, the Tucker-Lewis index (TLI) was used; this index measures a relative reduction in misfit per degree of freedom, which takes model parsimony into account (Mahler, 2011). TLI is non-normed (range can be negative or exceed 1). Like CFI, higher values of TLI indicate better fit, with TLI ≥ .95 indicating good fit (Hu & Bentler, 1999; West et al., 2012). In addition, the root mean square error of approximation (RMSEA; MacCallum et al., 1996) was used; this index measures the discrepancy due to the approximation in the population per degree of freedom. Unlike CFI and TLI, this is a measure of misfit detectability where lower values indicate a better fit. RMSEA values indicating reasonable and close fit to the data are ≤ .06, while RMSEA ≥ .10 is unacceptable (Browne & Cudeck, 1993).

Based on the results of the EFA, I cross-validated the scale by confirming the factor structure using a CFA on the 2020 and 2021 data, which totals 473 (97 + 376) cases. Chi-square tests were run to assess whether there were significant differences in any of the target variables between the 2020 and 2021 datasets; one difference in demographic characteristics was identified. The 2020 dataset had more children who were Black or African American than the 2021 dataset (χ^2 (1) = 7.478, p = .006). For child-level variables, children in the 2021 dataset tended to score 4 points lower on Day/Night Stroop (t = -3.188, p = .001) and 7 points lower on HTKS (t = -3.933, p < .001) than children in the 2020 dataset. Despite these differences, it was determined that combining the datasets was important to maximize sample sizes for the present analyses; as such, cohort is included as a control for analyses hinging upon relations between the latent variable and parent- or child-level variables. Sample size is an important consideration for CFA and SEM because it affects parameter estimates, chi-square tests, and goodness of fit indices. The specified sample size far exceeds the rules of thumb specified by many authors to provide adequate statistical power for a 20-item measure (>200; Hoe, 2008; Singh et al., 2016), and fits the sample size recommendations generated by Monte Carlo simulation studies for normal (>200; Jackson, 2001; Wolf et al., 2013) or non-normal data with missing values (>400; Yuan & Bentler, 2000). The people-to-variables (N:p) ratio which is widely accepted as 10:1 (see Kyriazos, 2018) is also satisfied, as there will be over 400 cases to far less than 40 variables. The current sample size is sufficient even if communalities are low, few and weakly determined factors are identified, and each factor has only 3-4 indicators (>300); even if all conditions were to be adverse, this sample size approximates the minimum (500) recommended in that context for CFA/SEM (Dimitrov, 2012; Tabachnick & Fidell, 2013; Thompson, 2004). As such, even if

data are non-normal and some data are missing, the proposed sample size is appropriate for the planned analyses.

In CFA, the model is restricted such that the relations between certain factors and indicators is constrained to zero (as informed by the EFA outcome). Reflective indicators were used given that the survey items are thought to reflect an underlying latent variable(s). Given the many weaknesses of sum-scoring or even representing sum scoring in a parallel model (see McNeish & Wolf, 2020, for a review), I instead used a congeneric model in which loadings from the latent true score to each observed item score are uniquely estimated for each item. Unlike a parallel model which unit-weights each item, congeneric models take into account both how individuals responded to each item and for which items those responses occurred, thus creating optimal weights.

Following this CFA, an additional EFA was conducted (in the same manner as the first) on the 2020 and 2021 parent survey data to ensure that the results determined by the previous CFA are the most accurate and there was not a better representation of the data. This is especially valuable given that the first EFA was conducted on data gathered prior to the COVID-19 pandemic, and the CFA (and second EFA) was conducted on post-pandemic data. The factor structures were compared to assess differences; specifically, I examined alignment of the number of factors, factor loadings, and model fit.

To address the second research aim, concurrent validity was examined through linear regression with the Self-Regulation Home Environment survey predicting children's HTKS and EF component scores. Due to the previously mentioned differences between the 2020 and 2021 datasets, cohort was included as a control variable for all regressions. The current sample size far exceeds minimum requirements for regression (>25; Jenkins & Quintana-Ascencio, 2020). I

expected that more frequent use of parent supports would relate to elevated child self-regulation and executive functioning.

For the third research aim, a series of linear regressions was run to examine relations between the parents' self-reports on the Self-Regulation Home Environment survey and other parent factors, including maternal education, parent self-regulation, and parent stress. Once again, the current sample size far exceeds minimum requirements for regression (>25; Jenkins & Quintana-Ascencio, 2020). I expected that higher maternal education, higher parent self-regulation, and lower parent stress would (separately) predict higher frequency of parent supports.

Finally, I conducted a mediation analysis to examine whether parent-reported practices predict children's academic performance in literacy and math indirectly via their influence on children's behavioral self-regulation (the integrated form; see Figure 1 for a path diagram). Although there is debate in the literature regarding the appropriateness of mediation with cross-sectional data (see, for example, Maxwell & Cole, 2007), it is generally agreed that theoretical causation, as discussed in the current work, is sufficient justification to examine this effect, bearing in mind that causation cannot be concluded from correlational data (Kline, 2015). A good number of mediations examining similar pathways from aspects of parenting, through child self-regulation/executive function, to children's achievement lend support to the theoretically causal nature of these relations (e.g., Berthelsen et al., 2017; Bindman et al., 2015; Devine et al., 2016; Kopystynska et al., 2016; Lee et al., 2012; NICHD Early Child Care Research Network, 2003; Perry et al., 2018).

The mediation was run on the combined 2020 and 2021 data (N = 476), which is appropriate for the planned SEM model as previously discussed (see Kyriazos, 2018). Although

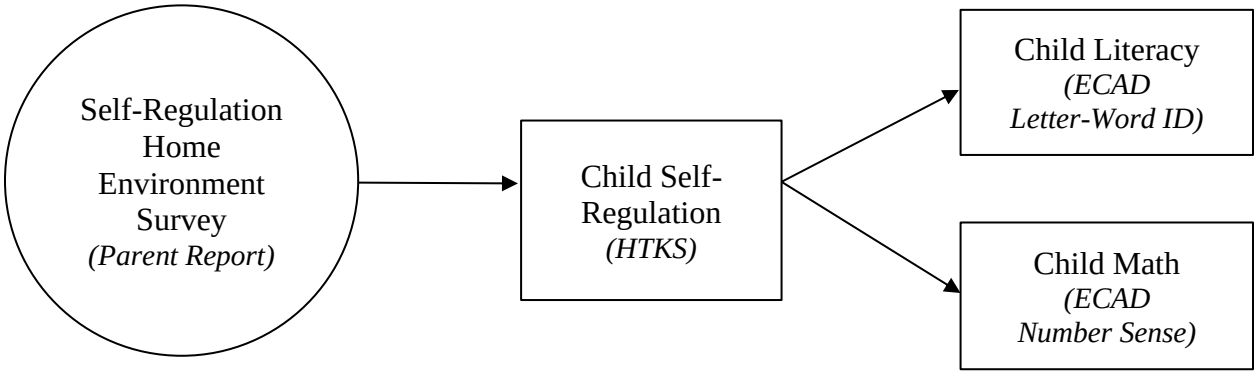
bootstrapping is more common for mediation analyses, the current analysis required a Bayesian estimator. This is because some differences were identified between the 2020 and 2021 cohorts, making it important to control for cohort in the mediation. In order to include cohort in the model, Mplus requires use of a Bayesian estimator; the inclusion of a dichotomous variable for cohort prevented use of ML estimation, so Bayes was used (as recommended by Mplus) rather than WLSMV in order to make use of full information to handle missing data (Muthen & Asparouhov, 2012). For this estimation type in the current analysis, default non-informative prior distributions for parameters were combined with the data likelihood to form posterior distributions for the parameter estimates (Muthen, 2010). The median (theta) of the posterior distribution was reported, along with a *p*-value.

I hypothesized that parents' practices are associated with children's academic outcomes and that this relation exists as an indirect effect through child self-regulation. Based on previous research examining the path from parenting behaviors to young children's child self-regulation, I hypothesized effect sizes for this path to range between .10 to .25; effect sizes specific to especially relevant practices such as autonomy and scaffolding range from .19-.20 (Valcan et al., 2018). Based on effect sizes from the literature on the path from childhood self-regulation to achievement in literacy and math, I hypothesized effect sizes to range between .20-.43; effect sizes specific to aspects of literacy (decoding) and math (word problems) reflected by the current tasks range from .20-.37 and .33-.43, respectively (Spiegel et al., 2021). Cross-sectional associations, as the one hypothesized in the current work, have shown to range from .34-.42 for literacy and math, and studies specific to preschool self-regulation as it relates to early childhood achievement range from .24-.31 (Jacob & Parkinson, 2015; Robson et al., 2020). Given these

effect sizes, and based on the multiplication of the path coefficients, I estimated the size of the indirect effect would land between 0.02 and 0.12.

Figure 1

Hypothesized path diagram for the proposed mediation



CHAPTER 4: RESULTS

Descriptive Data: Fall 2019

In the data from 2019 (n = 271), the number of responses from parents for individual items fell between 268-271, thus missingness was very low (3.7%). See Tables 2 and 3 for frequencies and descriptive statistics. Eight participants were caregivers (not mother or father), but given the overwhelming majority were parents I continue to use the term "parent(s)" here. Overall, parents reported high frequencies of support across the survey items. The most commonly endorsed response option for 14 of the 20 items was *always*. Of the remaining response options, *frequently* was most commonly endorsed for three items (5, 16, and 18; "I let my child know at least five minutes before we have to switch activities," "My child and I discuss how to solve problems together," and "If my child is behaving in a way I don't like, I help him/her find something else to do instead"). The response *sometimes* was most commonly endorsed for one item (14; "I talk aloud while I'm solving a problem so my child will learn from my process"), *rarely* was most commonly endorsed for one item (12; "I give my child items to help him/her keep track of time"), and *never* was most commonly endorsed for one item (7; "My child has a job chart or other visual schedule"). Despite the tendency for parents to endorse lower frequency response options less often than higher frequency options, each response option was endorsed at least once for every item with the exception of *never* for items 15 ("I help my child talk about what s/he is feeling") and 17 ("When I ask my child to stop doing something, I talk with my child to help him/her understand why") which no one selected. Categories endorsed by fewer than five individuals were exclusive to *never* for items 1-4, 8-9, 11, 15, and 17-20, and *rarely* for items 1-2, 8, 10, 15, 17-19.

Examination of the means shows that fourteen items had means above 4.0; these items span all three mechanisms: routines and transitions (6 items), autonomy (6 items), and modeling (2 items). The most highly endorsed item was 2, regarding having a set bed time for week nights (routines; $M = 4.56$). In contrast, two items had notably low means positively skewed (parents reporting low frequency of these supports), including items 7 ($M = 2.27$, $SD = 1.368$) and 12 ($M = 2.57$, $SD = 1.245$), which regarded the use of a job chart/visual schedule (routines and transitions) or an item to track time (autonomy), respectively. For the former item (and that item alone across the survey), *never* was the most frequently selected response option. Both these items had the highest standard deviations and variances of all included items.

Histograms and skewness statistics indicated that most items were negatively skewed. Although skewness statistics for most items were approximately -1, values ranged from -2.134 to .814. Nine items demonstrated negative skew less than -1 (parents reporting high frequency of supports): 1-6, 8-10, 16, and 19. Over half of these items reflect the mechanism establish routines and support transitions, and the remaining four of them reflect providing opportunities for autonomy. However, it is important to note that the survey itself does not equally represent each mechanism; the survey has eight items for routines and transitions, nine items for autonomy, and three items for modeling.

Kurtosis values across all survey items ranged from -.671 to 5.717, which is outside of the normal range of 2 to 4, indicating the data are kurtotic; most items have platykurtic distributions with kurtosis values under 1. Only items 2 and 19 have leptokurtic distributions with kurtosis values over 4, likely driven by a large proportion of responses of *always* and showing the strongest ceiling effects across the survey items. In accordance with the skewness and kurtosis statistics, the Shapiro-Wilk test was significant for every item (statistics ranged from

.631 to .892), indicating non-normality. For reliability, coefficient alpha was .843, and coefficient omega was .845.

Table 2

Frequencies (valid percent) of parent self-regulation supports (2019)

Item		Never	Rarely	Sometimes	Frequently	Always
1	I talk to my child about his/her schedule for the next day.	1.5	3.7	14.8	34.4	45.6
2	My child has a set bed time for week nights.	1.1	1.1	5.2	26.3	66.3
3	My child has a set bedtime routine for week nights.	1.1	1.1	11.1	28.4	58.3
4	My child has a calm, quiet environment for reading and learning (outside of school).	0.4	2.2	21.8	29.2	46.5
5	I let my child know at least five minutes before we have to switch activities.	2.2	3.7	30.4	36.3	27.4
6	I talk to my child before we go places that might be stressful to him/her.	1.8	2.6	13.7	28.0	53.9
7	My child has a job chart or other visual schedule.	39.8	24.9	15.6	7.8	11.9
8	I offer my child choices about what s/he wears, eats, or plays with whenever possible.	1.5	1.1	14.8	34.4	48.1
9	I bring toys or activities my child likes when I know s/he will need to wait for a while.	1.1	1.8	16.6	30.3	50.2
10	I let my child know at least five minutes before we have to go somewhere.	1.8	1.5	12.9	32.8	50.9
11	I talk to my child about other people’s emotions.	1.5	3.3	19.6	37.4	38.1
12	I give my child items to help him/her keep track of time (e.g., timer, clock).	22.8	29.5	26.5	10.8	10.4
13	I help my child break down larger tasks, like getting dressed, into smaller parts.	2.2	5.2	24.1	32.2	36.3

Table 2 (cont'd)

Item		Never	Rarely	Sometimes	Frequently	Always
14	I talk aloud while I'm solving a problem so my child will learn from my process.	2.6	10.4	36.9	30.2	19.8
15	I help my child talk about what s/he is feeling.	0	0.4	7.0	35.8	56.8
16	My child and I discuss how to solve problems together.	1.8	1.8	17.0	41.3	38.0
17	When I ask my child to stop doing something, I talk with my child to help him/her understand why.	0	0.4	11.4	41.0	47.2
18	If my child is behaving in a way I don't like, I help him/her find something else to do instead.	0.7	1.5	18.5	42.8	36.5
19	I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	0.7	0.7	5.5	30.6	62.4
20	I invite my child to help me make plans for our family.	1.1	4.4	31.0	28.8	34.7

Table 3

Descriptive statistics for each survey item (2019)

	Item	Mean	SD	Mode	Variance	Skewness	Kurtosis
1	I talk to my child about his/her schedule for the next day.	4.19	.923	5	.853	-1.126	1.026
2	My child has a set bed time for week nights.	4.56	.743	5	.553	-2.134	5.717
3	My child has a set bedtime routine for week nights.	4.42	.816	5	.666	-1.521	2.537
4	My child has a calm, quiet environment for reading and learning (outside of school).	4.19	.878	5	.770	-.715	-.385
5	I let my child know at least five minutes before we have to switch activities.	3.83	.949	4	.900	-.548	.130

Table 3 (cont'd)

	Item	Mean	SD	Mode	Variance	Skewness	Kurtosis
6	I talk to my child before we go places that might be stressful to him/her.	4.30	.928	5	.861	-1.377	1.693
7	My child has a job chart or other visual schedule.	2.27	1.368	1	1.870	.814	-.576
8	I offer my child choices about what s/he wears, eats, or plays with whenever possible.	4.27	.860	5	.739	-1.215	1.669
9	I bring toys or activities my child likes when I know s/he will need to wait for a while.	4.27	.880	5	.774	-1.105	.943
10	I let my child know at least five minutes before we have to go somewhere.	4.30	.883	5	.779	-1.396	2.167
11	I talk to my child about other people's emotions.	4.07	.918	5	.842	-.875	.558
12	I give my child items to help him/her keep track of time (e.g., timer, clock).	2.57	1.245	2	1.550	.479	-.671
13	I help my child break down larger tasks, like getting dressed, into smaller parts.	3.95	1.006	5	1.013	-.741	.045
14	I talk aloud while I'm solving a problem so my child will learn from my process.	3.54	1.007	3	1.013	-.224	-.415
15	I help my child talk about what s/he is feeling.	4.49	.643	5	.414	-.975	.246
16	My child and I discuss how to solve problems together.	4.12	.882	4	.779	-1.048	1.386
17	When I ask my child to stop doing something, I talk with my child to help him/her understand why.	4.35	.693	5	.480	-.662	-.439
18	If my child is behaving in a way I don't like, I help him/her find something else to do instead.	4.13	.813	4	.661	-.741	.539

Table 3 (cont'd)

	Item	Mean	SD	Mode	Variance	Skewness	Kurtosis
19	I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	4.53	.703	5	.494	-1.819	4.565
20	I invite my child to help me make plans for our family.	3.92	.964	5	.930	-.428	-.549

Descriptive Data: Fall 2020 and 2021

Descriptive statistics are reported for the combined 2020 and 2021 sample (n = 473), given that these combined data were used for all substantive analyses. The number of parents who responded to each item ranged from 370 to 373; data were missing for approximately 100 parents (21%). See Tables 4, 5, and 6 for frequencies and descriptive statistics.

Parents tended to report high frequencies for the majority of self-regulation support items included in the survey. For 15 of the 20 items, *always* was the most commonly endorsed response option, although means for all items were at or below 4.51. Of the other response options, *frequently* was most commonly endorsed for two items (5 and 18; "I let my child know at least five minutes before we have to switch activities" and "if my child is behaving in a way I don't like, I help him/her find something else to do instead"), *sometimes* was most commonly endorsed for two items (12 and 14; "I give my child items to help him/her keep track of time" and "I talk aloud while I'm solving a problem so my child will learn from my process"), and *never* was most commonly endorsed for one item (7; "my child has a job chart or other visual schedule"). Across the survey, lower frequency response options were endorsed far less often than higher frequency options. However, each response option was endorsed at least once for every item, with the exception of *rarely* for item 19 ("I help my child understand the results of

his/her behavior"), which no one selected. Categories endorsed by fewer than five individuals were exclusive to *never* for items 1-4, 8, and 15-19, and *rarely* for items 15 and 17.

Examining the means reveals additional patterns in responses. Thirteen items had means above 4.0; these items span all three mechanisms: routines and transitions (6 items), autonomy (5 items), and modeling (2 items). The most highly endorsed item was 19, regarding helping a child understand the results of their behavior (autonomy; $M = 4.51$).

Histograms and skewness statistics indicated that most survey items were negatively skewed. Although skewness statistics for most items were approximately -1, values ranged from -1.497 to .702. Eight items demonstrated negative skew less than -1 (parents reporting high frequency of supports): 2-3, 6, 9-11, 15, and 19. These items reflect the span of all mechanisms, although some mechanisms are represented more commonly than others; half of these items reflect the mechanism of establishing routines and supporting transitions, whereas two items reflect providing opportunities for autonomy, and two other items reflect the mechanism of modeling regulated emotions and behavior. However, it is important to note that the survey itself does not equally represent each mechanism; the survey has eight items for routines and transitions, nine items for autonomy, and three items for modeling.

Conversely, two items were positively skewed (i.e., parents reported low frequency of these supports), specifically items 7 ($M = 2.31$, $SD = 1.315$) and 12 ($M = 2.87$, $SD = 1.247$), which regarded the use of a job chart/visual schedule (routines and transitions) or an item to track time (autonomy), respectively. For the former item (and that item alone across the survey), *never* was the most frequently selected response option. Both these items had the highest standard deviations and variances of all included items.

Kurtosis values across all survey items ranged from -.851 to 1.969, which is outside the normal range of 2 to 4, indicating the data are kurtotic (specifically, platykurtic). In accordance with the skewness and kurtosis statistics, the Shapiro-Wilk test was significant for every item (statistics ranged from .697 to .906), indicating non-normality. For reliability, coefficient alpha was .867, and coefficient omega was .866; both values indicate strong reliability.

Table 4

Frequencies (valid percent) of parent self-regulation supports (2020-2021)

Item		Never	Rarely	Sometimes	Frequently	Always
1	I talk to my child about his/her schedule for the next day.	1.1	2.9	23.6	35.9	36.5
2	My child has a set bed time for week nights.	0.5	3.5	9.7	27.9	58.4
3	My child has a set bedtime routine for week nights.	1.1	4.0	15.8	23.6	55.5
4	My child has a calm, quiet environment for reading and learning (outside of school).	0.8	1.6	22.6	28.8	46.2
5	I let my child know at least five minutes before we have to switch activities.	2.2	4.6	26.1	36.7	30.5
6	I talk to my child before we go places that might be stressful to him/her.	4.8	4.3	17.2	20.7	53.0
7	My child has a job chart or other visual schedule.	37.1	23.4	21.0	8.6	9.9
8	I offer my child choices about what s/he wears, eats, or plays with whenever possible.	0.3	1.3	19.4	32.5	46.5
9	I bring toys or activities my child likes when I know s/he will need to wait for a while.	2.2	1.9	19.1	26.6	50.3
10	I let my child know at least five minutes before we have to go somewhere.	2.2	2.2	13.7	23.7	58.2
11	I talk to my child about other people’s emotions.	4.0	1.6	22.1	29.6	42.6

Table 4 (cont'd)

Item		Never	Rarely	Sometimes	Frequently	Always
12	I give my child items to help him/her keep track of time (e.g., timer, clock).	15.6	24.5	31.7	14.2	14.0
13	I help my child break down larger tasks, like getting dressed, into smaller parts.	1.6	3.8	26.1	32.3	36.3
14	I talk aloud while I'm solving a problem so my child will learn from my process.	5.9	7.0	35.8	30.9	20.4
15	I help my child talk about what s/he is feeling.	0.3	0.5	11.9	30.8	56.5
16	My child and I discuss how to solve problems together.	0.5	3.0	20.4	36.8	39.2
17	When I ask my child to stop doing something, I talk with my child to help him/her understand why.	0.3	0.8	17.5	36.1	45.3
18	If my child is behaving in a way I don't like, I help him/her find something else to do instead.	0.8	2.2	29.0	35.2	32.8
19	I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	0.3	0	8.6	30.6	60.5
20	I invite my child to help me make plans for our family.	3.2	7.3	30.9	25.8	32.8

Table 5

Descriptive statistics for each survey item (2020-2021)

	Item	Mean	SD	Mode	Variance	Skewness	Kurtosis
1	I talk to my child about his/her schedule for the next day.	4.04	.903	5	.816	-.668	.049
2	My child has a set bed time for week nights.	4.40	.842	5	.709	-1.442	1.709
3	My child has a set bedtime routine for week nights.	4.28	.945	5	.892	-1.192	.741

Table 5 (cont'd)

	Item	Mean	SD	Mode	Variance	Skewness	Kurtosis
4	My child has a calm, quiet environment for reading and learning (outside of school).	4.18	.892	5	.795	-.774	-.063
5	I let my child know at least five minutes before we have to switch activities.	3.89	.966	4	.933	-.658	.145
6	I talk to my child before we go places that might be stressful to him/her.	4.13	1.139	5	1.297	-1.219	.665
7	My child has a job chart or other visual schedule.	2.31	1.315	1	1.729	.702	-.619
8	I offer my child choices about what s/he wears, eats, or plays with whenever possible.	4.24	.826	5	.682	-.724	-.305
9	I bring toys or activities my child likes when I know s/he will need to wait for a while.	4.21	.960	5	.921	-1.148	.985
10	I let my child know at least five minutes before we have to go somewhere.	4.34	.943	5	.889	-1.497	1.969
11	I talk to my child about other people's emotions.	4.05	1.037	5	1.076	-1.067	.855
12	I give my child items to help him/her keep track of time (e.g., timer, clock).	2.87	1.247	3	1.556	.206	-.851
13	I help my child break down larger tasks, like getting dressed, into smaller parts.	3.98	.960	5	.921	-.656	-.047
14	I talk aloud while I'm solving a problem so my child will learn from my process.	3.53	1.075	3	1.155	-.470	-.122
15	I help my child talk about what s/he is feeling.	4.43	.741	5	.549	-1.114	.780
16	My child and I discuss how to solve problems together.	4.11	.868	5	.753	-.694	-.056
17	When I ask my child to stop doing something, I talk with my child to help him/her understand why.	4.25	.789	5	.622	-.714	-.167

Table 5 (cont'd)

	Item	Mean	SD	Mode	Variance	Skewness	Kurtosis
18	If my child is behaving in a way I don't like, I help him/her find something else to do instead.	3.97	.882	4	.778	-.416	-.368
19	I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	4.51	.675	5	.455	-1.256	1.457
20	I invite my child to help me make plans for our family.	3.78	1.082	5	1.171	-.509	-.432

Table 6

Mean differences of child sex for each survey item (2020-2021)

	Item	Male (N = 161)	Female (N = 209)
1	I talk to my child about his/her schedule for the next day.	3.98	4.09
2	My child has a set bed time for week nights.	4.38	4.43
3	My child has a set bedtime routine for week nights.	4.17	4.37
4	My child has a calm, quiet environment for reading and learning (outside of school).	4.06	4.28
5	I let my child know at least five minutes before we have to switch activities.	3.85	3.92
6	I talk to my child before we go places that might be stressful to him/her.	4.12	4.14
7	My child has a job chart or other visual schedule.	2.22	2.39
8	I offer my child choices about what s/he wears, eats, or plays with whenever possible.	4.16	4.31
9	I bring toys or activities my child likes when I know s/he will need to wait for a while.	4.20	4.21
10	I let my child know at least five minutes before we have to go somewhere.	4.32	4.35
11	I talk to my child about other people's emotions.	4.06	4.04

Table 6 (cont'd)

	Item	Male (N = 161)	Female (N = 209)
12	I give my child items to help him/her keep track of time (e.g., timer, clock).	2.88	2.87
13	I help my child break down larger tasks, like getting dressed, into smaller parts.	3.93	4.03
14	I talk aloud while I'm solving a problem so my child will learn from my process.	3.60	3.48
15	I help my child talk about what s/he is feeling.	4.30	4.52
16	My child and I discuss how to solve problems together.	4.06	4.16
17	When I ask my child to stop doing something, I talk with my child to help him/her understand why.	4.16	4.34
18	If my child is behaving in a way I don't like, I help him/her find something else to do instead.	3.93	4.01
19	I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	4.43	4.58
20	I invite my child to help me make plans for our family.	3.66	3.88

Factor Analyses

Data were analyzed as both continuous and categorical for the factor analyses given that data are skewed and thus not all categories were used by respondents. For continuous and categorical analyses, MLR was used to address missing data as planned. However, using MLR for a categorical analysis in Mplus does not produce output with the planned fit statistics (CFI, TLI, etc.) and given that the following models require the use of WLSMV, categorical analyses were run with both MLR and WLSMV for comparison. Given that the percentages of incomplete survey responses were quite low across datasets (2019 at 3.7%, 2020/2021 at 1.3%), no considerable differences were expected between estimators. All resulting models are discussed below.

EFA Treating Indicators as Continuous (2019)

In this original continuous model, the scree plot indicated a 1-factor solution in which all items loaded onto the single factor over .4 with the exception of items 2-3, 7, and 12. Items 2-3 refer to bedtime and bedtime routines, and these items were heavily endorsed by parents. In contrast, items 7 and 12 (providing a job chart/visual schedule and items to keep track of time, respectively) were the least endorsed by parents. Fit statistics were generally poor for this model (see Table 7). Note that Mplus issued non-convergence warnings for EFAs at 8 factors through 14 factors.

Table 7

Fit statistics for continuous factor solutions (one through four)

Solution	RMSEA	CFI	TLI	SRMR
1-Factor	.085	.690	.653	.079
2-Factor	.067	.831	.787	.064
3-Factor	.059	.883	.833	.051
4-Factor	.052	.920	.869	.040

EFA Treating Indicators as Categorical (2019)

Similar to the continuous model, the scree plot for the categorical data with MLR indicated a 1-factor solution in which all items loaded onto the single factor over .4 with the exception of items 2-3, 7, and 12. This replicates the continuous 1-factor solution, except that item 4 (child has a calm, quiet environment for reading/learning; loading at .399) did not quite make the cutoff here as it did in the continuous solution. For a categorical analysis with MLR, Mplus outputs only the AIC and BIC fit statistics. Both of these are comparative fit statistics, and as such their value alone is not meaningful; the factor solution with the lowest AIC and BIC is best. Among the factor solutions, the 1-factor solution had the highest AIC and BIC values (see

Table 8), indicating poor fit. In contrast, the 4-factor solution had the lowest AIC among the four solutions, and the 2-factor solution had the lowest BIC. No factor solution had an AIC and BIC that were lower than all others. Note that Mplus gave errors of varying kinds for 2-factor (non-positive definite first-order derivative product matrix), 4-factor (saddle point), and 5-factor solutions (same as 2-factor).

When this model was run with the Mplus default (Weighted Least Square Mean and Variance Adjusted) estimator, the scree plot remained similar to the model with MLR (indicating 1 factor) but only items 7 and 12 loaded below .4. However, fit statistic values were unacceptable for every statistic (*RMSEA = .118, CFI = .804, TLI = .780, SRMR = .109*), indicating that this model with WLSMV is not appropriate. Although the scree plot indicated a single factor solution, other possibilities were examined for the sake of exploration; factor solutions beyond 1 tended to have fewer than 3 items loading onto them and did not contribute substantive meaning. As such, the current analyses relied upon the single factor solution as indicated by the scree plot.

Table 8

Fit statistics for categorical factor solutions (one through four)

Solution	AIC	BIC
1-Factor	11701.701	12054.709
2-Factor	11587.439	12008.887
3-Factor	11523.293	12009.579
4-Factor	11478.354	12025.876

Iterative EFAs (2019)

Given the loading patterns and fit statistics, iterations of continuous and categorical EFAs were conducted to explore models in which items were dropped. The target items were those

which loaded below .4 in the continuous (2-3, 7, 12) and categorical (2-4, 7, 12) solutions. These items were also targeted theoretically, as items 2-3 overlap strongly in content and were extremely highly endorsed by parents, and items 7 and 12 were very rarely endorsed by parents. Item 4 was dropped in a later iteration as it only failed to load in the categorical model. The following iterations were conducted:

1. Dropped only 3 (bedtime routine)
2. Dropped only 2 (bed time)
3. Dropped 2 and 3
4. Dropped only 7 (job chart/visual schedule)
5. Dropped only 12 (items to track time)
6. Dropped 7 and 12
7. Dropped 2, 3, 7, and 12
8. Dropped 2, 3, 4 (calm/quiet environment), 7, and 12

Continuous Iterations

All of the continuous iterations indicated a 1-factor solution and produced better fit statistics than the original continuous 1-factor solution, although general fit statistics remained less than desirable (see Table 9). Loading patterns remained similar as items were selectively dropped, with the remaining target items continually failing to load above .4. Item 4 rarely failed to load (only in the original categorical solution and iteration #3), but was dropped in iteration #8 to evaluate whether this would improve the fit; dropping item 4 produced worse fit than keeping it in. The best continuous solution was identified as a result of iteration #7 above, where items 2-3, 7, and 12 were dropped.

Table 9

Fit statistics for iterations of continuous 1-factor solutions with dropped items

Item(s) Dropped	CFI	TLI	RMSEA	SRMR
	Ideal: >.95	*Ideal: >.95*	*Ideal: <.06*	*Ideal: <.1 (.05 best)*
3	.803	.779	.065	.068
2	.797	.771	.067	.069
2-3	.805	.778	.068	.069
7	.717	.681	.083	.077
12	.722	.688	.081	.076
7, 12	.734	.699	.082	.076
2-3, 7, 12	.869	.849	.058	.062
2-4, 7, 12	.864	.841	.061	.063

Categorical Iterations

All categorical iterations indicated a 1-factor solution and produced better comparative fit statistics (AIC and BIC; see Table 10) than the original categorical 1-factor solution. Loading patterns remained similar as items were selectively dropped, with the remaining target items continually loading below .4. Unlike the continuous iterations, item 4 frequently loaded below .4 (in the original categorical solution and iterations #1-4 and 6). As done previously for the continuous model, item 4 was dropped in iteration #8 to evaluate whether this would improve the fit. Although dropping this item produced worse fit for the continuous solution, dropping it in the categorical solution improved fit as measured by lower AIC and BIC values. This produced the best categorical solution with MLR as the estimator, where items 2-4, 7, and 12 were dropped.

As with the original categorical model, all categorical iterations were also run with the Mplus default (WLSMV) estimator to assess possible differences. The scree plots continued to indicate 1-factor solutions. As in previous continuous and categorical iterations, items 7 and 12 frequently loaded below .4. However, items 2 and 3 repeatedly loaded over .4; item 2 only failed

to load in iteration #1. When considering fit statistics (see Table 10), the best categorical solution with WLSMV as the estimator was iteration #7, in which items 2-3, 7, and 12 were dropped. The scree plot for this solution is presented in Figure 2 and was similar to all previous scree plots in prior analyses.

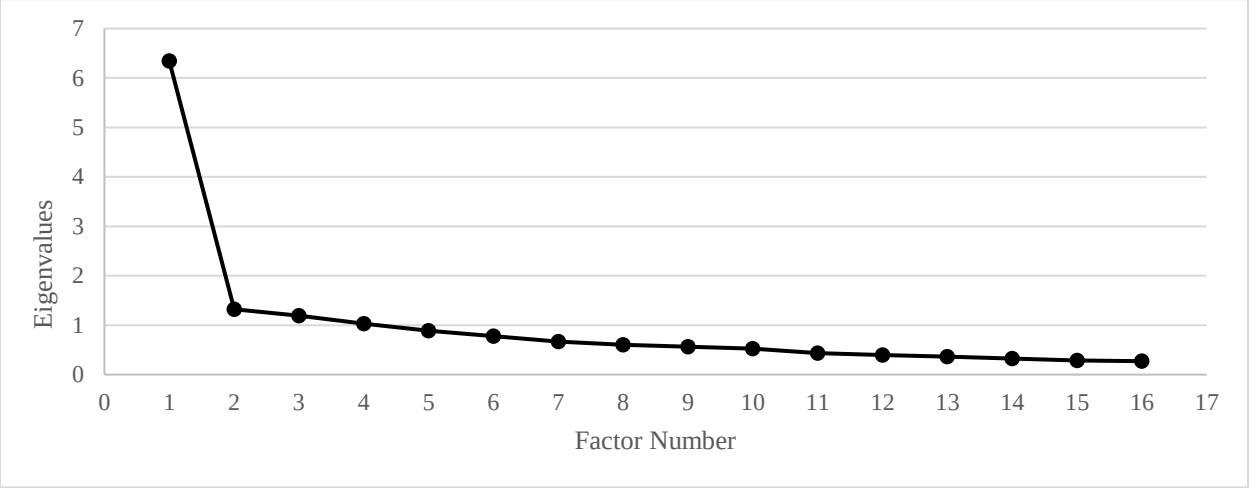
Table 10

Fit statistics for iterations of categorical 1-factor solutions with dropped items by estimator

		Estimator: MLR		Estimator: WLSMV			
Iteration	Item(s) Dropped	AIC	BIC	CFI	TLI	RMSEA	SRMR
				Ideal: >.95 (>.90 good)	*Ideal: >.95 (>.90 good)*	*Ideal: <.06 (>.10 unacceptable)*	*Ideal: <.05 (<.08 good)*
1	3	11172.551	11507.548	.900	.887	.084	.088
2	2	11232.207	11567.204	.897	.885	.086	.089
3	2-3	10699.685	11016.671	.898	.884	.089	.089
4	7	10917.178	11252.175	.811	.787	.121	.106
5	12	10903.382	11238.379	.818	.796	.118	.105
6	7, 12	10116.992	10433.979	.815	.791	.125	.106
7	2-3, 7, 12	9115.702	9396.667	.924	.913	.085	.078
8	2-4, 7, 12	8513.502	8776.457	.924	.911	.090	.080

Figure 2

Scree plot for categorical model w/WLSMV after dropping items 2-3, 7, and 12



Best Overall Model (2019)

Across all 27 EFAs that were run, the best overall model appeared to be the 1-factor categorical solution in which items 2, 3, 7 and 12 were dropped and all remaining items loaded onto the single factor over .4. The four dropped items did not meet the numerical criteria, but also appeared conceptually different from the others in the survey; theoretical justifications for dropping these items are explored further in the discussion. This solution showed the best fit statistics among all previous continuous and categorical solutions, including all the iterations. Treating the indicators as categorical seemed to be a more appropriate choice for this data and results were similar using the WLSMV and MLR estimators. Fit statistics were not excellent for this solution but were still good and were generally much improved from other solutions (see Table 10).

Theoretically, the 16 items reflected in this final solution form a set of parenting practices that promote young children's self-regulation, including 5 items about establishing routines and supporting transitions, 8 items about providing opportunities for autonomy, and 3 items about

modeling regulated emotions and behavior. As a result of the iterations, 3 items about routines and transitions were removed, and one item about supporting autonomy was removed. The remaining items met all pre-established criteria for inclusion and are theoretically meaningful (see Table 11).

Table 11

Standardized factor loadings for the final EFA 1-factor solution treating indicators as categorical and using the WLSMV estimator after dropping items 2-3, 7, and 12

	Item	Theoretical Mechanism	Factor Loading
1	I talk to my child about his/her schedule for the next day.	Establish Routines & Support Transitions	0.650*
4	My child has a calm, quiet environment for reading and learning (outside of school).	Establish Routines & Support Transitions	0.429*
5	I let my child know at least five minutes before we have to switch activities.	Establish Routines & Support Transitions	0.618*
6	I talk to my child before we go places that might be stressful to him/her.	Establish Routines & Support Transitions	0.633*
8	I offer my child choices about what s/he wears, eats, or plays with whenever possible.	Provide Opportunities for Autonomy	0.528*
9	I bring toys or activities my child likes when I know s/he will need to wait for a while.	Provide Opportunities for Autonomy	0.541*
10	I let my child know at least five minutes before we have to go somewhere.	Establish Routines & Support Transitions	0.619*
11	I talk to my child about other people's emotions.	Model Regulated Emotions and Behavior	0.576*
13	I help my child break down larger tasks, like getting dressed, into smaller parts.	Provide Opportunities for Autonomy	0.484*
14	I talk aloud when I'm solving a problem so my child will learn from my process.	Model Regulated Emotions and Behavior	0.511*
15	I help my child talk about what s/he is feeling.	Model Regulated Emotions and Behavior	0.760*
16	My child and I discuss how to solve problems together.	Provide Opportunities for Autonomy	0.750*
17	When I ask my child to stop doing something, I talk with my child to help him/her understand why.	Provide Opportunities for Autonomy	0.656*

Table 11 (cont'd)

	Item	Theoretical Mechanism	Factor Loading
18	If my child is behaving in a way I don't like, I help him/her find something else to do instead.	Provide Opportunities for Autonomy	0.605*
19	I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	Provide Opportunities for Autonomy	0.688*
20	I invite my child to help me make plans for our family.	Provide Opportunities for Autonomy	0.575*

CFAs Treating Indicators as Continuous and Categorical (2020/2021)

The first CFA was conducted on the reduced survey treating indicators as continuous and using MLR. The majority of fit statistics for this model were poor with the exception of SRMR which was nearly at an ideal value (*RMSEA = .081, CFI = .846, TLI = .823, SRMR = .059*). As with previous analyses, the CFA was also conducted treating indicators as categorical with both MLR and WLSMV. For the categorical analysis with WLSMV, fit statistics were slightly better than the continuous model (*RMSEA = .094, CFI = .912, TLI = .898, SRMR = .059*) but remained less than ideal with the exception again of SRMR. Overall, the best strategy—consistent with the EFA results—appears to be to treat the data as categorical with little difference between the MLR and WLSMV estimators. As subsequent analyses depend on the fit statistics provided by using the WLSMV estimator, this is the estimation method used in the final selected model and data were treated as categorical for all subsequent analyses.

Examining Modification Indices

To further explore possible model improvements, the modification indices were examined. Error covariances that had high modification indices were identified and evaluated for substantive justification before being systematically added to the model, beginning with the

highest modification index for the error covariance between items 6 and 5 (both relating to providing advanced notice). Next, the error covariance between items 5 and 10 (also referring to advance notice) was added to the model. These additions substantially improved model fit (*RMSEA = .082, CFI = .934, TLI = .923, SRMR = .052*). The next highest modification index was associated with the error covariance between items 19 and 18 (redirection and consequences). This error covariance could only be justified if item 17 was also included. Items 17, 18, and 19 are all items reflecting more reactive strategies, so it seemed appropriate for error covariances between all three of these items to be added into the model. The error covariance between items 16 and 17 (discussing problem solving and reasons to change behavior) had the next highest modification index but this could not be substantively justified alone. However, item 16 (discussing how to solve problems) may be considered as a possible reactive strategy, given its strong shared covariance with item 17 and the possibility that parents may have interpreted this item as an in-the-moment problem-solving support (rather than the intended meaning of discussing how to solve problems outside of an active conflict). If this were the case, item 16 would qualify as a reactive strategy and as such its error covariance with items 17, 18, and 19 was added into the model.

The error covariance between items 15 and 11 showed the next highest modification index; these items both uniquely refer to emotion coaching, so their error covariance was added into the model. This did not greatly improve the model fit, indicating that there may not be many more beneficial modifications. The next highest modification index was that of error covariance between items 19 and 1, but these items were theoretically unrelated and so their error covariance was not added into the model. The high modification index of items 10 and 6 (also referring to advance notice) was examined next and identified as an appropriate addition to the

model given that the error covariance between other advance notice items 5 and 10 were already included in the model. None of the remaining error covariances could be theoretically justified and had comparatively small modification indices, so modifications were halted.

The resulting model fit was a notable improvement from the pre-modification CFA results (*RMSEA = .064, CFI = .964, TLI = .954, SRMR = .043*). The modifications performed make theoretical sense given that items 5, 6, and 10 all reflect advance notice strategies, items 11 and 15 reflect emotion coaching, and items 16-19 reflect reactive strategies (as compared to the predominant proactive strategies in the survey). It was concluded that adding these modifications to the measurement model as supported by theory would achieve good model fit and better measurement of the latent construct. As such, later analyses involving the latent variable utilized this final version of the measurement model (see Table 12 for factor loadings).

Table 12

Standardized factor loadings for the CFA model with error covariances

	Item	Theoretical Mechanism	Factor Loading
1	I talk to my child about his/her schedule for the next day.	Establish Routines & Support Transitions	0.533
4	My child has a calm, quiet environment for reading and learning (outside of school).	Establish Routines & Support Transitions	0.531
5	I let my child know at least five minutes before we have to switch activities.	Establish Routines & Support Transitions	0.494
6	I talk to my child before we go places that might be stressful to him/her.	Establish Routines & Support Transitions	0.600
8	I offer my child choices about what s/he wears, eats, or plays with whenever possible.	Provide Opportunities for Autonomy	0.575
9	I bring toys or activities my child likes when I know s/he will need to wait for a while.	Provide Opportunities for Autonomy	0.544
10	I let my child know at least five minutes before we have to go somewhere.	Establish Routines & Support Transitions	0.536
11	I talk to my child about other people's emotions.	Model Regulated Emotions and Behavior	0.568

Table 12 (cont'd)

	Item	Theoretical Mechanism	Factor Loading
13	I help my child break down larger tasks, like getting dressed, into smaller parts.	Provide Opportunities for Autonomy	0.641
14	I talk aloud when I'm solving a problem so my child will learn from my process.	Model Regulated Emotions and Behavior	0.498
15	I help my child talk about what s/he is feeling.	Model Regulated Emotions and Behavior	0.760
16	My child and I discuss how to solve problems together.	Provide Opportunities for Autonomy	0.728
17	When I ask my child to stop doing something, I talk with my child to help him/her understand why.	Provide Opportunities for Autonomy	0.672
18	If my child is behaving in a way I don't like, I help him/her find something else to do instead.	Provide Opportunities for Autonomy	0.604
19	I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	Provide Opportunities for Autonomy	0.704
20	I invite my child to help me make plans for our family.	Provide Opportunities for Autonomy	0.710

EFA with Categorical Data (2020/2021)

The analysis pattern of EFA-CFA-EFA is novel to the field, but useful to determine whether the measurement of the latent variable was different in these two samples, particularly given the possible effects of COVID. The EFA with data treated as categorical and the WLSMV estimator continued to indicate a 1-factor solution. All items loaded above .4 except item 2. Fit statistics were unacceptable overall (*RMSEA = .122, CFI = .790, TLI = .765, SRMR = .095*) and fit tended to be worse than most of the other models from the previous factor analyses in the current work. (Note: item 3 failed to load above .4 in an EFA treating data as continuous and an EFA treating data as categorical with MLR; for brevity, these analyses are not detailed here.)

Iterative EFAs (2020/2021)

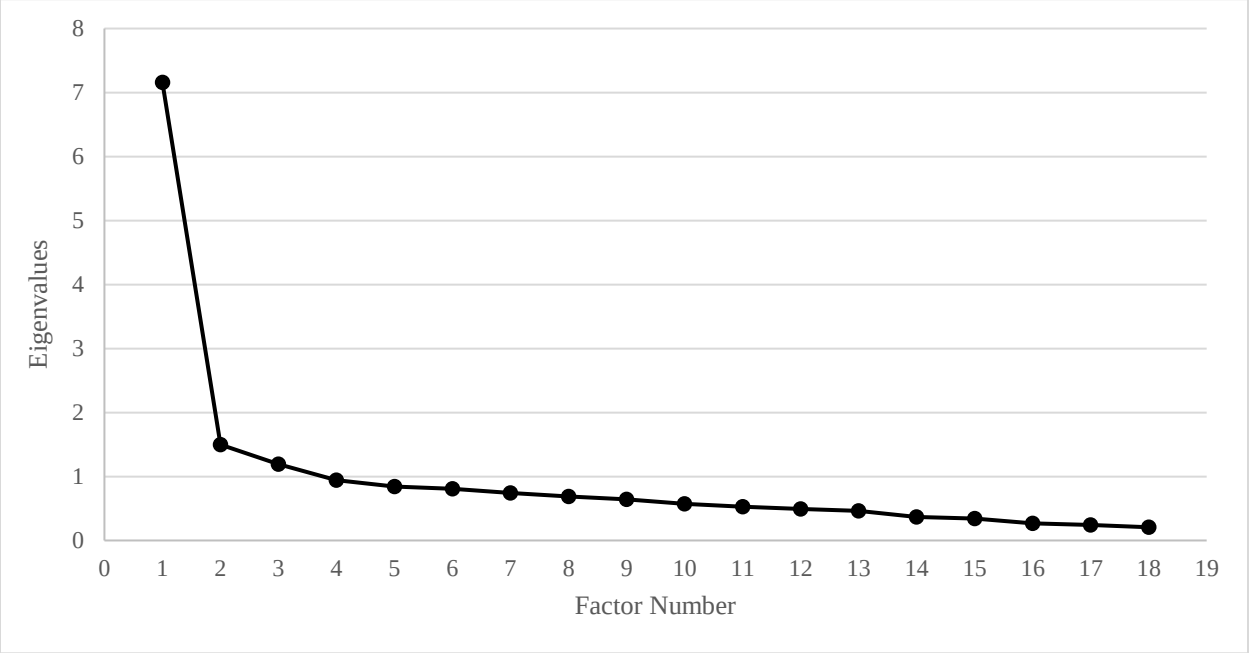
As with the 2019 EFA analyses, iterations of EFAs were conducted to explore the structure of the latent variable after dropping items with low factor loadings. The target items were those which loaded below .4 in the previous solution (items 2-3), with the same theoretical justification as previously discussed. The following iterations were conducted:

1. Dropped only 2 (bed time)
2. Dropped 2 and 3

After dropping items 2-3, all other items loaded above .4. The model was notably similar to the 2019 EFA model; the scree plot continued to show a single factor and the model fit remained unfavorable (*RMSEA = .089, CFI = .906, TLI = .894, SRMR = .077*) although slightly better than the 2019 model. It is important to consider that these data were collected post-COVID. The improved factor loadings may indicate that parents—many of which were likely forced into a unique work-from-home situation where they spent significantly more time with their children—may have used the strategies more frequently. However, this dataset is about 100 participants larger than the 2019 data, so the improved fit may be a result of greater sample size. Regardless, these results indicate that the single factor model is likely the best fit although some of the previously dropped items may be retained.

Figure 2

Scree plot for categorical model w/WLSMV after dropping items 2-3



Linear Regressions

Two linear regression models were run to evaluate relations between the latent variable identified from the survey, parent-level variables, and child-level variables. Given the differences previously identified between 2020 and 2021 cohorts (unexplained variation in certain variables across years), the following analyses on the combined data included cohort as a control variable. Correlations among variables are presented in Table 13.

The linear regression model with parent-level variables included the following paths:

1. Maternal education predicting latent variable (survey)
2. SSRQ (self-regulation) predicting latent variable (survey)
3. Perceived Stress Scale (stress) predicting latent variable (survey)

The linear regression model with child-level variables included the following paths:

1. Latent variable (survey) predicting HTKS (self-regulation)

2. Latent variable (survey) predicting Digit Span (working memory)
3. Latent variable (survey) predicting Day/Night Stroop (inhibitory control)
4. Latent variable (survey) predicting DCCS (cognitive flexibility)

No significant relations were identified between the survey and maternal education or parent stress (see Table 14). However, a small significant positive relation was found between parents' own self-regulation and the survey, such that higher parent self-regulation predicted more frequent reported use of self-regulation supports for children ($\beta = 0.362$, $p < .000$). No significant relations were identified between the survey and children's self-regulation, working memory, inhibitory control, or cognitive flexibility (see Table 15).

Table 13

Correlations among child-level and parent-level variables used in linear regressions

Variable	1	2	3	4	5	6	7
1. Maternal education	–						
2. PSS	-0.067	–					
3. SSRQ	0.092	0.142**	–				
4. DCCS	0.040	0.091	0.001	–			
5. Day/Night Stroop	0.110	-0.184**	-0.038	0.319**	–		
6. Digit Span	0.145*	-0.093	0.038	0.179**	0.316**	–	
7. HTKS	0.070	-0.068	-0.037	0.379**	0.371**	0.268**	–

Note. Parent-level variables include maternal education, PSS (stress), SSRQ (self-regulation). Child-level variables include DCCS (cognitive flexibility), Day/Night Stroop (inhibitory control), Digit Span (working memory), and HTKS (behavioral self-regulation).

*$p < .05$. **$p < .01$.

Table 14

Multiple linear regression model with parent variables predicting latent construct (survey)

Variable	Coefficient	Standard Error	*t*-test	*p*-value
Maternal education	-0.051	0.056	-0.912	0.362

Table 14 (cont'd)

Variable	Coefficient	Standard Error	*t*-test	*p*-value
SSRQ	0.397	0.053	7.533	0.000
PSS	-0.084	0.055	-1.520	0.129
Cohort	-0.008	0.056	-0.137	0.891

Note. Parent-level variables include maternal education, SSRQ (self-regulation), PSS (stress).

Table 15

Linear regression models with latent construct (survey) predicting child variables

Variable	Coefficient	Standard Error	*t*-test	*p*-value
HTKS	0.044	0.063	0.701	0.483
DCCS	-0.006	0.066	-0.091	0.928
Day/Night Stroop	0.050	0.065	0.778	0.436
Digit Span	0.016	0.065	0.252	0.801

Note. Child-level variables include DCCS (cognitive flexibility), Day/Night Stroop (inhibitory control), Digit Span (working memory), and HTKS (behavioral self-regulation).

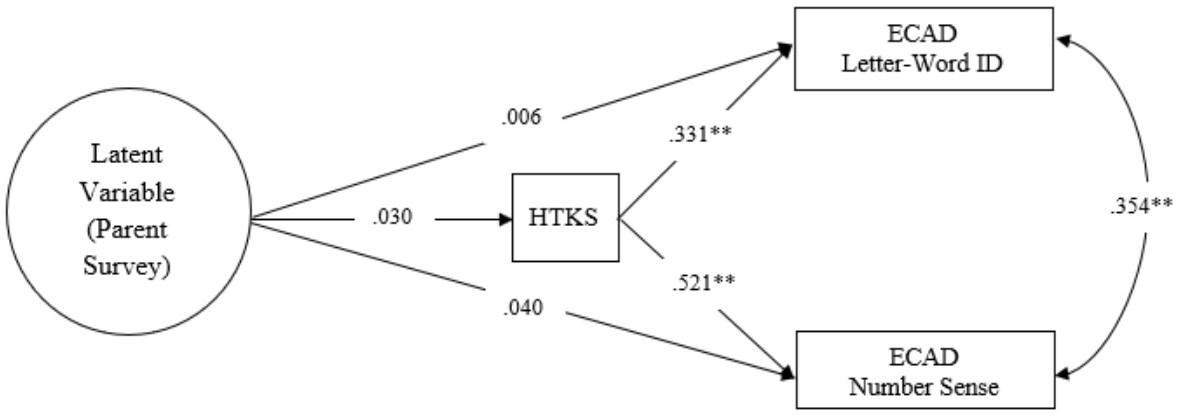
Mediation

As with the linear regressions, I controlled for cohort in this analysis. In order to include cohort in the model, Mplus required use of a Bayesian estimator for this analysis; the inclusion of a dichotomous variable for cohort prevented use of ML estimation so I used Bayes (as recommended by Mplus) rather than WLSMV in order to make use of full information. The model, depicted in Figure 4, provided an acceptable fit for the data ($p = 0.052$) as per guidelines by Muthen and Asparouhov (2012) which specify that a Posterior Predictive P-Value of less than 0.05 is indicative of poor model fit. As expected, children's self-regulation predicted math and literacy skills (see Figure 4), indicating that higher self-regulation was related to higher academic achievement. However, parent support as measured by the survey did not significantly predict children's behavioral self-regulation or academic skills. Similarly, no significant indirect effects were identified from parent support through self-regulation to either math or literacy skills (see

Table 16). These findings are surprising given the support in the literature for the value of parent behaviors in guiding children's self-regulation development. This is examined further in the discussion.

Figure 4

Mediation model



Note: Standardized estimates (θ) are reported for each path. *$p < .05$. **$p < .01$.

Table 16

Mediation indirect and total effects (using Bayes estimator)

Type	Effect	Estimate	Posterior S.D.	*p*
Indirect	Support → HTKS → Math	.016	.034	.328
	Support → HTKS → Literacy	.010	.022	.328
Direct	Support → Math	.040	.064	.262
	Support → Literacy	.006	.070	.467
Total	Support → Math	.056	.073	.221
	Support → Literacy	.016	.074	.415

Follow-Up Analyses

The linear regressions and mediation provided unexpected results, prompting me to explore further (within the confines of my data). To explore other factors that may be relevant to

the functionality of the survey, possible effects of age and sex were examined. First, a multiple-indicator multiple-cause (MIMIC) model was assessed to determine whether parents of older/younger children or male/female children differ in their responses. In this model, age and sex were added as covariates to the CFA for the latent variable. The model fit well (*RMSEA = 0.054, CFI = 0.968, TLI = 0.959, SRMR = 0.044*). Age showed no mean differences in levels of support (p = .750), but sex showed mean differences (p = .030) with parents reporting higher levels of support when their children were female. These results could reflect that parents of female children are truly giving them more support, or that the survey measures how parents of female children provide support better than how parents of male children provide support. However, the latter seems unlikely given that the vast majority of items do not reflect sex-specific biases that are well-established in the literature (e.g., parents talk about emotions more with female children; Fivush et al., 2000). Direct paths from the demographic covariates to the indicators were also considered in order to test for differential item functioning (DIF). This data-driven approach was implemented in Mplus, adding direct paths from sex and age to each item and setting the parameter to zero. Then, modification indices were examined to inform which parameters should be freed to improve the model fit. The direct path from age to item 6 (talking to the child before going somewhere that might be stressful) had the highest modification index, so this parameter was freed first. The resulting model revealed that item 6 was significant, indicating it had DIF based on age; specifically, for parents with the same level of support (controlling for the latent variable), parents with older children report more use of item 6 than those of younger children. The effect of item 14 on sex had the next highest modification index, so this was freed next. This item (talking aloud while solving a problem to model the process) had DIF as well, such that parents of male children were less likely to endorse this item while

controlling for the latent variable. Finally, the effect of item 14 on age was freed. DIF was confirmed, such that parents of older children were less likely to endorse this item among parents with the same level of support. No other items had modification indices that warranted consideration.

Age and sex were also considered as moderators of the path from parent support to child self-regulation (individual components as well as the integrated form); this was an extension of the previous linear regression models where cohort was included as a control. In order to include sex in the model, Mplus required use of a Bayesian estimator for this analysis; the inclusion of a dichotomous variable for cohort prevented use of ML estimation so I used Bayes (as recommended by Mplus) rather than WLSMV in order to make use of full information. When adding the main effects of age and sex, the expected differences were observed such that older children outperformed younger children across all self-regulation assessments and female children outperformed male children specifically on the Day-Night inhibitory control task. The latter finding is consistent with the literature (Silverman, 2021). However, when the latent interaction terms were added, no significant moderation effects were identified.

CHAPTER 5: DISCUSSION

Parenting has a well-documented impact on young children's development, particularly on their socioemotional skills. A core skill within this domain is self-regulation, which develops rapidly during the preschool period and is essential for numerous child and adult outcomes. The literature highlights three major mechanisms of parenting practices likely to promote self-regulation in early childhood, within which are specific proactive and reactive strategies thought to target self-regulation development. Although measuring parents' use of these kinds of practices is thus important to understand how they may support self-regulation, few self-report surveys exist which apply to the preschool age, target self-regulation skills, and emphasize proactive practices. As such, this dissertation aimed to accomplish the following:

1. Describe how parents are supporting preschool children's self-regulation at home through a new parenting survey.
2. Examine whether parents' supports relate to children's self-regulation and executive function.
3. Examine how factors which influence parenting may relate to parents' supports.
4. Assess whether self-regulation may mediate the relation between parent supports and children's academic outcomes.

Parents' Self-Reported Supports

Across all datasets, parents' overall responses to the 20 items were highly similar. Parents tended to report high frequencies of employing the practices covered by the survey. In accordance with the 15-20% rule for ceiling and floor effects (McHorney & Tarlov, 1995), 18 items showed a ceiling effect (lowest percentage for *always* across datasets was 19.8%) and the remaining 2 items showed a floor effect (lowest *never* was 15.6% across datasets). Accordingly,

the data tend to be skewed. However, there was variability within items. In 12 of the 20 items, *sometimes* was chosen by at least 20% of respondents. Given the self-report nature of this survey, the strong endorsement of most items may indicate either that parents are indeed engaging in these practices frequently, or that they believe they should be (and thus reported as such due to social desirability bias). The highest-mean items were not endorsed significantly more frequently than others.

Parents reported the lowest frequency of two specific practices: use of a job chart/visual schedule and giving items to help children keep track of time. Unlike the more highly endorsed items, the means for these items were a full point below those of the next lowest items, indicating these two items stand out meaningfully. The literature sheds little light on why parents might engage less often in these practices, although some possibilities are explored below.

Use of a job chart/visual schedule is an extremely common and recommended practice in early childhood classrooms to support self-regulation (Fettig et al., 2013; Yuan & Jiang, 2019). One study of 87 teachers showed daily schedules posted in 96.3% of classrooms and job charts in 88.9% of classrooms, with the latter showing particularly clear use by the teacher (Sularski, 2010). Preschool teachers at high-quality, NAEYC-accredited schools often begin the day by engaging children in identifying their jobs on the job chart, and commonly reference a visual representation of the activities for the day (large group, small group, free choice, etc.). As such, is possible that these types of supports are more common in classroom-based environments but may be perceived as less valuable at home for the preschool age; this is unexplored in the literature, which does not report or emphasize parents' use of this support for typically-developing children at home. Parents of children with disabilities (notably autism) often use visual schedules (Harte, 2008; Hume et al., 2014; Marshall & Mirenda, 2002), so it is possible

that the current sample of parents did not believe this support necessary for their typically-developing children. With regard to the job chart aspect of this item, parents in some studies report using chore charts with children as young as five (e.g., Peterson & Grimes, 2018), although parent report data are restricted on this subject. In most studies that mention these kinds of charts, parents tend to report using them with children ages twelve and up (Baker et al., 2016; Charmaraman et al., 2022; Criss et al., 2021). As such, it is possible that parents perceived the practice of using a job chart or visual schedule as either not age appropriate or not ability appropriate for their typically-developing preschoolers.

The other lowest-endorsed item was providing children with items to help them track time. As with the previous item, this is cited as a beneficial practice that is used in early childhood classrooms to promote turn-taking between children, or to signal the conclusion of an activity (e.g., lunch, clean up; Butler & Ostrosky, 2018; Hancock & Carter, 2016). As such, timers may not be a common support in a home environment, particularly if children do not have siblings (for turn-taking) or children have large age differences between them and their siblings such that a timer would not make sense for the other children involved. It is also possible that parents may perceive timers to be too advanced a support for a child at the preschool age, and/or that the props needed for this kind of support are not available or ideal (e.g., parents don't own sand timers, and/or don't wish to give the child access to their phone or tablet to use a timer on it).

The research literature offers little evidence of parents using timers with young children. To this author's knowledge, no studies focus exclusively on timer use with preschool-aged children; most studies that include the preschool age also include older children, making it difficult to isolate use and effects for the younger range. Importantly, the literature in this area

reveals that parents who do use timers seem to use them in a variety of ways that might not have been captured by the phrasing in the survey item. The item specifies that the parent gives the child a timer to help the child keep track of time, however most timer use appears to be exclusive to the parent (i.e., the child is not operating the timer). Several studies indicate that parents use timers themselves to limit children's media use. For example, Zaman and colleagues (2016) conducted a qualitative study on parents of children aged 3-9 in which they found parents used a kitchen timer to limit digital play, but that this use was fairly exclusive to the older children. In fact, older children ages 6-11 even recommend that parents use a timer to limit their children's screen time (Eck et al., 2020). Another study examined parents' use of the Amazon Echo (Alexa) to supplement their parenting practices; parents reported using Alexa's timer to settle a dispute or set a rule, such as signaling the need to switch toys (Beneteau et al., 2020). As such, parents may be using timers in ways that don't entail giving a child a timer nor having the child operate the timer independently, as implied by the item phrasing, thus parents did not endorse this item. Focus groups with parents of children aged 6-12 have further indicated use of a kitchen timer or alarm clock to monitor screen time, although in this case parents indicated specifically that "by letting the child put on the kitchen timer him/herself, the child gets involved and listens more easily" (Lepeleere et al., 2013, p. 6). This is a rare example in the literature of a parenting practice involving a child-operated timer, although the children were not preschool-age.

Studies that include younger children suggest a variety of timer use. Parents in Australia reported using a sand timer, phone, or built-in toothbrush timer to support children ages 2-8 to brush their teeth for 2 minutes (Tadakamadla et al., 2022). This could fit the item phrasing if the children were independently using the timers, which is unclear in the study. Other studies on younger children are restricted to non-typically-developing children, which were not included in

the current sample. For example, both visual schedules (as per the previous low-endorsed item) and timers were included in the set of antecedent strategies used by caregivers who tended to be more successful in managing the behavior of children aged 4-8 with prenatal alcohol exposure (Petrenko et al., 2016). As such, it appears that parents may use timers (and visual schedules) to support young children, but perhaps more so with children who have pre-existing conditions that might affect their ability to self-regulate. Given that our sample included only typically-developing children, this may shed light on the low frequency of this practice reported by parents.

Another possible explanation for the low endorsement of this item is that parents may not be using timers specifically "to help children keep track of time." Szabo and colleagues put together a set of practices—grounded in behavior analysis—designed to support parents during COVID; among these was the classic "beat the timer" game (Adams & Drabman, 1995) in which parents encourage children to complete a task before the timer runs out (Szabo et al. 2020). A review of components of effective prevention and treatment programs further highlights beat the timer as an essential unit of behavioral influence for school-age children (Embry & Biglan, 2008). This use of a timer as a motivational tool is not the use implied by the item in the survey. However, Szabo and colleagues also recommend using timers to aid in transitions between activities and to signal upcoming shifts among activities, highlighting that this increases the independence of the learner (consistent with the classification of this practice under the autonomy support mechanism). This latter recommendation is closer to the practice this item was intended to capture, although the authors give no indication that these practices are used by parents (just a recommendation to use them). Regardless, it is possible that because this game does not explicitly entail giving a child a timer to help them track time, parents did not endorse

that item. As such, parents may be using timers to promote children's self-regulation in ways uncaptured by the current item phrasing. Alternatively, it remains possible that parents—at least those in the current sample—are simply not using timers with preschool-aged children, despite the established benefits of this practice in the classroom and the theoretical benefits highlighted in the literature. This does not suggest that those practices would not be beneficial for children, but rather that parents may not recognize the value of these practices or understand how to incorporate them into the home environment.

Structure of the Parent Survey

The factor analyses revealed that the items in the current survey formed a single factor. Through iterative EFA, four items which did not consistently load were pruned from the measure, including items 2-3 (referring to a regular bedtime and bedtime routine), item 7 (providing a job chart/visual schedule), and item 12 (providing items for children to keep track of time). From a theoretical standpoint, it appears most likely that items 2-3 are measuring bedtime-specific behaviors and this separated them from the rest of the items reflecting the latent construct. Relatedly, it is worth mentioning that in many multi-factor solutions across the EFAs, the bedtime items typically formed their own 2-item factor suggesting that they are jointly measuring another aspect of development. It is possible that these may be common practices that do not specifically target the latent construct in the ways that the other items do. That is, structured bedtimes benefit a wealth of child outcomes (see Mindell & Williamson, 2018, for a review), and so these items might have an overly broad impact on development, causing them to separate from the rest.

In the literature, sleep practices and non-sleep practices are often examined as separate entities, where the focus is on how they might relate to one another or interact to affect children's

outcomes. Indeed, entire surveys have been created and validated (Alfano et al., 2013) to assess sleep-specific parenting alongside—but not as a part of—other parenting practices (Smith et al., 2014), and general surveys of parenting practices tend to exclude sleep-related items (e.g., Arnold et al., 1993; Clerkin et al., 2007), even when questionnaires are quite extensive (over 50 items; Linver et al., 2004). When relations between these kinds of practices are examined, studies show associations between sleep- and non-sleep practices through correlation and regression (Smith et al., 2014), although findings tend to be mixed with some studies showing interaction or moderation effects on child sleep outcomes (Staples et al., 2015) and others failing to identify these (Shetty et al., 2022). Regardless, these studies indicate that bedtime-specific behaviors like bedtime routines are viewed as a construct separate from other parenting practices, which is consistent with the factor analysis results.

The other two items that were pruned (7 and 12) were the two lowest endorsed items previously discussed. Unlike the possible reasons why these items scored low, their failure to load indicates that they are capturing something different relative to the other items. As with the two bedtime items, it is important to note that these two items frequently formed their own 2-item factor in multi-factor solutions, indicating a relation between them which reflects a different construct. A prominent reason why these items form their own factor and do not reflect the latent construct as measured by the rest of the items could be that they both uniquely require the use of a specific external tool. Item 7 refers to use of job charts or visual schedules, which are physical tools parents would use with children. Similarly, item 12 involves giving children an item to track time, another external item provided to children by parents. As such, it is possible that the latent construct reflected by these two items involves use of specific, physical tools for self-regulation support. However, it may be important to note that item 9 about bringing “toys or

activities my child likes" for a waiting period did successfully load on the single factor. Like items 7 and 12, this item refers to external tools, but not particularly unique or specific ones which may be why item 9 loaded successfully.

Across data types and estimators, the CFA indicated that a categorical model with WLSMV remained best. The CFA results indicate that the single factor structure of the reduced survey was a modest representation of the latent variable, particularly when modification indices were examined and a final model was identified. The CFA further verifies that the structure identified in the EFA of the pre-COVID data can be applied reasonably well to the post-COVID data, indicating that these results are stable across time and context. Overall, these results indicate that the final set of items in this survey measure one aspect of parenting as related to self-regulation. The final EFA provides insight into the accuracy of previous models, given that results continued to indicate a single factor and generally flagged the same items as previous analyses, with strikingly similar loadings (all but one within 0.1 of the originals).

The consistent formation of a single factor from both EFAs and the good fit of the CFA give strong evidence that these items reflect one factor. This was unexpected, as the items were drawn from three areas of self-regulation support highlighted in the literature and logically reflect at least one of those three areas. It is possible that the emergence of a single factor may indicate a need to view the three theoretical mechanisms as complementary aspects of self-regulatory support. These three mechanisms may be related to an overarching aspect of parent attitudes or beliefs. Most obviously, the three mechanisms reflect proactivity wherein parents use foresight to ensure appropriate supports are provided that may prevent dysregulated behavior. Indeed, the emphasis on proactive parenting practices was a major focus in the design of the parent report measure in the current work. Akin to the current study, proactive practices—when

studied more generally without the self-regulation focus—have been shown to form a single factor (McEachern et al., 2012). Even though a couple of the items were designed to reflect responses to less-regulated behavior, the overall factor structure may still represent proactive parenting. Similarly, it is possible that a single factor was identified in the current work due to the more specific focus on supports for children's self-regulation within the context of proactive practices. Finally, the overarching connection among the three mechanisms could be that they fit within an authoritative parenting style; this would make sense given many items composing the survey reflect some of the core values expressed in authoritative parenting, such as reasoning, communication, supportiveness, and structure (Kuppens & Ceulemans, 2019). Regardless, the emergence of a single factor indicates that these mechanisms may be more cohesive than previously thought.

Concurrent Validity and Relations

Parent Outcomes

The present study found that neither maternal education nor stress—both of which were normally distributed in the current sample—predicted the latent variable. This was unexpected, given established relations in the literature between these parent factors and the quality of parenting provided to children (Davis-Kean et al., 2021; Farmer & Lee, 2011; Jeong et al., 2017; Nievar et al., 2014). Specifically for maternal education, one possibility is that this construct is related to parents' use of harsh parenting—such that lower education is associated with harsher parenting—but is unrelated to their positive parenting (Carr & Pike, 2012). As such, parents of any education level in the current study may be using similar amounts of positive parenting, but different frequencies of punitive practices uncaptured in the current study; research indicates that the presence of both supportive and harsh practices is possible in parenting (Skinner et al., 2005).

Overall, however, studies tend to show effects of maternal education on both positive and punitive parenting practices (Cuartas, 2022). Indeed, studies examining the association between maternal education and parenting quality tend to find clear expected relations (Davis-Kean et al., 2021), though some studies have found these relations to be small (Waylen & Stewart-Brown, 2010). Research also indicates that associations between these factors differ based on variations in measurement (Booth et al., 2018); for example, differences in parenting behavior instruments and whether education levels lower than the current study's lowest ("some high school") were considered. Regardless, the lack of relations between maternal education and parenting supports in the current work remains inconsistent with most literature and may indicate that the survey is not capturing critical aspects of parenting (to which education would likely relate).

For parenting stress, unmeasured mediators or moderators may also be at play; the relation between parenting stress and parenting quality has been shown to be mediated by maternal self-efficacy (Jackson & Huang, 2000) and moderated by perceived support (Oppermann et al., 2021). Another possibility is that parent stress affects more emotional aspects of parenting such as positivity (Crnic et al., 2005; McMahon & Meins, 2012) and responsiveness (Ward & Lee, 2020) rather than more cognitively-focused practices such as those in the current survey. Akin to the current study, some studies have failed to find a relation between parenting stress and parent behavior (e.g., Anthony et al., 2005) or found mixed results attributed to nuances in measurement of aspects of parenting stress and interactions (e.g., Crinic et al., 2005). There may also be a developmental window during which parent stress has a strong impact; some longitudinal work indicates that maternal stress may be important during infancy, but less impactful later in childhood (Planalp et al., 2022). However, the bulk of the literature shows a strong relation between stress and parenting quality during the preschool years (Farmer & Lee,

2011; Guajardo et al., 2009), indicating that the current finding is unusual and may suggest that the survey's latent construct is not reflecting parenting practices of great value that would typically relate to stress.

Interestingly, the current work did find the expected significant positive relation between parents' own self-regulation and the latent variable. This indicates that parents who are better regulated use the strategies from the survey more often in their parenting. These findings are consistent with previous work indicating that parental self-regulation increases parenting quality (Crandall et al., 2015). However, the current study did not find the secondary link between the survey and child self-regulation, indicating that although better-regulated parents are using these supportive strategies, the strategies may not be directly supporting self-regulation. Other studies found that parental self-regulation is related both directly (i.e., genetically; Friedman et al., 2008; Gagne & Saudino, 2010) and indirectly to children's self-regulation skills. Indirect relations have been observed through socioeconomic status (Kao et al., 2018), caregiving behaviors (Cuevas et al., 2014), autonomy-supportive practices (Distefano et al., 2018), and games and activities thought to target self-regulation (Korucu et al., 2019). This indicates that better-regulated parents that engage in these practices more frequently tend to have better-regulated children. The lack of similar findings in the present work is discussed below.

Child Outcomes

The lack of relations between the latent variable and child outcomes is surprising given the theoretical and empirical evidence in support of these connections. When proactive parenting is studied more generally—rather than focusing specifically on self-regulation—it has been predictive of children's behavior problems, which is highly related to self-regulation (McEachern et al., 2012). The current work adds to a smaller body of research that does not find relations

between aspects of parenting (styles, dimensions, or practices) and children's outcomes (Guajardo et al., 2009; Hindman & Morrison, 2012; Lengua et al., 2007; Razza et al., 2012). Within that literature, one study in particular aligns with this dissertation: Korucu and colleagues (2019) compiled a set of 15 items derived from two well-established parent questionnaires (including about 4 items that overlap strongly with the present survey) designed to capture the frequency of parents' self-regulation supports, similar to the present work. The researchers ran a CFA on the survey and examined the predictive ability of the resulting factors (stimulation, sensitivity-responsivity, control-discipline, and warmth) with children's self-regulation. None of the parent factors related to the components of self-regulation (specifically cognitive flexibility and inhibitory control, with measures almost identical to the present study). Furthermore, there were no significant relations between the parent factors and the integrated form of self-regulation as measured by HTKS (also used in this study). Korucu's study was limited by a small, homogenous sample of high-SES families; well-resourced samples are a limitation noted by several studies finding no relations between parenting and child self-regulation (Bradley & Corwyn, 2005, 2007; Campbell et al., 2010; Steenhoff et al., 2021). Yet, these findings are consistent with those of the current study which used a larger and more diverse sample.

In the current work, it remains to explore the possible reasons why no significant relations were identified between the latent parent support factor and children's self-regulation. The first major reason is a common issue in survey-based research: social desirability bias. It is possible that parents recognized the behaviors within each item as practices they should be using to support their children's development—those which society would expect them to use if they were "good parents". As a result, parents may have overrepresented their use of these practices in defense of their social perception. This issue could have been compounded by the consistently

positive wording of the scale. That is, all items were in one direction such that a higher score would indicate greater support. Although this reduces the cognitive burden of reversed items (Steenkamp & Burgess, 2002; Swain et al., 2008), it may also reduce thoughtful responses such that parents wanting to seem socially desirable quickly realize that the items are positively worded and thus select the highest score for each item without attending to the content. However, the two items that often scored low (using a job chart/visual schedule and providing items to track time) indicate that this is unlikely, as parents would have needed to read carefully to respond lower for those items. In addition, other studies have used positively worded items for surveys of parent practices without observing unusual data patterns (e.g., Korucu et al., 2019; Robinson et al., 1995, 1996). Regardless, social desirability may have affected responses which would subsequently affect the measurement of relations. Another related possibility is that parents are unknowingly miscalculating how often they engage in these behaviors; some literature reports discrepancies between parent report and actual parent behavior such that parents tend to overestimate their use of supportive practices and grossly underestimate their use of punitive ones (Swenson et al., 2016).

It is important to consider that these specific strategies (as a single factor/latent construct) as applied by parents may not be elements that promote self-regulation in young children, despite the competing evidence in the literature. Indeed, other aspects of parenting may be more important for children's self-regulation than those practices captured here. For example, the previously mentioned study by Korucu and colleagues (2019) used a subset of parent questionnaire items (some of which were similar to those in the present study) to identify four parenting factors and assess their relation to child self-regulation. Unexpectedly, the authors found no relations between child executive function and parent factors, akin to the results in the

current study which also found no relations between the survey's single factor and child self-regulation. However, the researchers did find that HTKS could be predicted by a subset of items (the HEFE scale) which focused on activities and games thought to target self-regulation, such as red light/green light, puzzles, and repetitive songs. These kinds of activities, which the authors argue reflect "the home EF environment" as a unique component of the home learning environment, may serve as a type of informal training that parents can employ to target self-regulation development. Rather than infusing self-regulatory supports throughout common parenting interactions, as in the current survey items, these distinct games may target self-regulation with more specificity and place this kind of learning in the context of play. Play is strongly associated with learning and self-regulation (Diamond et al., 2019; Muir et al., 2023), so it is possible that the playful nature of these games promotes children's engagement in developing these specific skills, resulting in a particularly notable effect on self-regulatory development. The current survey did not include items that required playful interactions, although they do not exclude playfulness either; it is certainly possible for parents to use many of the present strategies in a playful manner. Perhaps, however, parents are not doing this, but in the context of a game (as in the HEFE items) would be more likely to become especially engaging and playful.

A multitude of activities—beyond the HEFE items and the parenting practices highlighted in the current survey—have been shown to improve self-regulatory skills in young children. Reviews that specifically examined peer-reviewed publications identifying longitudinal, causal relations (with a comparison group) between self-regulation and other factors highlighted benefits of computerized training, aerobic exercise and sports, martial arts and mindfulness practices, and targeted preschool curricula (e.g., *Tools of the Mind*), indicating

that many other factors may be important for this skill above and beyond specific parenting practices (Diamond & Lee, 2011; Diamond, 2012; Muir et al., 2023). However, the consistent conclusion of these reviews—even when they don't explicitly mention parenting—is that self-regulation is "better when we are less stressed, happier, well rested, and feel there are people who we can share experiences with, who care about us, and who we can turn to for support…" (Diamond & Ling, 2016, p.43), which strongly implicates caregiver practices akin to those in the current survey as a major influential factor in self-regulation development. Perhaps, then, Diamond's assertion refers more to activities that simply foster a sense of togetherness; this was supported in a large study of national survey data which found that parents who read with, sang or told stories with, and ate meals with their children tended to have children with a significantly lower risk of developmental, behavioral, or social delays (Cprek et al., 2015). If other aspects of parenting (beyond those in the current survey) are more critical for children's self-regulation, the observed lack of relations would make sense as use of these practices would not be the driving force in self-regulatory development. As mentioned across the literature base, the factors affecting self-regulation are myriad, complex, bi-directional, and dynamic across development, yielding challenges in measurement (Claussen et al., 2021; Erdmann & Hertel, 2019; McClelland et al., 2018).

One aspect of parenting that is unstudied in the current work but may be obscuring relations is warmth or responsiveness. Attachment theorists and supporters of parenting style conceptualizations often stress the importance of a warm, responsive approach above and beyond the use of certain parenting practices to promote self-regulation development. Research is mixed on this point, with some studies showing that certain practices carry more weight than warmth, and others showing that warmth is the critical component. In an example of the former, Lengua

and colleagues (2014) found that parental scaffolding predicted stronger self-regulation skills during preschool, yet found no relation for warmth, negativity, or responsiveness; this was the case even though the coded parent-child interaction involved emotionally-taxing requirements such as avoiding highly desirable toys, building a challenging Lego figure, and cleaning up. Some meta-analyses have even shown no significant association between responsive parenting and children's self-regulation (as defined broadly by compliance, inhibition, and emotion regulation; Karreman et al., 2006), which is surprising given their theoretical connections. However, in line with theory, other meta-analyses do report these associations (although effect sizes are small, r = .25; Valcan et al., 2018), muddying the waters on the importance of responsiveness to self-regulation development. This may indicate that the relation is more complex, perhaps involving both a warm approach and implementation of particular strategies to foster self-regulation development. Indeed, parenting characterized by warmth has been shown to moderate the impact of specific parenting practices on preschool children's adaptive functioning; frequent use of behaviors like discussing emotions (as in the current parent survey) is associated with better regulation only when parental warmth is also high (Yule et al., 2019). Across the literature, warmth/sensitivity is frequently identified as a mediator or moderator of children's outcomes (Birmingham et al., 2017); perhaps the strategies in the current survey are not effective in the absence of a warm, responsive relationship with the caregiver who is using them. The current work did not explicitly assess parental warmth and so the presence of this relationship is unknown, although several of the items overlap with items used in other questionnaires to assess this construct (e.g., the Parenting Styles and Dimensions Questionnaire item "I encourage my child to talk about their troubles" is similar to both "I help my child talk about what they're feeling" and "My child and I discuss how to solve problems together"). As

such, there is some implication that parents who endorse these items from the current survey are also likely to show nurturance in their overall parenting style or approach. However, the number of items that may be reflective of warmth is limited in the survey and so may not be represented potently enough to yield relations to child outcomes.

Although the items in the current survey reflect positive practices which were endorsed highly by parents, this study did not collect data on the use of punitive practices. Research indicates that the use of positive strategies does not preclude the use of harsh practices; specifically, in a review of parenting measures used since 1945, Skinner and colleagues (2005) used data from thousands of participants to compare models of unipolar (opposing constructs like structure and chaos or autonomy support and coercion on different factors) and bipolar (opposing constructs on the same factor) parenting dimensions. Although bipolarity was previously assumed in the field as appropriate, the unipolar models had significantly better fit for all three pairs of features (structure/chaos, autonomy/coercion, warmth/rejection) and for both maternal and paternal data, indicating that parents could be characterized as both high on structure and high on chaos (Skinner et al., 2005). Given this possibility, parents who report frequent use of supportive practices from the current survey may also be using punitive practices which counteract the positive effect of supportive practices on children's development, thus distorting the results. Future work should include measures assessing more harsh parenting to enable this distinction.

Beyond family-specific contexts, it may be the case that unmeasured child-level variables are obscuring the expected relations. Specifically, children's language ability has been shown to mediate the association between parenting practices and child self-regulation (Hammond et al., 2012; Landry et al., 2002). This mediation has been demonstrated specifically in the context of

proactive parenting; Chang and colleagues (2015) found that children's verbal ability at age three partially mediated the effect of proactive parenting at age two on effortful control at age five. This kind of relation is consistent with Vygotsky's theoretical framework, given that proactive parenting inherently involves increased positive dialogue as parents discuss choices, emotions, consequences, and plans with children; this would in turn promote children's ability to use language to communicate, reason, reflect, and strategize, all tools which promote self-regulatory function. Other child-level factors, such as technology use, may also be clouding the association between parenting practices and child self-regulation; parents may be utilizing the current strategies, but also permitting long stretches of screen time that may be negatively affecting self-regulatory development (John et al., 2023). Future research may benefit from examining these kinds of child-level variables alongside the survey for a more comprehensive view.

A further possibility related to child-level variables is that associations between parenting practices and child self-regulation may be bidirectional based on children's individual developmental level. If parents recognize that their children are struggling with self-regulation skills, these parents may employ more frequent use of the strategies in the current survey in order to support their children. This may conflate parents with low-regulated children with parents of high-regulated children, as both may be frequently utilizing supportive practices. Visual examination of scatterplot data between the latent construct and children's self-regulation (HTKS total score) indicates that variation in parent support was similar across all levels of child self-regulation; that is, there were similar observations of high and low support for children of low self-regulation. This indicates that some high-supportive parents have low-regulated children.

To this author's knowledge, there is no research directly comparing the supports provided by parents of low-regulated children to the supports provided by parents of high-regulated children specifically within the context of parents' knowledge of their child's self-regulation capacity. Certainly, parenting interventions targeting self-regulation indicate that parents with low-regulated children can increase supports to improve regulation (Morawaska et al., 2019); however, do parents make this adjustment naturally? As discussed across the current work, children with low levels of self-regulation are typically associated with less-supportive parents, but arguably there must be some low-regulated children with parents who recognize and respond to their children's regulatory needs.

There is limited evidence suggesting that parents naturally respond supportively to dysregulated behavior (Chen et al., 2024), although some studies shed light on the subject. Studies utilizing observational tasks (e.g., challenging puzzles or gift delay) report that some parents do increase supportive behaviors when children struggle (Cole et al., 2009; Morris et al., 2011; Ravindran et al., 2021), although the research focus is typically on child behavioral outcomes; that is, these studies do not select for parents of low-regulated children nor do they discuss the percentage or qualities of parents who respond supportively (vs. parents who do not). In addition, these tasks are often observed in a laboratory environment where parents may feel pressure to provide more support when their children struggle. That said, survey studies also indicate that some parents respond supportively to dysregulated behavior and these parents tend to have better-regulated children (e.g., Nelson & Boyers, 2018), although again the literature doesn't address the incidence of parents with low-regulated children increasing their supports accordingly. Some studies do report how many parents engaged in supportive behaviors when their child faced a challenging task; in a study by Russell and colleagues (2013), about half of the

43 non-diverse, highly educated parents provided some support (rephrasing instructions, conversing, or playing) during gift delay for their 2–3-year-old children. However, the children of those parents were not designated as having low self-regulation, they were simply facing a taxing self-regulatory challenge. Regardless, these studies offer some evidence that a subset of parents may respond to children's self-regulation struggles by using more supportive strategies, which could have caused the non-relation to self-regulation skills observed in the current sample. It is important to mention, however, that a great deal of bidirectional data suggests the opposite trend: when children struggle to self-regulate, parenting quality tends to decrease, which then results in further self-regulation deficits (Baron & Malmberg, 2019; Guo et al., 2023; Hong et al., 2024; Larsson et al., 2008; Merz et al., 2017; Pearl et al., 2014; Wang & Gai, 2024; Yan, Ansari, & Wang, 2019). That said, in the current sample, there are high-supportive parents of both low- and high-regulated children, suggesting that some parents are recognizing their child's struggle and providing more support. Although the number of these parents appeared about equal to the number of high-supportive parents with high-regulated children in the current sample, in the population it remains possible that only a particular subset of parents (i.e., with certain qualities) of children who struggle with self-regulation would "rise to the challenge." One possible quality that may be related to high support of low-regulated children is parent self-regulation; parents with high self-regulation may be more likely to increase supports for low-regulated children, given that better-regulated parents tend to have a stronger developmentally appropriate understanding of their children and are better situated to utilize positive practices in response to dysregulated behavior (Crandall et al., 2015). That said, based on visual examination of scatterplots of parent self-regulation, child self-regulation, and the latent construct in the current sample, no clear trends appear; that is, it doesn't appear that high-regulated parents of low-

regulated children are providing more support (as measured by the latent variable). Regardless, future research would benefit from examining what qualities (e.g., high self-regulation) are shared among parents of low-regulated children who anticipate and respond to their children's frequent self-regulatory struggles with increased proactivity and support.

Limitations and Future Directions

It is important to acknowledge several limitations of the current study. Although the samples used were relatively diverse, particularly in terms of maternal education (across datasets, about half of mothers did not complete college), some demographics may be less representative. Future research is encouraged to pursue factor analysis of the current survey with different and larger datasets—including datasets that do not span major world events such as COVID—following this same EFA-CFA-EFA pattern to fully evaluate the models.

The most notable limitation of the current work may be the lack of an observational measure for parent-child interactions. The current work relies exclusively on the strategies parents report using in the survey, without an observational measure to corroborate their report. As previously mentioned, discrepancies have been documented between parent report and parent behavior (Swenson et al., 2016). Possible effects of parents' miscalculation of how often they engage in supportive practices, along with issues of social desirability and item misinterpretation, could be elucidated if the present survey were paired with an observational measure of parenting practices. Future work should seek to observe agreement between a self-report and observational measure to further validate the survey. Researchers who have encountered unexpected results such as those in this work have recommended the parallel use of observational tools to provide more accurate information, particularly in the validation stage given that the goal of these parent

report surveys is typically to replace observational assessment and its associated burdens (Korucu et al., 2019; McEachern et al., 2012).

Similarly, future studies may also seek to assess convergent and divergent validity by including established parent-report measures of practices, which may shed light on the latent construct reflected by the single factor; alternative parent surveys that may be most valuable for comparison include authoritative parenting subscales (e.g., Parenting Styles and Dimensions Questionnaire; Robinson et al., 2001) and the PARYC items previously discussed (McEachern et al., 2012), many of which are similar to the current items. Lack of relations between the current items and these measures would strongly indicate that the current survey is measuring something especially distinct and unexpected. It may also be of interest to collect data about parent or home characteristics that may be related to use of these practices, such as parent self-efficacy, household chaos, or the home learning environment. Observing expected (or unexpected) associations between these characteristics and the present survey would help to establish the possible value and relevance of these strategies.

Finally, it may be useful to include teacher- and classroom-level data. It is possible that the "driving force" for self-regulation stems from school rather than home, perhaps particularly for families experiencing adverse socioeconomic conditions. Certain curricula used nationwide place strong emphasis on building children's self-regulation (e.g., HighScope, Tools of the Mind), and this focused education may have an important impact on children's development. High-quality childcare and education have a protective effect for children's development when parenting is of lower quality (Seiler et al., 2022). As a result, effects from teaching and school may cloud effects from parenting behaviors at home. Although this was unlikely in the current study as data were collected early in the year, this could be addressed in future studies by

additionally collecting teacher- and classroom-level data on practices known to support children's self-regulation.

Conclusion

The present study details the design of a new parent survey created to target specific parent practices reflecting three major mechanisms that are indicated by the research literature as supportive of self-regulation development in preschool-aged children. Descriptive information of survey responses was presented to explore patterns and offer explanations for the observed trends, generally indicating high frequencies of engagement in the target strategies. To understand the factor structure of the survey, it was examined through a rigorous series of factor analyses revealing a single factor structure. Additionally, possible associations were examined between the latent construct and child factors (three executive function skills and integrated self-regulation) as well as parent factors (maternal education, maternal stress, and maternal self-regulation). Finally, children's self-regulation was assessed as a mediator of the relation between parents' supports as measured by the survey and children's behavioral self-regulation. Three major findings are highlighted below.

First, this study found that the current sample of parents reported high frequencies of strategy use overall, with the only exceptions including use of a job chart/visual schedule and providing items for children to keep track of time. The literature indicates that although these are frequent supports in preschool classrooms, parents may perceive these to be less valuable at home for young and/or typically-developing children, or parents may be using these in ways uncaptured by the item phrasing. Across data types and estimators, factor analyses revealed the parent survey had a single factor structure and resulted in pruning four items from the 20-item survey, including the two aforementioned items and two bedtime-focused items (which also

failed to consistently load into the factor); these four pruned items appear to be conceptually separated from the rest of the items in the survey. The final model was a modest representation of the latent variable, and its accuracy was further supported by strikingly similar results from the final EFA on the CFA dataset. The consistent identification of a single factor indicates that the mechanisms originally hypothesized to separate into distinct factors may instead represent a cohesive aspect of parenting; this could be proactive parenting, authoritative parenting, or another overarching aspect of parent attitudes or beliefs. The identification of one factor is consistent with other work showing similar items forming a single factor (e.g., McEachern et al., 2012).

Second, the present study found no relations between the survey's latent construct and maternal education or stress. This was unexpected given trends in the literature (Andreadakis et al., 2020; Carr & Pike, 2012; Harvey et al., 2016; Kracht et al., 2021; Matte-Gagne et al., 2015; Raviv et al., 2004; Wu et al., 2019), but could be explained by unmeasured variables or measurement nuances; alternatively, this lack of relations could indicate that the survey is not capturing critical aspects of parenting. A significant positive relation was identified between mothers' self-regulation and the latent variable, consistent with previous work showing that parental self-regulation increases parenting quality (Crandall et al., 2015). This relation is the chief indicator in the present work that the survey may be capturing an intended, relevant construct.

Third, no relations were identified between the survey and child outcomes. Previous work typically identifies the expected significant associations (e.g., McEachern et al., 2012), but some studies align with the current work in showing no relations (e.g., Korucu et al., 2019). These unexpected results may be explained by measurement issues such as social desirability bias, but

may be better understood by considering that the strategies in the survey may not be a driving force behind self-regulation development. Other aspects of parenting may be more important, such as EF-focused activities and games that leverage play to promote learning and engagement (Korucu et al., 2019), curricula that target self-regulation, computerized training, sports and exercise, or martial arts and mindfulness practices (Diamond & Lee, 2011; Diamond, 2012). Some research indicates that simple, general parent behaviors like reading, singing, and eating with children significantly reduce risks of self-regulation-related delays (Cprek et al., 2015). Other unmeasured variables that may have obscured relations include responsiveness, use of punitive practices alongside supportive ones, child language, use of games and playfulness, and/or a subset of high-supportive parents with low-regulated children.

Although the current work did not identify expected relations, studies as recent as within the past few months have identified positive associations between the current mechanisms and preschool children's self-regulation (Wang & Gai, 2024), indicating there is more to explore in this area. The current study had a fairly diverse sample and an adequate sample size, but future work could improve further on these elements to promote representation and statistical power. The present work was chiefly limited by the lack of an observational measure to evaluate agreement between parents' survey responses and their actual behavior. Future research may elucidate the present findings by including observational measures, established parent-report measures, and teacher- and classroom-level data.

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APPENDIX

Table 17

Self-Regulation Home Environment Survey

Instructions: Please report how often you do each of the following.

	Never	Rarely	Sometimes	Frequently	Always
1. I talk to my child about his/her schedule for the next day.	1	2	3	4	5
2. My child has a set bed time for week nights.	1	2	3	4	5
3. My child has a set bedtime routine for week nights.	1	2	3	4	5
4. My child has a calm, quiet environment for reading and learning (outside of school).	1	2	3	4	5
5. I let my child know at least five minutes before we have to switch activities.	1	2	3	4	5
6. I talk to my child before we go places that might be stressful to him/her.	1	2	3	4	5
7. My child has a job chart or other visual schedule.	1	2	3	4	5
8. I offer my child choices about what s/he wears, eats, or plays with whenever possible.	1	2	3	4	5
9. I bring toys or activities my child likes when I know s/he will need to wait for a while.	1	2	3	4	5
10. I let my child know at least five minutes before we have to go somewhere.	1	2	3	4	5
11. I talk to my child about other people's emotions.	1	2	3	4	5
12. I give my child items to help him/her keep track of time (e.g., timer, clock).	1	2	3	4	5
13. I help my child break down larger tasks, like getting dressed, into smaller parts.	1	2	3	4	5

Table 17 (cont'd)

14. I talk aloud while I'm solving a problem so my child will learn from my process.	1	2	3	4	5
15. I help my child talk about what s/he is feeling.	1	2	3	4	5
16. My child and I discuss how to solve problems together.	1	2	3	4	5
17. When I ask my child to stop doing something, I talk with my child to help him/her understand why.	1	2	3	4	5
18. If my child is behaving in a way I don't like, I help him/her find something else to do instead.	1	2	3	4	5
19. I help my child understand the results of his/her behavior (e.g., if you throw your toy it might break).	1	2	3	4	5
20. I invite my child to help me make plans for our family.	1	2	3	4	5

Note. Above is the survey as it appeared to parents. No title or context was provided other than the instructions at the top of the survey.