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Learning to Let Go: Parental Over-Engagement Predicts Poorer Self-Regulation in Kindergartners

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Responsive parenting and parental scaffolding have been shown to foster executive functions (EFs) and self-regulation skills in young children, but could too much parental directive engagement be counterproductive? To answer this question, we examined parental responses when children were demonstrating active on-task behaviors in a community sample of 102 dyads. We measured the time that parents spend actively guiding children's behavior relative to following the child's lead and created a measure of parental over-engagement to index the degree of active parental engagement via positive control/scaffolding behaviors. We hypothesized that parental over-engagement would negatively relate to children's self-regulation and EF skills because it creates fewer opportunities for children to practice self-regulation by leading dyadic interaction with their parents. We used an innovative State-Space Grid method to capture second-to-second changes in parental and child behaviors during a set of structured tasks. We examined the conceptual overlap of over-engagement with the global ratings of parenting, revealing that parental over-engagement was negatively correlated with global ratings of parental scaffolding and unrelated to global ratings of parental sensitivity. Next, we showed that parental over-engagement predicted lower levels of child hot EFs and observed self-regulation, controlling for age, parent education, family income, and global ratings of parenting. The predictive validity of over-engagement was unique to times when the child was actively engaged and was absent when the child was passively engaged. This study contributes to the discussion of how parents can support the development of self-regulation during the transition to elementary school.

Keywords: parenting, scaffolding, executive functions, State-Space Grid method, early childhood

Parents are often considered children's first teachers and, increasingly, their first playmates. Backed by extensive research showing that parenting behaviors support child learning, experts have urged parents to transform everyday interactions into educational experiences. Parental scaffolding and responsive parenting, which help regulate children's behaviors, attention, and emotions during these dyadic interactions, have been linked to better self-regulation behaviors and executive function (EF) skills in young children (Bridgett et al., 2015; Fay-Stammbach et al., 2014; Karreman et al., 2006; Valcan et al., 2018). But more work is needed to understand whether there are circumstances in which direct guidance from parents undermines the development of children's independent self-regulation. Theoretical models have emphasized that the effectiveness of parental socialization depends on responsiveness to children's needs (Grolnick & Pomerantz, 2009), and empirical research has demonstrated that parental direction can be beneficial when children are struggling and need help. In contrast, researchers rarely examine the variability of parents' behaviors at times when children are on-task and do not need assistance, despite the fact that these behavioral states represent a significant portion of dyadic interaction time. Studies that employ global ratings of scaffolding and autonomy support have not captured variability in directive versus nondirective parental engagement and responses that are specific to times when children are actively engaged.

Parents today report spending unprecedented amounts of time engaged in developmentally stimulating childcare (Altintas, 2016), even as they are warned about the potential negative impact of "helicopter parenting" on their children's developing independence (Greenberg, 2015). These trends raise questions about how parental interactions with children can be supportive without being overly directive. To this end, we observed the balance that a parent strikes between directive engagement and following the child's lead when the child is actively working on a task, and we investigated whether this balance has any implications for children's self-regulation at the onset of elementary schooling. We captured second-to-second changes in parent and child behavioral states during structured laboratory tasks, isolating periods of time when children were actively on-task. During these periods, we distinguished between two types of ostensibly supportive parental behavior: Positive control/scaffolding (i.e., directive behaviors such as instructing,

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explaining, or redirecting) and following the child's lead (i.e., nondirective behaviors such as monitoring, encouraging, or acknowledging the child's efforts). We created a measure of *parental over-engagement* to index the proportion of time that parents spent engaged in positive control/scaffolding behaviors rather than following the lead of an actively engaged child. Next, we examined the conceptual overlap of parental over-engagement with the global ratings of parental scaffolding and parental sensitivity. We then studied how parental over-engagement was associated with children's EFs and self-regulation during the transition to elementary school.

The Role of Parental Control and Scaffolding for EFs and Self-Regulation

Sensitive and responsive parental behaviors are broadly associated with the promotion of well-regulated behavior in young children (Bridgett et al., 2015; Valcan et al., 2018). Specifically, parental sensitivity (i.e., behaviors that are characterized by positive regard and consistent discipline), and parental scaffolding (i.e., teaching behaviors meant to improve a child's acquisition of new skills) are particularly relevant for the development of EF and self-regulation skills in early childhood (Fay-Stammbach et al., 2014; Hughes & Ensor, 2009; Vernon-Feagans et al., 2016). These behaviors require that the parents balance their hierarchical position of having more control over the interaction and greater relevant skills than their child with their support for the child's development of autonomy and self-regulation skills. Parental control that is too coercive and parental scaffolding that is too intrusive can undermine the development of children's autonomy and the internalization of rules and skills.

The degree of control that parents employ with their young children to achieve a desired behavioral outcome plays an important role in the development of early self-regulation skills. To date, most studies examining the relationship between parental control and children's EFs have focused on negative parent behaviors, such as parental harshness, power assertion, and intrusiveness (Valcan et al., 2018). For example, global ratings of over-controlling parenting in infancy and toddlerhood negatively predicted change in caregiver-reported self-regulation skills between age two and four (e.g., Taylor et al., 2013) and worse performance on EF tasks among kindergarteners (Holochwost et al., 2016, 2018; Perry et al., 2018). However, this research does not address how positive aspects of parental control (e.g., structure and guidance; Grolnick & Pomerantz, 2009) relate to the development of self-regulation.

Providing clear and consistent expectations, directions, and feedback is related to how parents guide children's learning through deliberate instruction, demonstration, questioning, elaboration, and redirection. These scaffolding behaviors support growth in "the zone of proximal development," a learning space that enables children to expand their knowledge and abilities with guidance from a more skilled adult (Mermelshtine, 2017; Vygotsky, 1978). These parenting practices not only support the acquisition of new knowledge, they also help children learn to regulate their attention, behavior, and emotions. Thus, parental scaffolding during everyday learning opportunities promotes the development, practice, and internalization of self-regulatory capacities in early childhood (Hammond et al., 2012; Matte-Gagné & Bernier, 2011). Indeed, observed measures of parental scaffolding and autonomy support have been linked to better EF skills in young children (Distefano et al., 2018; Matte-Gagné & Bernier, 2011; Mermelshtine, 2017) and have been shown to predict EF growth in early childhood (Fay-Stammbach et al., 2014; Hughes & Ensor, 2009; Landry et al., 2002). However, parental scaffolding that is experienced as intrusive or pressuring can undermine the development of self-regulation. One study measured maternal behaviors such as being strict or demanding and constantly guiding or exerting influence over tasks and showed that these behaviors during play and clean-up tasks at age two were related to poorer EF skills at age five (Perry et al., 2018).

The line between supportive and unsupportive parental behaviors changes depending on children's developmental needs at different ages. Specifically, a shift in the implications of parental control and scaffolding behaviors for child self-regulation may occur around the transition to formal schooling. Observed parental directiveness during a puzzle task was positively associated with cognitive and social independence at age two, whereas the association was reversed by preschool age, suggesting that the benefits of parental directiveness declines as children become more competent (Landry et al., 2000). Another study found that parental scaffolding statements (e.g., offering ideas, providing choices, and transferring control) were linked with higher EFs at age three, but predicted slower growth between preschool and kindergarten ages (Bindman et al., 2013). Notably, a recent meta-analysis revealed that the significant positive association between cognitively oriented parent behaviors (e.g., scaffolding, stimulation, and attention maintaining) and child EFs decreased between two and seven years of age (Valcan et al., 2018). Given that the transition to kindergarten places new demands on a child to independently regulate their emotions and behaviors, it is important to examine how variability in parental positive guidance and engagement during dyadic interactions relates to children's EFs and behavioral self-regulation during this developmental period.

Synchrony of Parent and Child Behavioral States

A critical aspect of parental socialization and guidance is that it should be responsive to and contingent on the child's needs (Mermelshtine, 2017) and provide the amount of support that is "minimally sufficient" to promote children's learning or self-regulation (Salonen et al., 2007). Different analytic approaches have attempted to test this concept in relation to young children's EFs and behavioral self-regulation. Global coding systems may instruct raters to appropriately consider the child's needs as a context for interpreting parent behavior and provide a broad, single-score rating of parenting behavior observed across the entire interaction session (Hammond et al., 2012). Indeed, global ratings of the quality of parental control and scaffolding, including the degree to which parent behavior is responsive to child behavior, have been shown to predict children's EFs and self-regulation behaviors (e.g., Bernier et al., 2010; Distefano et al., 2018; Helm et al., 2020; Merz et al., 2017). However, global ratings reduce the variability of parental and child co-occurring behaviors to one-dimensional Likert scale ratings. For example, a global rating of autonomy support reflects the appropriateness of parental support aggregated across a time when children are actively on-task, passively on-task, and also off-task. Unpacking the variability of parenting responses during these discrete child behavioral states may help us understand the relevance of specific dyadic experiences for developmental outcomes.

By studying temporal sequences of parent and child behaviors, researchers have examined the contingent nature of parental responses conditional of child's needs and bids. For example, Hughes and Devine (2019) evaluated three-turn chains of parent–child interactions (1: Parent intervenes; 2: Child acts; 3: Parent responds) during both free and structured play. Contingent parental scaffolding, measured by the percentage of time the parent increased support following child failure as well as maintained or lessened support following success, was linked to a 1-year increase in preschooler's EF skills. This study was unique in capturing a *reduction* of parental support or intervention when a child is able to complete a task independently, but aggregating this aspect of parenting with other forms of support did not allow the authors to test whether providing support when it is not needed uniquely relates to the development of EF skills. Analyses based on turn-taking sequences also do not take concurrent behaviors into account; that is, what a parent does during times when a child is already engaged in a specific behavior.

Others have rated parent behaviors across shorter time epochs, capturing more variability and nuance in parenting across a parent–child interaction session. Using 5-s epochs, Conway and Stifter (2012) showed that in parental interactions with a child who was on-task, the proportion of time parents spent providing praise, commenting, or describing the situation was positively associated with EF skills in preschoolers. This study revealed that parental redirection of a child already on-task was associated with poorer EFs for behaviorally inhibited preschoolers. These findings suggest that further research is needed to investigate the implications of parental engagement that specifically account for the child's behavior at the same time.

More recently, researchers have "turned up the microscope" on parent–child observations even further by employing the State-Space Grid (SSG) method (Hollenstein, 2013), which relies on independent second-by-second coding of both parent and child behavioral states. This approach enables researchers to identify and examine the relevance of parental and child behavioral states that occur at the same time. In a sample of preschoolers, the degree to which parent–child dyads spent more time in stable co-regulated states predicted positive teacher ratings of social skills with adults and peers (Lunkenheimer & Wang, 2017). In a previous publication with the current sample, we showed that a state space measure of positive dyadic coregulation was significantly linked to teacher reports of children's self-regulation, whereas global ratings of the same construct were not (Bardack et al., 2017). Both of these studies employed the whole grid approach, representing all possible mutually exclusive states, to calculate an overall measure of dyadic coregulation. However, the SSG method also allows for more in-depth examination of specific behavioral states. For example, children and parents tend to spend most of their interaction time continuously negotiating who is leading and who is following the activity. The SSG method can permit more fine-grained analyses to investigate the variability of positive parental and child behaviors within the regions representing positive coregulation rather than aggregating this variability into a single metric of positive parent–child interaction dynamic.

Current Study

The current study focused on examining how variability in positive parental behaviors while children are actively engaged in mildly to moderately challenging laboratory tasks (e.g., playing with less attractive toys, discussing a problem, and learning how to complete a puzzle) relates to children's EFs and self-regulation. First, the study aimed to advance previous work by investigating the balance that parents strike between directive and nondirective engagement at the same time that their child is taking an active role in the interaction. Second, the study builds on previous work that has focused on toddlers' and preschoolers' EF and self-regulation. Our study focuses on kindergarten-age children, who face greater demands and expectations for self-regulation than younger children as they transition to elementary school.

We independently coded parent and child behavior on a second-by-second basis using the SSG methodology to examine two mutually exclusive parent behavioral states. Specifically, we created a measure of *parental over-engagement* by calculating the proportion of parental positive control and scaffolding (as opposed to following the child's lead) while the child was active on-task. First, we examined the conceptual overlap of parental over-engagement against global ratings of two positive parenting behaviors: Parental sensitivity and parental scaffolding. Second, we examined whether the degree of parental over-engagement is related to children's directly assessed hot and cool EF skills and observed self-regulation behaviors during a laboratory visit. We included measures of both cool and hot EF skills as prior research shows that these related skills activate distinct neural networks, have unique family correlates, and predict different developmental outcomes (Finch & Obradović, 2017; Zelazo, 2020). We included a separate measure of observed self-regulation skills because research shows that ratings of self-regulation skills are related to direct assessments of EFs but capture distinct, contextually relevant skills that have unique predictive validity for adaptation (Blair et al., 2015; Fuhs et al., 2015).

We hypothesized that parental over-engagement would be negatively related to children's EFs and self-regulation because it creates fewer opportunities for children to practice these skills by leading dyadic interaction with their parents. Given the novelty of the parental over-engagement construct, we did not have differentiated hypotheses for the three outcomes. Finally, we tested the robustness of the associations between parental over-engagement and child's EFs and self-regulation by controlling for related, but distinct, global ratings of parenting as well as a parental engagement when the child was passively engaged with the tasks.

Method

Participants

Participants in this study were 102 4–6-year-old children (52% female) and their primary caregivers (87% biological mother, 7% biological father, 3% adoptive mother, 3% other females; henceforth, "parents"). The average age of participating children was 5.61 years ($SD = 0.56$ years). Child race/ethnicity was reported by parents as follows: 26% Hispanic/Latino, 20% Asian, 14% Multiracial/Other; 4% Black/African American, and 36% Non-Hispanic White. Parents also reported their educational attainment: 13% high school degree or less, 36% associate's or bachelor's degree, and 42% graduate or professional degree. Parent-reported median family income was \$125,000 (SD = \$72,701), and 16% reported being single parents (81% married, 3% cohabitating, 8% separated/divorced, and 8% never married).

Procedure

All study procedures were approved by the Stanford University Institutional Review Board (Protocol ID 20976). Families were recruited with advertisements at community centers, preschools, elementary schools, and libraries and were eligible if they had a child who was fluent in English and entering kindergarten or first grade. Ninety-one percent of the sample were either entering kindergarten or were in kindergarten at the time of the assessment; only 9% of children were assessed in the fall of their first grade. Children and their parents came to a university laboratory for a 2.5-hr visit. During the visit, children completed a number of direct assessments of EFs, and research assistants rated children's observed self-regulation. Children and parents were then invited to participate in structured parent–child interaction tasks. For their participation, parents received \$40 and children received a toy and stickers.

Measures

Cool EFs

During the backward digit span task (Flanagan & Kaufman, 2009), children were verbally presented with a sequence of digits and asked to repeat this sequence in reverse. Two trials for each sequence length were presented until the child failed both trials at that level. We summed the number of correct responses. During the self-ordered pointing task (Cragg & Nation, 2007), children were shown a set of three to five pictures and instructed to touch a different picture until each of the pictures had been touched once. Pictures were scrambled after each response. We standardized and averaged the number of errors (reversed) and correct responses (r = .95). During the flanker task (Rueda et al., 2004), children viewed a fish flanked on each side by distractor fish facing the same direction (congruent; 20 trials) or the opposite direction (incongruent; 13 trials). They were instructed to press a key corresponding to the direction the middle fish was facing. Following the fish flanker, children completed a second block that used arrows as stimuli. The performance was calculated as a proportion of correct incongruent trials. During the computerized go/no-go task (Durston et al., 2002), children were asked to press a button when they saw a mole (the "go" stimulus; 31 trials), but to avoid responding to a less frequent nontarget image of an eggplant (the "no-go" stimulus; 10 trials). The sensitivity index (d')—representing overall performance across both types of trials—was calculated using signal detection theory (Wickens, 2002). Given that all four tasks assess EFs in a relatively emotionally neutral and decontextualized way that is characteristic of cool EF tasks (Zelazo, 2020), we standardized and averaged children's performance on these tasks to create a cool EF composite (α = .62).

Hot EFs

During the gift wrap task (Kochanska et al., 1996), children were asked to refrain from peeking while the assessor noisily wrapped a gift for 60 s. The assessor then told the children not to peek and left them alone with the gift 180 s. During the dinky toys task (Kochanska et al., 1996), children were asked to keep their hands in their lap and to verbally choose a toy from a box of attractive toys. For each task, the worst transgression (e.g., turns head and grabs toy), the number of transgressions, and the latency to the first transgression were coded. Thirty-two percent of cases were double coded with excellent reliability (κs = 1.00; ICCs $\geq$ .94). Because rewards are a prominent aspect of these two tasks, which assess EFs in a motivationally salient way that is characteristic of hot EF tasks (Zelazo, 2020), we created a hot EF composite by reversing the number of transgressions and standardizing and averaging the scores across these two tasks (α = .89).

Observed Self-Regulation

Research assistants rated children's observed self-regulation (SR) using the Preschool Self-Regulation Assessment Assessor Report (Smith-Donald et al., 2007). We calculated a standardized average of 13 four-point ratings of children's attention, inhibitory control, and emotion regulation (α = .96). Twenty percent of cases were double coded to establish reliability (ICCs = 0.82–1.00).

Parenting

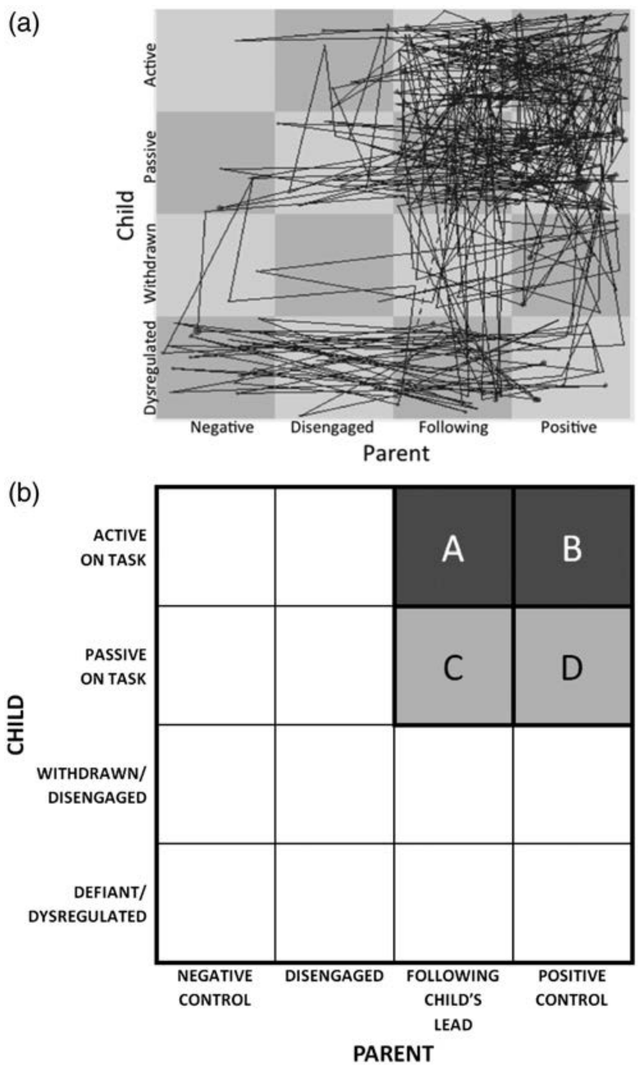
Observed Dyadic Interaction. Parenting behaviors were based on video recorded parent–child interaction during four widely used structured tasks. During the free play task, parents and children were asked to play together with provided toys, but parents were secretly instructed to prevent children from touching certain attractive toys. During the cleanup task, parents were instructed to read a magazine while asking children to clean-up the toys but were not explicitly prohibited from helping children. During the problem-solving discussion task, parents and children were asked to try to resolve a salient issue that parents had chosen from a list of age-appropriate parent–child challenges (e.g., waking up on time, getting along with siblings). During the teaching task, parents were asked to teach and support children in completing a series of challenging geometric puzzles (i.e., Tangoes).

SSG Coding. To obtain momentary measures of parenting, each second of observed behavior during the parent–child interaction was coded as representing one of four mutually exclusive parent behavioral states (positive control/scaffolding, following the child's lead, disengaged, and negative control) and separately one of four mutually exclusive child states (active on-task, passive on-task, disengaged, and defiant/dysregulated). Together, these child and parent behavioral state codes comprise a 4 × 4 space grid that describes parent–child co-regulation states. Figure 1 displays exemplar data for one dyad (panel A) and SSG coding schema (panel B).

Second-by-second codes were completed by two independent raters of child and parent behavior using the software program ProcoderDV (Tapp, 2003). The codes represented durations of behavior where each code was applied at the behavior onset and maintained until the onset of a different code. A master coder trained the raters to reliability using examples from a different published study and then double-coded 20% of videos for child behavior and a separate 20% for parent behavior. Observer accuracy was calculated based on the kappa statistic and observed base rates of behavior in the sample (Bruckner & Yoder, 2006). Observer accuracies for all

Figure 1

(a) An example of a single dyad's State-Space Grid showing transitions among parent and child codes. (b) State-Space Grid showing the over-engaged parenting codes, B/(A + B), and the codes used to calculate the parental engagement ratio while the child was passive on task, D/(C + D)



parent and child codes were above 90% with the accuracy of parent disengaged/distracted and child disengaged above 95%. Using Gridware 1.5b (Hollenstein, 2013), we quantified the amount of time spent in each cell of the grid (see Figure. 1b). For more information on this coding approach, see Bardack et al. (2017).

Parental Over-Engagement. For the purposes of the current study, we focused on a region of the 4 × 4 grid where dyads in this community sample spent a large majority of the time. To calculate the measure of parental over-engagement we used data from two cells (see the shaded area in Figure. 1b) that captured the amount of time parents engaged in (a) positive control/scaffolding (i.e., using positive, constructive strategies to manage and guide the child's attention, behavior, and emotions); and (b) following the child's lead (i.e., being involved and responsive, without being directive or modifying child's attention, behavior, and emotions), while the child was *active on-task* (i.e., taking the lead in interaction or activities while engaged in appropriate and constructive behavior that is consistent with task demands). Parental over-engagement was calculated as the amount of time that parents used positive control/scaffolding while children were active on-task, divided by the total amount of time that parents used positive control/scaffolding or were following the child's lead while children were active on-task. We used the same approach to calculate the variable that was used for sensitivity analyses, which captured the proportion of time that parents used positive control/scaffolding (rather than following the child's lead) while children were passive on-task.

Compared to using counts of parent behavior, proportion scores are advantageous because they take into account the *relative* amount of each behavior (Shaffer et al., 2017). This approach also ensured that this variability in over-engagement was not affected by differences in the length of tasks within dyads or across dyads. Larger scores indicate relatively more positive control/scaffolding and relatively less following the child's lead. Across four tasks selected to represent diverse parent–child relationship challenges, the percentage of over-engagement varied: (a) free play: $M = .38$, $SD = 0.15$; (b) clean-up: $M = .32$, $SD = 0.24$; problem-solving: $M = .17$, $SD = 0.17$; teaching: $M = .43$; $SD = .17$. Correlations among four task-specific percentage scores ranged from .21 to .48 ($M = .30$). We standardized and averaged the task-specific percentage scores into a parental over-engagement composite across the entire parent–child interaction.

Table 1 lists specific behavioral markers for the two-parent and two-child behavioral states. It is important to note that parental behaviors were coded as "positive control/scaffolding" only when the parent had a positive or neutral affect, and did not engage in hovering, interrupting, intruding, taking over tasks completely, using harsh tones, criticism, teasing, or manipulating. Those negative parental behaviors, coded as a negative control, were rare when children were engaged with the tasks and were not included in the current study.

Global Parenting Codes. Observed parenting behavior across all four tasks was also coded using global ratings adopted from the Minnesota Longitudinal Study of Parents and Children (Sroufe et al., 2005). Global ratings were completed using a 5-point Likert scale (1 = *very low*, 5 = *very high*) with detailed, developmentally appropriate behavioral descriptions of each level. After completion of the second-by-second coding, the same observers double-coded all cases using global codes of (a) positive responsiveness, as indexed by warmth, enjoyment, concern, and positive affect ($M = 4.30$, $SD = 0.69$, ICC = .72); (b) structure and limit setting, as indexed by consistency in expectations and discipline ($M = 3.86$, $SD = 1.02$, ICC = .83); (c) hostility, as indexed by harshness, angry or punitive attitude and actions ($M = 1.38$, $SD = 0.55$, ICC = .74); (d) support for autonomy, as indexed by parents' respect and understanding of children's abilities and ideas ($M = 3.96$, $SD = 0.81$, ICC = .72); and (e) quality of assistance, as indexed by parents' ability to provide appropriate assistance, encouragement, and feedback ($M = 3.95$, $SD = 0.80$, ICC = .69).

To examine the validity of our new parenting construct, we created two parenting global composites of varying conceptual overlap with the second-by-second coding of parental over-engagement. Standardized scores of positive responsiveness/warmth, structure and limit setting, and hostility (reversed) ratings were averaged to create a global score of parental sensitivity (α = .79). Standardized ratings of support

Table 1
Description of State-Space Grid Parent and Child Codes

Parent Codes	Description	Example Behavioral Markers
Positive control/scaffolding (actively managing and guiding the child's behavior)	Positive, constructive strategies the parent uses to regulate the child through managing and guiding the child's attention, behavior, and emotions. Parental behaviors should be done with positive or neutral affect, and without harsh tones, criticism, teasing, manipulating, taking over tasks completely, hovering, interrupting/intruding, which are coded as Negative Control	■ Providing instruction, corrections, or suggestions that are relevant to the task ■ Asking questions to gauge child's understanding ■ Redirecting child's attention to appropriate, on-task behavior ■ Giving comforting verbalizations (e.g., "It's OK") or physical contact/affection to provide reassurance or praise
Following child's lead	Parent behaviors that are involved and responsive but not directive (i.e., not specifically aimed at controlling or modifying child behavior or emotions). Parent should display positive or neutral affect, and may use appropriate and sensitive physical affection, to convey attentive monitoring or acknowledgment of child's on-task behavior or speech	■ Attentive monitoring of child behavior ■ Active listening through reflective comments or questions intended to elicit elaborations from child (e.g., "Anything else?") ■ Encouragement or acknowledgment of progress or success with task
Child Codes	**Description**	**Example Behavioral Markers**
Active on-task	Child is taking the lead in interaction or activities while engaged in appropriate and constructive behavior that is consistent with task demands. Child may be working fairly independently and confidently or leading the parent. Child's affect must be positive or neutral, with no indication of emotional dysregulation or defiance	■ Playing independently or leading play ■ Talking appropriately ■ Engaging parent in joint attention, social referencing or positive affect sharing ■ Verbal requests for attention or verbally expressing a feeling state
Passive on-task	Child is passively involved and engaged, following the parent's lead with appropriate and constructive behavior that is consistent with task demands or parent instructions. Child may be complying with directives issued by parent, actively listening while parent speaks, repeating or reflecting parent's words, or attending to something the parent is talking about (joint attention). Child's affect must be positive or neutral, with no indication of emotional dysregulation or defiance	■ Following the parent's lead: Child is engaged and involved but is doing just what the parent says without active, independent involvement ■ Complying with parent instructions, including cleaning up toys in response to parent directive, moving puzzle pieces in accordance with parent's instruction, obeying when told to sit up, look at parent, or other simple directive ■ Active listening when parent is talking, including eye-contact or nodding/giving brief responses (e.g., "uh huh") to show they are listening as parent talks

for autonomy and quality of assistance were averaged to create a global score of parental scaffolding ($\alpha = .84$).

Data Diagnostics

Three dyads did not participate in the parenting assessment. An additional three dyads had missing data for more than one parent–child interaction task, so their parental over-engagement score was not calculated. Other analysis variables had no missing data. Distributions for all variables were visually inspected for outliers. For the flanker ($n = 1$) and self-ordered pointing tasks ($n = 3$), scores that were more than 3 *SD* from the mean were Winsorized to 3 *SD*.

Results

Convergent and Divergent Validity of Parental Over-Engagement

We examined how second-by-second coding of parental over-engagement construct related to other aspects of parenting using bivariate correlations with global ratings of parental sensitivity and parental scaffolding (see Table 2). A higher degree of parental over-engagement was moderately related to lower global ratings of parental scaffolding, indicating that two measures represent partially overlapping, yet distinct, parenting constructs. Despite a strong positive association between the two global ratings of observed parenting practices, parental over-engagement was not significantly associated with global ratings of parental sensitivity.

Higher family income was associated with a lower proportion of parental over-engagement, indicating that parents from more affluent homes displayed relatively less positive control/scaffolding and relatively more following their children's lead. Higher family income was also associated with higher global ratings of both parental sensitivity and parental scaffolding. Family income was less strongly associated with parental over-engagement than the global rating of parental scaffolding, $t(88) = -2.57$, $p = .012$. In contrast, greater parent education was strongly associated only with lower global ratings of parental scaffolding. This highlights that the parental over-engagement measure captures a unique aspect of parenting that is related to global ratings of parental scaffolding but does not vary across parental education levels.

Parental over-engagement and the two global measures of parenting were each significantly associated with cool EFs, hot EFs, and observed self-regulation. Additionally, the variable indicating the balance of two parenting engagement responses when children were passive on-task was not associated with children's outcomes.

Predictive Validity of Parental Over-Engagement

We examined the predictive validity of parental over-engagement for children's cool EFs, hot EFs, and observed self-regulation using path analyses in Mplus 7.4 with the MLR estimator that is robust to violations of multivariate normality. The path analytic approach is similar to multiple regression analysis, but it has two important

Table 2
Bivariate Correlations

		1	2	3	4	5	6	7	8	9	10
1	Child age	—									
2	Child sex	−.08	—								
3	Family income	.07	.02	—							
4	Parent education	.04	−.10	.61***	—						
5	Parental over-engagement	−.22*	−.09	−.21*	−.11	—					
6	Parental engagement ratio (child passive on task)	.04	.02	.00	.03	.43***	—				
7	Parental sensitivity	.20+	.06	.25*	.19	−.13	.05	—			
8	Parental scaffolding	.20*	.10	.48***	.45***	−.34***	.05	.78***	—		
9	Hot EFs	.33***	−.01	.30**	.35***	−.31**	−.11	.29**	.36***	—	
10	Cool EFs	.59***	.03	.42***	.41***	−.27**	−.05	.31**	.41***	.51***	—
11	Observed SR	.36***	.05	.29**	.35***	−.33***	−.06	.37***	.43***	.55***	.68***

Note. EFs = Executive functions. SR = Self-regulation.
* $p < .05$. ** $p < .05$. *** $p < .001$.

advantages: (a) it enabled us to include all three dependent variables in a single model and estimate their covariations; and (b) we were able to analyze all available data (i.e., using cases with partial missing data) via full information maximum likelihood. Power analysis with $N = 102$ and the observed associations with demographics and outcome variables showed that power exceeded 80% when the standardized coefficient for parental over-engagement was −0.24. Since all three child outcome variables were also significantly related to child's age, family income, and parent education, these variables were included in the path analyses as controls. Child sex was not significantly related to any variables and was not included in any models. We ran a series of three models using a hierarchical approach (i.e., each successive model added additional predictors).

In Model 1 (see Table 3), we tested the associations between three key demographic covariates and child outcomes and established how much variance is explained by these factors. Child age is a good proxy of children's cognitive maturity and it emerged as the strongest predictor of all three outcomes. For cool EFs, which represent a set of higher-order cognitive skills, the standardized age coefficient was more than twice as large as the coefficients for family income and parent education. Age was more strongly related to cool EFs than to hot EFs, $\chi^2(DF = 1) = 8.318$, $p = 004$, or observed self-regulation, $\chi^2(DF = 1) = 28.708$, $p < .001$. Parental education positively predicted all three outcomes, whereas family income emerged as a unique predictor only of cool EFs. The R^2 values for this model were 52.4% for cool EFs, 22.7% for hot EFs, and 24.6% for observed SR. Consistent with the bivariate correlations, these covariates explained more than twice the variance in cool EFs relative to hot EFs or observed self-regulation, leaving a smaller amount of variance in cool EFs that could be explained by parenting variables.

In Model 2 (see Table 3), we tested the unique contribution of parental over-engagement for child outcomes over and above relevant demographic covariates. Parental over-engagement did not predict cool EFs. In contrast, a greater degree of parental over-engagement, while the child was active on-task, predicted lower levels of hot EFs and observed SR, explaining an additional 4.2% and 4.9% of the variance in these outcomes, respectively.[1] The overall R^2 values for this model are reported in Table 3. Relative to Model 1, the R^2 values increased by .006 for cool EFs, .042 for hot EFs, and .049 for observed SR.

Sensitivity Analyses

To test the sensitivity and robustness of parental over-engagement as a predictor of the children EF and self-regulation skills we conducted several follow-up analyses. First, we tested the analogous balance of parental engagement responses while the child was passive on-task as the predictor of child outcomes in a separate model that paralleled Model 2. Controlling for demographic variables, it was unrelated to cool EFs ($\beta = -0.06$, $SE = 0.06$, $p = 292$), hot EFs ($\beta = -0.13$, $SE = 0.08$, $p = .119$), and observed SR ($\beta = -0.07$, $SE = 0.09$, $p = .428$). Further, we confirmed that the inclusion of this variable in Model 2 did not change the key findings.

Second, we tested whether parental over-engagement would remain a significant predictor of child outcomes while controlling for the global rating of parental scaffolding and global ratings of parental sensitivity, two relevant, but distinct, measures of parenting. Parental over-engagement while the child was active on-task remained a robust, significant predictor of hot EFs and observed SR (see Model 3 in Table 3). Since global ratings of parental scaffolding and sensitivity were highly colinear ($r = .78$), we also estimated supplemental models that separately included each of these two variables. Global ratings of parental scaffolding had a marginally significant association with observed SR ($\beta = .21$, $SE = .11$, $p = .055$) and were not associated with cool or hot EFs. Global ratings of parental sensitivity had marginally significant relations with cool EFs ($\beta = .10$, $SE = .06$, $p = .078$) and hot EFs ($\beta = .16$, $SE = .09$, $p = .065$), and were significantly related to observed SR ($\beta = .24$, $SE = .10$, $p = .018$).

Discussion

Parents play a key supportive role in socializing their children's development through managing and guiding their children's attention, behavior, and emotions (Grolnick & Pomerantz, 2009; Mermelshtine, 2017; Valcan et al., 2018), but we know less about how these parental behaviors function when children do not need any direct parental input. We operationalized the construct of

[1] We also tested Model 2 without parent education and income covariates. Over-engagement was significantly related to hot EFs and observed SR, but also emerged as marginal predictor of cool EFs ($p = .082$).

Table 3
Path Analysis Results

		DV = Cool EFs			DV = Hot EFs			DV = Observed SR		
Model	Predictor	β	*SE*	*p*	β	*SE*	*p*	β	*SE*	*p*
1	Child age	0.56***	0.06	<.001	0.31***	0.08	<.001	0.34***	0.07	<.001
	Family income	0.23**	0.09	.007	0.07	0.12	.569	0.09	0.13	.480
	Parent education	0.24**	0.08	.003	0.30**	0.10	.003	0.27*	0.14	.045
			R^2 = .524			R^2 = .227			R^2 = .246	
2	Child age	0.54***	0.06	<.001	0.26**	0.08	.002	0.29***	0.08	<.001
	Family income	0.21*	0.09	.013	0.03	0.12	.771	0.06	0.14	.677
	Parent education	0.24**	0.08	.002	0.3**	0.10	.004	0.27*	0.13	.036
	Parental over-engagement	−0.08	0.07	.206	−0.21**	0.08	.008	−0.23*	0.10	.016
			R^2 = .530			R^2 = .269			R^2 = .295	
3	Child age	0.52***	0.06	<.001	0.24**	0.09	.007	0.26***	0.07	<.001
	Family income	0.20*	0.09	.023	0.04	0.13	.778	0.03	0.13	.792
	Parent education	0.24**	0.08	.003	0.29*	0.11	.010	0.25*	0.13	.048
	Parental scaffolding	−0.01	0.13	.932	−0.07	0.20	.712	−0.01	0.16	.943
	Parental sensitivity	0.11	0.10	.298	0.21	0.15	.165	0.24	0.15	.114
	Parental over-engagement	−0.07	0.07	.333	−0.22*	0.09	.010	−0.21*	0.10	.040
			R^2 = .538			R^2 = .295			R^2 = .343	

Note. DV = Dependent Variable. EFs = Executive functions. SR = Self-Regulation.
* $p < .01$. ** $p < .01$. *** $p < .001$.

parental over-engagement as the balance that parents strike between responding in directive versus nondirective ways when the child has taken the lead in dyadic interaction. By employing second-by-second coding of simultaneous parent and child behavioral states during a structured dyadic interaction with an innovative SSG method (Hollenstein, 2013), we examined two parental responses (positive control/scaffolding versus following the child's lead) only when the child was actively engaged in appropriate and constructive behavior that was consistent with task demands. Notably, we found that a greater degree of parental over-engagement was uniquely associated with children's lower hot EFs and self-regulation skills, controlling for key demographic variables. This finding was unique to the balance of two parental behavioral responses when the child is active on-task, and not when the child is passive on-task and in need of parental guidance and support. Further, parental over-engagement continued to be a significant predictor while controlling for global ratings of parental sensitivity and scaffolding. Our findings advance understanding of how parental practices relate to children's skills during an important developmental transition by focusing on kindergarteners, extending the research on toddlers and preschoolers (Fay-Stammbach et al., 2014).

What is Parental Over-Engagement?

In this study, parental over-engagement captured the proportion of time that parents engage in directive behaviors such as providing instructions, corrections, or suggestions that are relevant to the task, asking questions to gauge children's understanding, redirecting children's attention to on-task behavior, or providing reassurance or praise. These behaviors are in contrast to parent behaviors that follow the child's lead and are responsive, but not directive: Attentive monitoring, active listening, and acknowledgment of children's progress or success. We assigned the term over-engagement to this index because parents' behavior was observed in a context when the child was working fairly independently or leading the parent in the activity. It is important to note that parental over-engagement captures only strategies that are ostensibly helpful (albeit not needed in the moment), executed with positive and neutral affect and without harsh tones, criticism, teasing, manipulating, hovering, interrupting, intruding, or taking over tasks completely. In other words, a greater proportion of parental positive control and scaffolding behaviors was deemed indicative of parental over-engagement not because the behaviors were negative per se, but because they happened when the child was already active on-task.

On average, parents did not spend a high percentage of time in this over-engaged state, ranging from 17% to 43% across different tasks. The highest average percentage of over-engagement was observed during the teaching task, followed by the free play task, clean-up task, and problem-solving task. However, there was meaningful variability in this percentage, with the standard deviation ranging from 15% to 24%, depending on the task. There was a moderate-to-high correlation between parental engagement during times that the child was active on-task and times when the child was passive on-task. Yet only parental over-engagement (when the child was active on-task) was significantly associated with hot EFs and observed SR.

Parents who displayed more parental over-engagement were also rated as displaying lower global levels of scaffolding, which captured parents' autonomy support and the quality of assistance during the entire dyadic interaction session. However, the global ratings of these parental behaviors are not limited to parental responses uniquely when children were actively engaged with the task. For example, a low rating of global autonomy support can be given to a parent that is contradicting, ignoring, or dismissing the child's ideas *or* to a parent that is not attempting to elicit contributions from an uninvolved child. This conceptual difference between global and SSG measures limits their direct comparisons.

Parental over-engagement further differs from a global measure of parental scaffolding in associations with external factors.

First, the global measure of parental scaffolding was strongly related to the global measure of parental sensitivity (sharing over 50% of variance), whereas parental over-engagement was not related to parental sensitivity. Second, global measure of parental scaffolding was strongly related to parental education, whereas parental over-engagement was not related to parental education. Third, the association between the global rating of parental scaffolding and family income was statistically stronger than the association between family income and parental over-engagement. It is feasible that when coders focus on classifying parent behaviors on a second-by-second basis, they are less likely to be biased by their perceptions of parental education and family income. Since parental over-engagement is distributed more evenly across the socioeconomic continuum, it has the potential to advance theoretical models of how parents from diverse socio-economic backgrounds can support children's behavioral self-regulation skills.

Parental Over-Engagement: Links With Children's Self-Regulation and EF

Building on the previous research linking observed measures of globally rated parental control and scaffolding (Distefano et al., 2018; Fay-Stammbach et al., 2014; Holochwost et al., 2016, 2018; Mermelshtine, 2017; Taylor et al., 2013; Valcan et al., 2018), we found that children whose parents spend more time following their lead during structured parent–child interaction tasks were separately observed as displaying greater focused attention and behavioral inhibition during the emotionally laden 2-hr laboratory visit and had a greater delay of gratification skills on direct assessments. Consistent with our hypothesis, these children may have had more opportunities to practice behavioral self-regulation while taking a lead role in the dyadic interaction with their parents, which could be indicative of more opportunities to engage and practice behavioral self-regulation and delay-of-gratification at home.

Our findings corroborate recent studies showing that parental directiveness and even suggestive utterances (e.g., offering ideas and providing choices) are negatively associated with EFs of kindergarten-age children, even when they have been positively linked in preschoolers (Bindman et al., 2013; Hughes & Devine, 2019; Landry et al., 2000; Valcan et al., 2018). For example, our results are consistent with a recent finding that the complexity of parental language input during parent–child free play negatively predicted changes in EF skills between ages four and five (Hughes & Devine, 2019). However, Hughes and Devine (2019) did not differentiate between (a) parents who provide more conversational support during free play because their children lack the EF skills to show autonomy, and (b) parents who talk too much, leaving no room for children to display autonomy and engage in self-regulation. Our use of independent, second-by-second coding of parental and child behavioral states allowed us to isolate parental engagement behaviors *specifically* during times that the child was working independently or taking the lead in the interaction by engaging in appropriate and constructive behavior that was consistent with task demands. Our study extends the work showing the benefits of using second-by-second coding of mutually exclusive, co-occurring parent and child states to reveal how the variability within specific dyadic states relates to independent measures of children's self-regulation and related skills (Bardack et al., 2017; Lunkenheimer & Wang, 2017).

The absence of a unique association between parental over-engagement and cool EFs in the multivariate models could be partially attributed to the strong associations of child age (a proxy for cognitive maturity) and family socioeconomic variables with cool EFs. Indeed, these demographic variables explained over 50% of the variance in cool EFs (i.e., more than double the variance explained in hot EFs and self-regulation skills). When removing the two socioeconomic variables in a follow-up analysis, the link between parental over-engagement and cool EFs became only marginally significant. Further, parental over-engagement may not be as relevant for kindergarteners' performance on emotionally neutral and externally driven cool EF tasks as it is for hot EF skills or observed self-regulation, which reflects children's abilities to regulate their attention, behavior, and emotion in less structured, emotional contexts. This specificity of our findings echoes Barker et al.'s (2014) finding that time spent in adult-led activities (e.g., adult-led lessons or practices, studying) was negatively associated with 6- and 7-year-olds' performance on self-directed EF tasks that required the child to determine what to do or how to solve a problem, but was not associated with performance on a cool EF task that required the child to follow explicit instructions. Further, performance on a self-directed EF task was *positively* related to time spent in less-structured activities (e.g., free play, reading, and social events with family). Allowing school-age children to plan their own time and activities may be uniquely relevant for developing internally driven EFs (Barker & Munakata, 2015).

Strengths, Limitations, and Future Directions

Strengths of this study include the multimethod assessment of self-regulation and highly reliable second-by-second coding of parental over-engagement behavior. The inclusion of global parenting measures provided validation of the parental over-engagement construct and a robustness check for the predictive analyses. Limitations of the study include the small sample size and relatively high average family income and parental education. This highlights the need for replication of these findings in larger, more diverse samples, including more male caregivers.

The cross-sectional study design limits our ability to draw conclusions about the directionality of the effects, including the degree to which child characteristics such as temperament may elicit parenting behavior or whether parental over-engagement is keeping the child on-task. Further, the observational measures of parent and child behavior are limited by capturing only short periods of interaction time, which may not be representative of each dyad's experiences outside of the highly structured laboratory context. Nevertheless, we propose that future research extend the construct of parental over-engagement to a wider range of tasks in order to identify optimal levels of support for children's self-regulation while simultaneously supporting positive dyadic interactions and children's active task engagement across different contexts. Extension of this work to younger and older age periods would help us test if the relevance of parental over-engagement may peak during the transition to elementary school when children are increasingly expected to show independent on-task behaviors at school and parents may not have adjusted to this new "zone of proximal development."

Our findings suggest that second-by-second, low-inference measures of parenting behaviors can complement and advance—rather than replace—global, high-inference ratings. Together, they can identify how specific parental responses at different timescales can support children's learning and development. However, the utility of microcoding approaches must be balanced against the time-intensive nature of second-by-second coding. This cost is a barrier to widespread use, especially for larger studies. Thus, studies employing microcoding can inform the creation and validation of new global rating scales. We advocate for a global rating capable of distinguishing between parental engagement and responses that promote versus undermine the development of children's self-regulation in the context of their active engagement.

Conclusion

To support parents in their role as their child's first teacher, it is important to elucidate how parents balance being in control and knowing more during dyadic interactions with letting their children explore and learn on their own. Parents are spending more time with their children than in previous decades (Altintas, 2016) and are encouraged to maximize learning opportunities during everyday parent–child interactions (Obradović et al., 2016; York & Loeb, 2018). Yet children also need space to independently solve problems and learn to self-regulate, and we argue that this may be especially salient at the developmental transition to school.

Emerging evidence suggests that parents can improve their scaffolding and autonomy-support behaviors in response to brief interventions (Meuwissen & Carlson, 2019). Moreover, maternal scaffolding has been identified as a key mediator of early parenting intervention effects on young children's EFs (Lengua et al., 2014; Obradović et al., 2016). Further replication of the current findings would suggest that future parenting programs should go beyond merely teaching parents *what* to do and address *when* to do it, taking into account the dynamic nature of children's engagement from moment to moment and also across developmental periods.

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