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Promoting Self-Regulation in Young Children: The Role of Parenting Interventions

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Abstract
Self-regulation is a foundational skill in childhood and underpins various positive and negative outcomes throughout childhood, adolescence and into adulthood. Parents and the way they parent their children play a key role in the development of young children's self-regulatory capacity. However, there is limited evidence for the effectiveness of parenting interventions on child self-regulatory outcomes. This paper provides an overview of the role of parenting in the development of child self-regulation and a summary of the evidence base for parenting interventions to promote self-regulation in children under age eight, focusing on infancy, the toddler/preschooler period, and early school-age. We conclude by examining the gaps in this field of research and providing directions for future research.

Keywords Parenting · Self-regulation · Infancy · Toddler · Preschool · School-age child · Intervention

Introduction

Self-regulation refers to the capacity to guide one's own goal-directed activities over time and across changing circumstances. It is "*the primarily volitional cognitive and behavioral processes through which an individual maintains levels of emotional, motivational, and cognitive arousal that are conducive to positive adjustment and adaptation, as reflected in positive social relationships, productivity, achievement, and a positive sense of self*" (Blair and Diamond 2008, p. 900). Self-regulation involves the utilization of cognitive processes to regulate behavior and emotional responses and includes multiple distinct and overlapping mechanisms, such as emotion management, effortful control (the ability to suppress a dominant response that may be deemed inappropriate, for a less dominant one that would be more appropriate), focusing and shifting attention, and inhibiting and activating behavior (Karreman et al. 2006).

Although self-regulation in children has received increasing attention in the literature, there has been a lack of conceptual clarity, lack of agreement about underlying components and processes of self-regulation, and a fragmented approach to definitions. Depending on discipline, self-regulation may be referred to as executive functioning (Blair et al. 2014), effortful control (Graziano et al. 2010; Lengua et al. 2007), emotional regulation (Riva Crugnola et al. 2016), or self-control (Meldrum et al. 2018). Self-regulation is often distinguished from emotion regulation, and various definitions of the terms have been used in the literature, leading to calls to integrate these concepts under a broader self-regulation umbrella term (Nigg 2017). We take a broad approach to the definition of self-regulation to encompass multiple mechanisms that result in a child's ability to manage their behavior and emotions in adaptive ways. Therefore, for the purposes of this paper we include studies which examine child outcomes in terms of self-regulation, emotion regulation, executive functioning, effortful control, or self-control. We also review these self-regulation outcomes from a developmental perspective during early childhood.

In this position paper, we aim to highlight the importance of a developmental perspective on child self-regulation, the role of parenting in this process and the extent to which parenting interventions may play a role in promoting children's self-regulatory skills. We provide examples for how different parenting strategies may be effective at different developmental stages within early childhood (infancy, preschool, and

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early school-age), and examine the evidence base for parenting interventions in these developmental periods.

The Development of Self-Regulation During Early Childhood

Infants have very limited capacity for self-regulation and rely on their caregivers to assist with self-soothing. As children grow older, they rapidly develop self-regulatory skills in response to parental socialization. Between 12 and 18 months of age children become capable of self-control, and this is an important hallmark in the development of children's socialization (Kopp 1982). With increasing age, self-regulatory skills become more coherent in their expression (Kochanska et al. 2000). The development of self-regulation in early childhood appears to take an exponential trajectory, with rapid non-linear growth in the preschool years (Montroy et al. 2016).

Early self-regulatory processes provide a continually evolving framework, with more advanced self-regulatory processes building on mechanisms that develop earlier and thus gradually creating more sophisticated behavior as children mature (Eisenberg et al. 2010; Masten and Cicchetti 2010; Williams and Berthelsen 2017). For example, better self-regulatory capacity provides a framework for children to engage more effectively with teachers and peers in the early learning context, which in turn contributes to improved academic outcomes, fostering a virtuous cycle for continued improvement (Eisenberg et al. 2010; Williams and Berthelsen 2017).

Early differences in self-regulation are implicated in a developmental cascade leading to a range of short and long-term outcomes. Greater self-control in early childhood predicts numerous adult outcomes ranging from lower criminal convictions, better health and academic outcomes, and higher income (Moffitt et al. 2011). Without intervention, self-regulation is relatively stable from infancy into the preschool years and beyond (Feldman 2009; Kim and Kochanska 2012; Kochanska et al. 2000). When interventions result in improvements in child self-regulation, these improvements are associated with better adult outcomes (Moffitt et al. 2011). Pinpointing key ways to improve children's self-regulatory processes at different developmental stages during early childhood is essential for preventing the escalation of social-emotional, behavioral, and academic difficulties throughout the lifespan.

Key Influences on the Development of Self-Regulation in Early Childhood

Numerous factors shape the early emergence of self-regulation including temperament (Kochanska et al. 2000; Posner and Rothbart 2000), genetics, and the broader family environment in which the child is raised (Bridgett et al. 2015; Morris et al. 2007). A review of the literature highlights the link between brain development and self-regulation, demonstrating how stressful environments and the lack of responsiveness and cognitive stimulation impact young children's self-regulation (Blair 2002).

Self-regulation in early childhood has been consistently understood to be shaped by parental factors (Kopp 1982; Lengua et al. 2014; Morris et al. 2007). Longitudinal evidence suggests an effect of parenting in the early years being an important influence on a variety of self-regulatory skills, including executive functions and behavioral inhibition (Bernier et al. 2010; Kochanska et al. 2000; Roskam et al. 2014; Williams and Berthelsen 2017) and children's emotional regulation (Morris et al. 2007). A recent comprehensive review also demonstrates that parenting is a key social mechanism in the intergenerational transmission of self-regulation (Bridgett et al. 2015).

Parenting processes and specific parent–child interactions appear to impact children's development of self-regulation. Meta-analyses show that parental use of positive parenting strategies (e.g., guidance) is associated with better child self-regulation, while use of negative parenting strategies (e.g., coercive behaviors) is associated with weaker child self-regulation (Karreman et al. 2006; Valcan et al. 2017). An authoritative parenting style, characterized by high levels of responsiveness but also use of boundaries and limit setting, has been linked to better child self-regulatory skills, in comparison to permissive (i.e., high responsiveness, low boundaries) and authoritarian (i.e., low responsiveness, high boundaries) styles (Piotrowski et al. 2013). Early sensitive and responsive parenting may be particularly important for children with more difficult temperaments (Kim and Kochanska 2012). There is also evidence to suggest that hostile, critical parenting may play a particularly important role in the development of poorer self-regulation (Baron and Malmberg 2017; Williams and Berthelsen 2017).

Child self-regulation is likely the result of cumulative and multiple experiences of predictable, sensitive and consistent parenting. For example, over time, an environment of warmth and acceptance increases the likelihood that children will respond to parent's guidance and boundaries regarding what is acceptable, self-regulated behavior. Similarly, sensitive and warm responding to infant and child distress helps children learn that their emotions are acceptable and therefore learn to self-soothe and calm themselves when upset. Children learn what is considered appropriate behavior via parental acknowledgement or praise of self-regulated behavior (e.g., persisting with a task, playing well and sharing toys with siblings, asking for help when frustrated). Finally, parental modeling of self-regulatory skills is also likely to influence children's self-regulatory skills. In contrast, if parents fail to model appropriate skills, do not attend to

effective child self-regulatory behavior, or respond inconsistently or inappropriately to child distress or displays of emotion, children are less likely to learn and internalize self-regulated behavior.

The overall home environment may also be a contributing factor in the development of children's self-regulation. Children who are raised in home environments that are noisy and disorganized, have many simultaneous activities, and are lacking in routines tend to "tune out" of the chaos around them (Matheny et al. 1995). Home chaos is a unique and somewhat stable construct, contributing to children's social development above and beyond parenting skills and family income (Dumas et al. 2005). Greater home chaos during the first three years of life was associated with poorer child behavioral regulation and also predicted children's self-regulation later in school (Vernon-Feagans et al. 2016). The extent of chaos in the home environment may be important to consider in promoting children's self-regulation.

Interventions to Promote Self-Regulation in Early Childhood

Several previous reviews have suggested that interventions can be effective in enhancing children's self-regulatory skills (e.g., Diamond and Lee 2011; Piquero et al. 2016), however, these have tended to focus on older children, on interventions in the preschool or school setting, or interventions provided directly to children outside of the school or family setting (e.g., in clinical settings). Given the importance of parenting in the development of children's self-regulation, it is somewhat surprising that relatively little intervention work has focused on parenting as a vehicle for improvements in this area. In this section, we examine the evidence for the effectiveness of parenting interventions in promoting early child self-regulation, beginning with interventions in infancy, through to those targeting parents of children in the early years of school-based education.

Parenting Interventions in Infancy

A recent meta-analysis of universal self-regulation based interventions for children aged between 0 and 19 years did not find any universal interventions for children under the age of two (Pandey et al. 2018). However, some targeted interventions for specific populations have examined the effects of parenting interventions on self-regulation in infancy. For example, studies have shown that an intervention targeting responsive caregiving for infants in foster care resulted in better infant biological self-regulatory skills, measured by cortisol levels as an indicator of stress reactivity (Dozier et al. 2008) and long-term effects of the intervention indicate better executive functioning (Lewis-Morrarty et al. 2012). The ABC intervention is designed to help children develop regulatory capabilities via responsive caregiving, specifically by helping caregivers provide an environment that supports the development of regulatory capabilities, reinterpreting children's alienating behaviors, and managing any personal issues that interfere with providing nurturing care. An evaluation of the program with 93 infants in foster care, resulted in cortisol levels of foster care children in the ABC intervention group being indistinguishable from a non-foster care control (Dozier et al. 2008), indicating that children were better able to regulate their responses to stress. Likewise, interventions targeting parents of premature infants focusing on a variety of early parenting skills (e.g., creating an appropriate environment, teaching developmental skills, positive interactions) have resulted in enhanced toddler emotion regulation in stressful situations but not changes in stress responses (Wu et al. 2016).

Part of the problem in identifying such interventions may be that parenting interventions are generally not described as targeting self-regulation, and seldom measure either infant or parent self-regulatory skills as an outcome (Sanders and Mazzucchelli 2013). There are examples of interventions that target parenting or aspects of parenting in infancy, which have demonstrated outcomes on infant self-regulation, but these have not been studied consistently or used the same terminology. For example, mother-infant skin-to-skin contact, known as Kangaroo Care, has been shown to improve self-regulatory skills (e.g., higher thresholds to negative emotionality, better sustained attention) in preterm infants (Feldman et al. 2002). However, these types of interventions generally do not target self-regulation specifically, and measurement of self-regulation as an outcome is often simply one of a number of outcomes examined. Similarly, universal interventions targeting the co-parenting relationship at the transition to parenthood, have demonstrated not only improvement in parenting and the co-parenting relationships, but also improvements in 1-year-old infants' observed self-soothing behavior, posited as a marker of early self-regulatory ability (Feinberg et al. 2009). Once again, these types of interventions are not focused on self-regulatory skills specifically and measure such outcomes incidentally as part of a comprehensive package of outcome assessment.

Arguably, parenting interventions targeting infant sleep and crying could also be conceived of as impacting on self-regulation, as the ability to settle and re-settle are early signs of the infant's emerging self-regulation. Meta-analytic evidence shows parenting interventions targeting infant sleep have significant, but small effects ($d = .24$) while those targeting infant crying demonstrate no significant effects. Outcomes for parental responsiveness, a key factor thought to underpin the early development of infant self-regulatory skills are stronger ($d = .77$; Mihelic et al. 2017).

In summary, evaluations of a few parenting interventions in infancy have examined some self-regulatory outcomes (cortisol reactivity, emotion regulation strategies, higher thresholds to negative emotionality, better sustained attention, self-soothing ability, improved sleep), but there has been no consistency in defining self-regulation across studies. The range of intervention components, program durations, approaches, and target population has been considerable (e.g., co-parenting interventions, foster carers, parents of premature babies) making it difficult to integrate the literature in this area and suggest what the effective components of parenting interventions for infants may be. With the emerging ability to self-regulate in infancy often being a key parenting challenge for sleep-deprived parents, this is a key developmental period to assess the effects of parenting interventions on self-regulation.

Parenting Interventions in the Toddler and Preschool Period

An earlier meta-analysis that specifically focused on parenting and self-regulation in children ages 2–5, included 41 studies (Karreman et al. 2006). Studies were correlational and not necessarily randomized controlled intervention studies. Across studies, significant positive associations were found for parent's use of positive control (e.g., limit setting, guidance, and positive directives) and negative associations were found for parent's negative control (e.g., coercion, criticism, intrusiveness, and anger) with children's self-regulation. Effect sizes were quite small (average mean effect sizes were .08 and − .14 respectively). Parent responsiveness was not significantly associated with children's self-regulation. A more recent correlational study of 306 children ages 36–40 months from economically diverse families found small positive associations between observed parenting factors (warmth, scaffolding, limit setting, and responsivity) and children's executive control (defined as attention shifting and inhibitory control; Lengua et al. 2014). Moreover, parent scaffolding (guidance and low intrusiveness) and limit setting mediated the association between lower income and greater executive control. These studies highlight that parental guidance and limit setting that is provided in a positive, non-intrusive manner are parenting skills to target for promoting preschool-age children's self-regulation.

In the recent review on interventions targeting children's self-regulation (Pandey et al. 2018), only two out of the nine randomized trials involving family interventions targeted toddlers and/or preschool-age children. One of the studies involved 220 children (ages 3–5 years; predominately white, Hispanic/Latino, and African American) participating in Head Start (Sheridan et al. 2010). The parent intervention promoted parent engagement, including warmth and sensitivity, support for child autonomy, and participating in child learning (enriching the home environment and teaching social-emotional skills), and resulted in no significant differences between the intervention and control groups on child self-regulation. A second study involved the Family Check-up for parents of children ages 2–5 (Chang et al. 2015). Results indicated that increased proactive parenting (e.g., calm and clear communication about expectations) was associated with improved child effortful control in the intervention group, and this association was mediated by children's language skills. Moreover, the Family Check-up intervention resulted in higher teacher-ratings of inhibitory control when children were about 7.5 years old (Chang et al. 2014) demonstrating lasting positive effects in the elementary school setting.

To our knowledge there are two relatively recent randomized controlled trials of parenting interventions studying self-regulation outcomes in preschool-age children; one solely focused on children with conduct problems (Somech and Elizur 2012) and the other involved both parenting and preschool-based interventions (Landry et al. 2017). In the first study with an Israeli sample of 209 children, a co-parenting intervention focusing on parent involvement and positive behavior management resulted in significant improvement in effortful control ($d = .47$) of preschool-age children with conduct problems compared to the control group (Somech and Elizur 2012). The second study with 623 children (2/3 Hispanic/Latino and 1/4 African American) investigated parenting interventions [play and learning strategies (PALS)] and preschool teacher [the early education model (TEEM)] interventions across four intervention conditions: TEEM and PALS, TEEM alone, PALS alone, and usual care control (Landry et al. 2017). Parents in the TEEM and PALS and PALS alone conditions significantly increased their responsiveness and children improved their self-regulation and social skills compared to those in the other two conditions. Specifically, children performed better on a delay task ($d = .19$), representing a small effect on children's self-regulation skills.

In summary, these studies demonstrate that parents of preschool-age children can have a positive effect on self-regulation skills, which have been identified as important for preparing children for school and foundational for healthy development (e.g., Sanders and Mazzucchelli 2012; Thompson and Raikes 2007). It appears that parent involvement, positive and proactive guidance, and low negativity are important in supporting young children's self-regulation. Results are mixed for the link between parent responsiveness and children's self-regulation at this developmental stage. It is surprising to see so few randomized trials on parenting and children's self-regulation for this age group. Much more research on the efficacy of parenting interventions targeting preschool-age children's self-regulation is needed.

Parenting Interventions for School-Aged Children

Starting school places unprecedented demands on a young child's behavioral and emotional self-regulatory capacity. To function well at school, both academically and socially, children need to regulate their behavior and emotions so that they can listen, sustain their attention and generally avoid disruptive or off-task behavior that may interfere with learning or disrupt relationships with their teachers and peers. Young children with sound self-regulatory capacity will build the academic skills, particularly in literacy and numeracy, which form the foundation of their education (McClelland and Cameron 2011). Furthermore, over time, complementary motivation and self-regulatory processes contribute to a child's self-efficacy and sense of personal agency, and their belief that they are an effective and competent student capable of self-directed learning (Blair and Diamond 2008).

Yet, despite the critical importance of self-regulation in the early school years and the important role that parents play in shaping these skills, to our knowledge there are no randomized controlled trials evaluating the effects of parenting interventions on child self-regulation among young school-aged children. There are, however, evaluations of multi-component programs that include a parenting intervention. For example, in a large 4-arm controlled trial, Kumpfer et al. (2002) evaluated the effects of the project Strengthening America's Families and Environment (SAFE) prevention program on reducing risk factors and improving protective factors associated with substance abuse among a sample of first-graders from primarily Caucasian, middle-class rural families. Specifically, the trial compared the effectiveness of the different components of the year-long Project SAFE program, evaluating the effects of a school-based curriculum (I Can Problem Solve) with and without a comprehensive family intervention involving parent training, child skills training and family life skills training (Strengthening Families), or a streamlined version of Strengthening Families involving only the parent training component. The greatest gains in behavioral self-regulation skills and, relatedly, in social competence, were found in children who received the school-based curriculum in combination with the streamlined strengthening families program (parent training only). Medium to large effect sizes were achieved for this condition for self-regulation ($d = 1.04$) and social competence ($d = 0.77$) in comparison to control families, whereas intervention effects were noticeably smaller for the school-based curriculum only ($d = 0.46$ for self-regulation, $d = 0.08$ for social competence) and the school-based curriculum plus the full Strengthening Families program ($d = 0.69$ for self-regulation, $d = 0.35$ for social competence). However, non-random assignment to the three intervention arms along with very small sample sizes in the two Strengthening Families intervention arms make it difficult to draw firm conclusions regarding the impact of the project SAFE program.

Trials of other multi-component programs that include a significant focus on family and parenting interventions suggest that such programs can improve child self-regulation skills. For instance, August et al. (2001) conducted a trial of the Early Risers program for 6-years-old children displaying early-onset aggressive behavior. Children were from Caucasian families of low to low-middle income socioeconomic status. They found improvements in behavioral self-regulation ($d = 0.70$) among severely aggressive children, but not mildly or moderately aggressive children, after the 2-years intervention period. More recently, O'Connor et al. (2014) evaluated the effects of the comprehensive INSIGHT program, which was specifically developed to promote child self-regulation skills across kindergarten and first grade with the ultimate aim of enhancing academic achievement. The sample of children was from low-income, urban neighborhoods and were primarily African–American (75%) or Hispanic (16%). In comparison to a supplemental reading program that acted as an active control condition, the year-long INSIGHT program was associated with gains in attentional control (effect size = 0.39) and reduced teacher-rated behavior problems (effect size = 0.54), along with enhancing reading and mathematics achievement.

Finally, one noteworthy example of a multi-component, multilevel intervention is the work of the conduct problems prevention group on the Fast Track program for children at high risk of long-term antisocial behavior (Conduct Problems Prevention Research Group 1999). Half of the sample was African American, and a third came from the lowest socioeconomic background based on the Hollingshead index. The most intensive phase of this intervention took place in elementary school during grades 1 and 2, and comprised a mix of universal and indicated interventions that included a teacher-led social and emotional development curriculum, parent training, home visits, child social skills training, peer pairing, and academic tutoring. Long-term follow up of the effects of this intervention indicated that the important preventative effects of the intervention on delinquency and arrests in adolescence and early adulthood (Conduct Problems Prevention Research Group 2010, 2015) were mediated by growth in emotional and behavioral self-regulation skills and social competence during childhood (aged 6–11 years; Sorensen et al. 2016). Although the design of this study did not allow an experimental test of the different intervention components, the considerable scope and long-term, prospective nature of this study means that these findings are compelling, and provide strong justification for further evaluations of the potential of parent training as a standalone intervention to enhance critically important self-regulation skills.

Research with children who have deficits in self-regulation skills, namely children with attention deficit/hyperactivity disorder (ADHD), provides insight into the potential of parent training in isolation for enhancing child self-regulation. Tamm and colleagues (Tamm and Nakonezny 2015; Tamm et al. 2014) have examined the impact of teaching parents to implement targeted training in self-regulation skills (e.g., attention, inhibitory control, working memory, planning) with their young children with ADHD aged 3–7 years. In this 8-week intervention, children participated in a range of activities and games designed to improve their self-regulatory capacity, while parents attended concurrent sessions to be taught how to implement these activities in the home and to use positive reinforcement for desired behavior. In a small randomized controlled trial with 25 children from mostly Caucasian backgrounds, intervention children displayed improved parent ratings of attention shifting ($g = 1.01$) and emotional regulation ($g = 0.97$), and clinician ratings of inattentive behavior ($g = 1.10$), at post-intervention in comparison to the control group (Tamm and Nakonezny 2015).

Overall, the evidence base for the impact of parenting interventions on self-regulatory skills in young school-aged children is severely limited and represents an area in which much more research is needed. Trials of multi-component interventions in which parenting programs are a key element give some preliminary support that parenting interventions can improve behavioral (e.g., staying on-task, sustaining attention, persisting at and completing tasks) and emotional (e.g., express and manage negative emotions appropriately) self-regulation skills. The efficacy of parenting programs tailored specifically to address child self-regulatory capacity represents a promising area for future research. However, just like the research with younger age groups, self-regulatory skills need to be included as outcomes in trials of parenting programs to provide more convincing, experimental evidence for the role of parenting in the development of child self-regulation in school-aged children.

Summary and Recommendations

We have identified a significant gap in knowledge of the effectiveness of parenting interventions on children's self-regulation. Given that there is clear evidence for the link between parenting and child self-regulation (e.g., Fay-Stammbach et al. 2014), and an extensive evidence base for parenting interventions on children's social development (e.g., Lundahl et al. 2006; Sanders et al. 2014; Sandler et al. 2011) it is surprising that there is so little experimental research examining the effects of parenting interventions on children's self-regulation as an outcome. For example, while interventions such as Triple P (Sanders 2012), Incredible Years (Webster-Stratton and McCoy 2015), and Parent Child Interactional Therapy (Funderburk and Eyberg 2011) have extensive evidence bases regarding their effects on disruptive child behavior, evaluation of child self-regulation specifically has not been examined. There is also research lacking in the area of limiting the negative effects of chaotic home environments (such as having clear routines, spaces for quiet play, and play spaces that are organized and not over-cluttered).

The existing evidence hints at the effectiveness of parenting interventions during early childhood, but the promise of this intervention approach remains to be realized. In infancy, very few interventions have examined infant self-regulatory outcomes and of these, targeted interventions focusing on sleep have the largest evidence base. These interventions generally provide parents with specific, actionable parenting strategies that are focused on improving infant sleep via improvements in infant's capacity to self-soothe. Parental responsiveness also appears to be important in promoting infant self-regulation and is modifiable via interventions. In the preschool period, parental responsiveness appears to play a less important role, while parent involvement, positive and proactive guidance, and low negativity are essential in supporting young children's self-regulation. While the evidence in this age group is also limited, parenting interventions targeting these types of skills have demonstrated improvements in a range of child self-regulatory skills. In the school-age group, parenting interventions have rarely been examined on their own, and have by and large been included as one of a number of parts in multi-component interventions, making it difficult to determine which types of parenting skills are particularly important for prompting self-regulation in school-aged children.

A number of definitional, methodological and practical issues hamper progress in this area and the broader field of self-regulatory interventions (Steinberg 2018). For example, as noted earlier, self-regulation is described and defined differently by different researchers, making comparison and integration of studies very difficult. Issues of measurement also remain a continuing concern in this field (McClelland and Cameron 2012), particularly during the earliest periods of development. Likewise, the interventions examined targeted different aspects of parenting ranging from responsiveness to positive behavior management to supporting children in using their newly learned self-regulatory skills. Significant theoretical and empirical work is required to tie different aspects of children's self-regulation to specific parenting strategies and skills at different child developmental stages.

Different parenting practices may be relevant at different developmental stages for the growth of self-regulation. For example, parental responsiveness during infancy may contribute to self-regulation, but may not have much of an impact for preschool- and school-aged children, whereas

parental support may be needed to assist children to cope with negative emotions appropriately, or to problem-solve and persist in difficult tasks. Thus, research in this field needs to clearly define which aspects of parenting are associated with child self-regulation at different stages of development, while using consistent terminology to describe self-regulation. Evaluations of existing evidence-based parenting interventions should test child self-regulation outcomes, while examining the mechanisms of action in parent training, including the association between improved parental self-regulation and child self-regulation. Focusing on mechanisms of change in intervention evaluations could provide clear evidence for the links between different aspects of parenting and child self-regulation outcomes.

The research we have reviewed suggests that multi-component interventions for preschool and early school-aged children that include parenting programs produce positive effects on self-regulation. However, a clear issue with trials evaluating the impact of multi-component interventions is that most have not separated the effects of the parent training or family-focused aspects of the programs on self-regulation outcomes. It is challenging to have sample sizes with sufficient power to investigate separate effects of each intervention in such multi-component studies. Furthermore, these programs are time- and resource-intensive, typically lasting across one or more school years. Parent training programs, in contrast, could offer a minimally sufficient strategy for producing early improvements in self-regulation skills that may have important longer-term protective effects, reducing the risk of conduct and substance abuse problems and mental health issues, and improving academic, relationship, and employment outcomes. Comprehensive prospective longitudinal research is needed on the effects of parent training as a standalone intervention for improving child self-regulation skills in the short-term, and the impact of this on distally-related outcomes in later childhood, adolescence and beyond. Given the already extensive evidence base for parenting interventions, it is essential to examine whether existing parent training approaches and strategies are sufficient for improving child self-regulation, or whether enhancements are required to specifically target child self-regulation skills. Furthermore, it is critical to address whether parenting intervention alone or in combination with other modules is similarly effective across different stages of development and across differing target populations.

Finally, issues relating to self-regulatory outcomes, processes and the importance of parenting intervention for young children across culture and setting have yet to be explored (Jaramillo et al. 2017; LeCuyer and Zhang 2015). Most of the existing evidence, limited as it is, has been conducted largely in the United States and other similar nations, limiting our ability to generalize findings to other contexts. It is essential that we broaden the research outlook to examine the role of culture and culturally mediated mechanisms relating to the development of self-regulation in children.

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Compliance with Ethical Standards

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Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

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