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Examining the role of parents and teachers in executive function development in early and middle childhood: A systematic review

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ABSTRACT

The aim of the current systematic review is (1) to examine theoretical frameworks and mechanisms explaining the association between parental and teacher behaviors and child executive function (EF) development, and (2) to compare and combine empirical findings for the relationship between parental and teacher behaviors and child EF development in early and middle childhood. Results revealed that theoretical frameworks have been established more strongly in the parent literature and parental behaviors have been more extensively studied with more diverse terms compared to studies in teacher literature. Overall, patterns of findings suggest that positive (e.g., emotional support) and cognitive parental/teacher behaviors (e.g., cognitive stimulation) were positively linked to child EF performance while negative behaviors (e.g., intrusiveness) were adversely related. Considering the similar roles of parents and teachers in child EF development, insights from parent literature could enable a better understanding of the impact of teacher behaviors on child EF (and vice versa), and opens new venues for future teacher research. Moreover, these findings suggest that, in addition to genetic transmission, social factors such as parent/teacher-child interactions play a significant role in EF development. Future research should investigate the joint influence of parent and teacher behaviors on child EF.

Introduction

Executive Functions (EF) are higher-order cognitive processes which enable goal-directed actions, emotions, and thoughts (Diamond, 2013; Miyake & Friedman et al., 2000). It has been consistently shown by various studies and meta-analyses that EFs are linked to children's social abilities (e.g., Flynn, 2007; Sabbagh et al., 2006), cognitive skills such as language and theory of mind (e.g., Carlson et al., 2004; Devine & Hughes, 2014; Moses et al., 2005; Slot & von Suchodoletz, 2018) and academic achievement (e.g., Brock et al., 2009; Cortés Pascual et al., 2019; Jacob & Parkinson, 2015). Social interactions between children and adults play an important role in EF development (Carlson, 2009; Lewis & Carpendale, 2009). Parents and teachers are both important adult figures who influence EF growth particularly from early childhood to adolescence (Landry & Smith, 2010; Vandenbroucke, Spilt, Verschueren, Piccinin, & Baeyens, 2018). While parents' and teachers' influences on child development differ (e.g., children share genetic codes with parents

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but not with teachers), they also share relevant properties (e.g., children spend a large amount of time with them starting from early ages). Moreover, whilst research on the influence of parents and teachers are largely separate bodies of literature, there are similarities and differences in theoretical backgrounds and findings. The primary aim of this systematic review study is to elucidate these similarities and differences and examine, first, the theoretical approaches used in the literature on parenting and teaching contexts in EF development and, second, the patterns of findings from parent-child and teacher-child interaction studies with regard to EF development of children from early to middle childhood.

Executive function and its development

Neuroimaging studies have shown that EF has strong correlations with the functioning of the frontoparietal network that includes portions of the prefrontal and parietal cortex (Marek & Dosenbach, 2022; Sheffield et al., 2015). Functionality of EF is associated with activation particularly in the prefrontal cortex and related brain areas such as the anterior cingulate cortex (Carter et al., 1999). EF encompasses three separate but interrelated cognitive components: Inhibitory control, working memory, and cognitive flexibility (Diamond, 2013; Miyake et al., 2000). Inhibitory control refers to the ability to refrain from automatic and dominant responses. Working memory is the ability to hold and manipulate information in mind. Cognitive flexibility (also referred to as attention shifting or set shifting) enables flexibly switching between two or more tasks or mental sets. Higher level EFs such as reasoning, problem solving, and planning abilities build upon these three core EF skills (Diamond, 2013). As higher level EF skills develop at later ages, in this study, we only focus on the three core components to have one model for the full age range for consistency.

EFs emerge already in infancy and show a strong development throughout childhood, even into young adulthood (Carriedo et al., 2016; Diamond et al., 2002, 2006; Zelazo & Carlson, 2012) as a function of the substantial postnatal maturation in the prefrontal cortex (Heyder et al., 2004). In the first year of life, building blocks of EF such as control of attention and self-regulation abilities emerge, while in the second year, abilities related to cognitive flexibility such as shifting and conflict resolution start to develop (Hendry et al., 2016). The most rapid growth of the prefrontal cortex and, relatedly, EF occurs during the preschool years (Bell & Deater-Deckard, 2007; Zelazo & Müller, 2011).

The growth rate of EFs shows differences across its core components. Simple inhibitory control, the ability to inhibit a dominant response, displays a steady growth from 18 months to age 5 with a deceleration in growth rate starting from age 4. Complex response inhibition is the ability to produce an alternative response whilst inhibiting a dominant response. Children typically begin to succeed in this type of complex response inhibition task around the age of 4 (Best & Miller, 2010). Large improvements in inhibitory control performances are observed from ages 5 to 8 while development appears to be more gradual at later ages (Romine & Reynolds, 2005). Regarding working memory, children show a linear development from age 4 to 14 in both simple (i.e., span tasks requiring retaining information in a short amount of time) and complex tasks (i.e., tasks requiring maintenance and manipulation) (Gathercole et al., 2004). Regarding cognitive flexibility, by the age of 4, children can switch from one rule to another rule (e.g., switching from categorization of cards based on colors to shapes) while 3-year-olds typically perseverate and continue to apply the initial rule (Doebel & Zelazo, 2015; Hughes, 1998). The growth of rule switching displays a linear and protracted trajectory until adolescence (Davidson et al., 2006; Huizinga et al., 2006; Luciana & Nelson, 1998). Further, in terms of task maintenance (i.e., switching from one rule to another in interspersed trials), children reach adult levels by the age of 15 years (Huizinga & van der Molen, 2007).

Table 1
Search Terms Used for Database Search.

Executive Function	AND	Parent Behaviors	/AND	Teacher Behaviors	NOT	Excluded Terms
OR		OR		OR		OR
Executive function*		Parent child interaction*		Teacher child interaction*		ADHD
Cognitive control		Parent-child interaction*		Teacher-child interaction*		Autism
Executive control		Mother child interaction*		Teacher student interaction*		Attention deficit
Effortful control		Mother-child interaction*		Teacher-student interaction*		Premature
Working memory		Father child interaction*		Teacher student relation*		Disability
Updating		Father-child interaction*		Teacher-student relation*		Disorder
Inhibitory control		Parent child relation*		Teacher behavior*		Disease
Inhibition		Parent-child relation*				Cerebral palsy
Flexibility		Mother child relation*				Trauma*
Switching		Mother-child relation*				Impairment
Shifting		Father child relation*				Brain injury
Selective attention		Father-child relation*				Down syndrome
Executive attention		Parent* behavior*				Congenital
Attention* control		Maternal behavior*				Developmental delay
		Mother behavior*				Adolescen*
		Paternal behavior*				Secondary school
		Father behavior*				High school
						Teenage
						Mice
						Mouse
						Ape
						Monkey
						Nonhuman

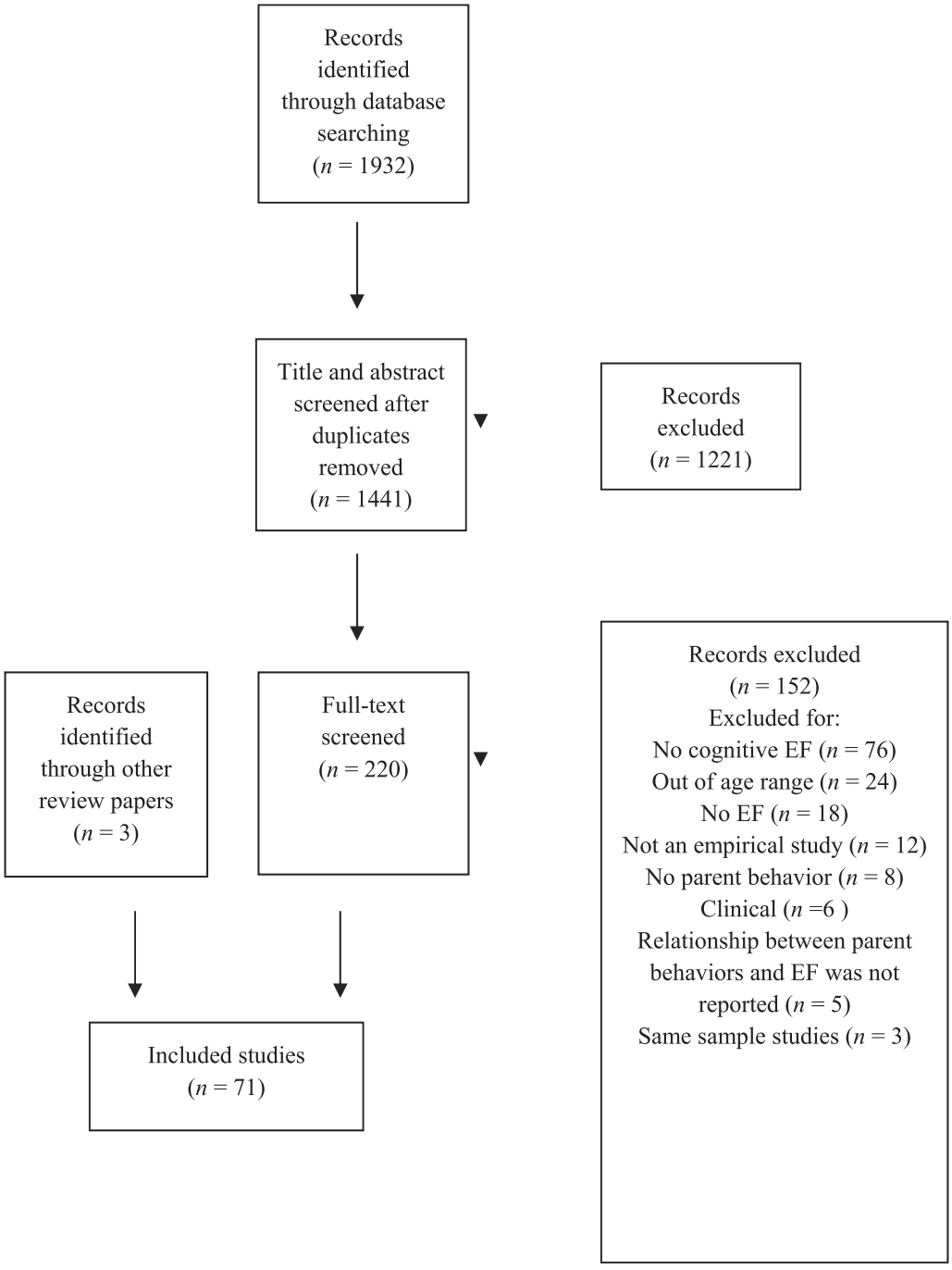

Fig. 1. Flow Diagram of Parent Behavior Articles' Selection Process.

Even though the three abilities can already be measured separately in early childhood using behavioral tasks, some researchers prefer to use a unitary EF factor (i.e., aggregate scores of EF from separate subcomponents) in their studies. Several studies suggested that a unitary EF factor shows stronger reliability than separate EF component scores for preschool children (4- and 6-year-olds, Hughes & Ensor, 2009; 2.25 to 6-year -olds, Wiebe et al., 2011; 4-year-olds, Willoughby & Blair, 2011). As children grow older, the three subcomponents seem to become more differentiated and frequently studied (Miyake & Friedman et al., 2000). It is possible that measurement error tends to be higher in young children as they are more prone to factors that affect their performance, such as fatigue. Yet, studies on the development of EF are characterized by large diversity in terms of assessment and analyses of EF: both global EF scores (i.e., creating a composite score from different EF subcomponents or assessing general EF with one task) and separate scores acquired from tasks/questionnaires measuring EF subcomponents are frequently used.

The relation between parent and teacher behaviors and EF development

The high levels of plasticity and prolonged maturation of the prefrontal cortex make the development of EF susceptible to environmental stimulation, such as the quality of adult-child interactions and characteristics of the physical environment (e.g., Bernier et al., 2010; Bernier et al., 2015; McClelland et al., 2018; Moriguchi, 2014; Vygotsky, 1978; Zelazo et al., 2016). Considerable evidence shows that parent–child interactions are one of the primary contexts for EF development such that parents' positive (e.g., responsiveness, warmth) and cognitive behaviors (e.g., scaffolding, autonomy support) reinforce EF abilities while negative parental behaviors (e.g., intrusiveness, control) adversely impact the development of EF abilities of children (for two reviews see Fay-Stammbach et al., 2014; Valcan et al., 2018).

Although parents as the primary caregivers play a crucial role in child development from birth, from early ages many children start to attend early childhood education and care settings. From that moment onwards, teachers become important adults in children's lives. Yet, a more limited number of studies have investigated the impact of teachers on children's EF development, which contrasts with the extensive body of literature on parents. In line with the parenting literature, the teacher literature points to associations between aspects of teacher-child interactions and classroom environments, on the one hand, and EF development, on the other hand (for a review see Vandenbroucke, Spilt, Verschueren, Piccinin, & Baeyens, 2018). For example, while positive teacher-child interactions (e.g., closeness) reinforce EF performance of children, negative interactions (e.g., conflict) negatively influence EF

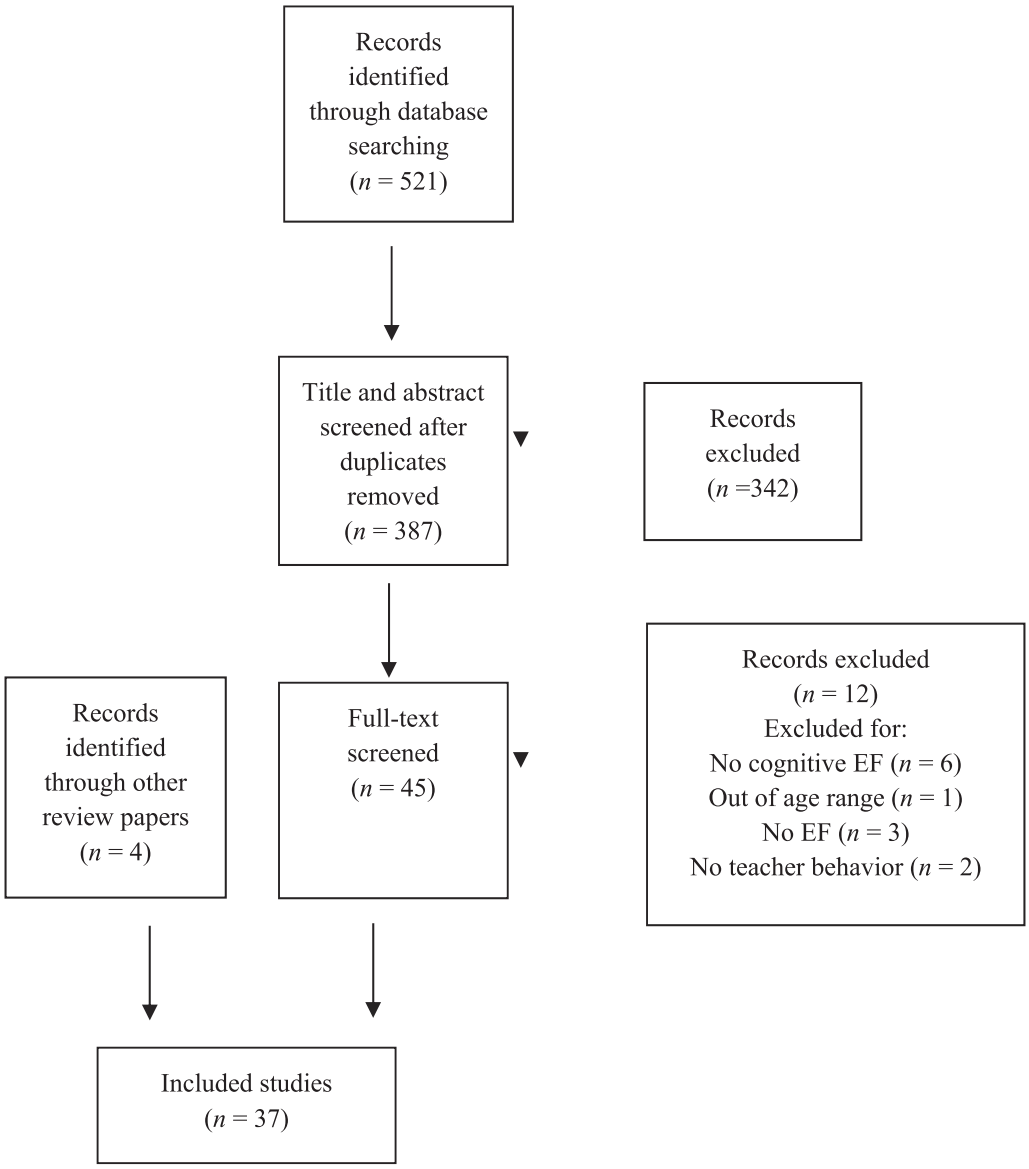

Fig. 2. Flow Diagram of Teacher Behavior Articles' Selection Process.

Table 2
Overview of Parenting Studies' Characteristics.

Author(s)	Year	Country	Sample Size	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of parent behaviors *M* (*SD*)	Low SES	Design	Parental Behavior	EF Measures
Baker	2018	USA	3349	53.31 (6.57) months	36 months	1	Longitudinal	Maternal warmth[pq], maternal reading[pq]	Inhibitory control[t, s]
Baker and Kuhn	2017	USA	18,174	Time 2 (spring semester) Age not reported	Time 1 (fall semester) 67.5 (4.5) months	0	Longitudinal	Maternal warmth[pq], home learning stimulation[pq]	Inhibitory control[tq], working memory[t], cognitive flexibility[t, b]
Baptista et al.	2016	Portugal	72	69.51 (3.09) months	55.04 (1.54) months	0	Longitudinal	Mental state talk[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, b]
Berkes et al.	2019	Cambodia	6508	47.04 (-) months	47.04 (-) months	1	Cross-sectional	Cognitive parenting[pq], socioemotional parenting[pq], negative parenting[pq]	Inhibitory control[t], attention shifting[t], sustained attention[t, g]
Bibok et al.	2009	Canada	36	24.97 (2.65) months	24.97 (2.65) months	0	Cross-sectional	Directive and elaborative parental utterances[o]	Cognitive flexibility[t, s]
Bindman et al.	2013	USA	127	From 3 to 4 to 5 years, assessed at 6 time points	Before kindergarten Age not reported	0	Longitudinal	Directive and suggestive language[o]	Inhibitory control[t, s]
Blair et al.	2014	USA	1292	37.5 (1.76) and 60.62 (3.26) months	37.5 (1.76) and 60.62 (3.26) months	1	Longitudinal	Responsiveness[o], cognitive stimulation[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Bosquet-Enlow et al.	2019	USA	53	46.08 (3) months	46.08 (3) months	0	Cross-sectional	Cognitive stimulation[o], emotional support[o]	Inhibitory control[t], working memory[t, s]
Cassidy et al.	2017	USA	141	10 weeks later than parent behavior assessment	50.68 (5.94) months	1	Intervention	Attachment[o]	Inhibitory control[t], cognitive flexibility[t, s]
Cipriano-Essel et al.	2013	USA	118	44.4 (8.88) months	44.4 (8.88) months	1	Cross-sectional	Autonomy support[o], warmth[o], control[o]	Inhibitory control[t, s]
Clark & Woodward	2015	New Zealand	223	72 (-) months	24 (-) and 48 (-) months	0	Longitudinal	Supportive presence[o], intrusiveness[o], synchrony[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t], sustained attention[t], selective attention[t], planning[t, g]
Conway & Stifter	2012	USA	68	54 (5.52) months	24.12 (0.24) months	0	Longitudinal	Attention directing and maintaining[o]	Inhibitory control[t, s]
Cuevas et al.	2014	USA	62	25.08 (0.7), 37.2 (0.9), and 49.32 (0.9) months	37.2 (0.9), and 49.32 (0.9) months	0	Longitudinal	Negative caregiving[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Daneri et al.	2018	USA	1009	48.32 (1.14) months	15 (-), 24 (-), and 36 (-) months	0	Longitudinal	Responsiveness[o], linguistic input[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Distefano et al.	2018	USA	85	53.92 (6.32) months	53.92 (6.32) months	0	Cross-sectional	Autonomy[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Eason & Ramani	2016	USA	32	63.26 (3.94) months	63.26 (3.94) months	0	Cross-sectional	Directive and elaborative guidance[o]	Planning and organizing[pq], working memory[pq, g]
Ekerim & Selcuk	2017	Turkey	239	53.29 (10.19) months	53.29 (10.19) months	0	Cross-sectional*	Maternal warmth[pq], inductive reasoning[pq]	Inhibitory control[t, s]
Gärtner et al.	2018	Germany	103	27.24 (3.09) months and 6 weeks later	27.24 (3.09) months	0	Longitudinal	Positive and negative co-regulation[pq]	Inhibitory control[pq, s]
Graziano et al.	2010	USA	435	66 (-) months	24 (-) months	0	Longitudinal	Responsiveness[o], warmth[o], control[o]	Inhibitory control[t, s]
Gueron-Sela et al.	2017	USA	137	60 (-) months	60 (-) months	0	Cross-sectional*	Harsh-intrusive parenting[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Gueron-Sela et al.	2018	USA	1037	36 (-) and 48 (-) months	24 (-) and 36 (-) months	1	Longitudinal	Warmth[o], language complexity[o], joint attention[o], intrusiveness[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]

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Table 2 (*continued*)

Author(s)	Year	Country	Sample Size	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of parent behaviors *M* (*SD*)	Low SES	Design	Parental Behavior	EF Measures
Gündüz et al.	2015	Turkey	217	53.66 (9.59) months	53.66 (9.59) months	0	Cross-sectional	Sensitivity[pq], power-assertiveness[pq]	Inhibitory control[t, s]
Gustaffson et al.	2015	USA	154	60 (-) months	24 (-), 36 (-) and 60 (-) months	0	Longitudinal	Sensitivity[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, s]
Halse et al.	2019	Norway	1070	6 (-), 8 (-) and 10 (-) years	4 (-) and 6 (-) years	0	Longitudinal	Sensitivity[o], intrusiveness[o]	Inhibitory control[tq], Flexibility[tq], Emotional Control[tq], Initiate[tq], Working Memory[tq], Plan/Organize[tq], Organization of Materials[tq], and Monitor[tq, g]
Hammond et al.	2012	Canada	82	2 years 18 days (81 days), 3 years 21 days (82 days) and 4 years 28 days (110 days)	2 years 18 days (81 days), 3 years 21 days (82 days)	0	Longitudinal	Scaffolding[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, b]
Heylen et al.	2017	Belgium	120	10.61 (1.03) years	10.61 (1.03) years	0	Cross-sectional	Attachment[cq]	Inhibitory control[t, s]
Holochwost et al.	2016	USA	206	60 (-) months	24 (-) and 36 (-) months	1	Longitudinal	Sensitivity[o], intrusiveness[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Holochwost et al.	2018	USA	206	60 (-) months	24 (-) and 36 (-) months	1	Longitudinal	Positive regard[o], intrusiveness[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Hughes & Ensor	2005	UK	140	2.37 (4 months) years and one month later	2.37 (4 months) years	1	Longitudinal	Positive parenting[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Hughes & Ensor	2009	UK	125	2 (-) and 4 (-) years	2 (-) years	1	Longitudinal	Scaffolding[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Hughes & Devine Devine et al.	2017 2016	UK	117	3.94 (0.53) and 5.11 (0.54) years	3.94 (0.53) and 5.11 (0.54) years	0	Longitudinal	Scaffolding[o], cognitive stimulation[pq], linguistic input[o], negative affect[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Kamza et al.	2016	Poland	48	4.1 years (6.80 months)	4.1 years (6.80 months)	0	Cross-sectional	Acceptance[pq], autonomy[pq], inconsistency[pq], protection[pq]	Inhibitory control[t], cognitive flexibility[t, s]
Kok et al.	2013	The Netherlands	544	48.5 (1.04) months	3 (-) years	0	Longitudinal	Sensitivity[o], intrusiveness[o]	Inhibitory control[pq], working memory[pq], planning[pq], shifting, emotional control[pq, b]
Korucu et al.	2019	USA	120	56.65 (6.54) months	56.65 (6.54) months	0	Cross-sectional	Sensitivity[pq], warmth[pq], cognitive stimulation[pq], control[pq], EF-related activities[pq]	Inhibitory control[t], cognitive flexibility[t, s]
Landry et al.	2002	USA	253	6 (-) years	39.9 (0.2) months	1	Longitudinal	Verbal scaffolding[o]	Working memory and cognitive flexibility[t, s]
Lee et al.	2018	Korea	95	55 (3.7) months	55 (3.7) months	0	Cross-sectional	Contingency[o], intrusiveness[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, b]
Lengua et al.	2014	USA	306	36–40 (-), 45–49 (-), 54–58 (-), and 63–67 (-) months	36–40 (-), 45–49 (-), 54–58 (-), and 63–67 (-) months	0	Longitudinal	Warmth[o], negativity[o], scaffolding[o], responsiveness[o]	Inhibitory control[t], cognitive flexibility[t, g]
Li-Grining	2007	USA	439	4.50 (0.83)	4.50 (0.83) years	1	Cross-sectional*	Dyadic connectedness[o]	Inhibitory control[t, s]
Low & Webster	2015	USA	1004	54 (-) months and 6 (-) years	36 (-) months	0	Longitudinal	Attachment[o]	Inhibitory control[t], sustained attention[t,s]
Lowe et al.	2014	USA	40	44.5 (4.1) months	44.5 (4.1) months	0	Cross-sectional	Verbal scaffolding[o]	Inhibitory control[t], cognitive flexibility[t, s]

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Table 2 (*continued*)

Author(s)	Year	Country	Sample Size	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of parent behaviors *M* (*SD*)	Low SES	Design	Parental Behavior	EF Measures
Lucassen et al.	2015	Netherlands	607	48.4 (0.9) months	3 years, 48.4 (0.9) months	0	Longitudinal	Sensitivity[o], harsh parenting[pq]	Inhibitory control[pq], cognitive flexibility[pq], emergent metacognition[pq, s]
Mathis & Bierman	2015	USA	210	4.8 (-) years	4.8 (-) years	1	Cross-sectional	Warm-sensitive parenting[o], directive-critical parenting[o]	Inhibitory control[t, s]
Matte-Gagné et al.	2014	Canada	78	36.8 (0.8) months	15.5 (0.9), 36.8 (0.8) months	0	Longitudinal	Autonomy support[o]	Inhibitory control[t], delay of gratification[t], cognitive flexibility[t, g]
Meece & Robinson	2014	USA	721	54 (-) months	54 (-) months	0	Cross-sectional	Father positive caregiving[o], father harsh control[pq]	Inhibitory control[t, s]
Merz et al.	2017	USA	534	4.46 (0.52) years and 6.5 months later	4.46 (0.52) years and 6.5 months later	1	Longitudinal	Warm acceptance[o], contingent responsiveness[o], and verbal scaffolding[o]	Inhibitory control[t], cognitive flexibility[t, g]
Meuwissen & Carlson	2015	USA	110	37.68 (1.68) months	37.68 (1.68) months	0	Cross-sectional	Father autonomy[o], father control[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t], delay of gratification[t, b]
Meuwissen & Carlson	2018	USA	89	57.8 (1.33) months	3 years, 57.8 (1.33)	0	Longitudinal	Father autonomy[o], father control[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t], delay of gratification[t, g]
Meuwissen & Carlson	2019	USA	128	39.48 (1.52) months	39.48 (1.52) months	0	Experimental	Autonomy support[o], control[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t], child self-regulation[o, g]
Mileva-Seitz et al.	2015	Netherlands	752	51.5 (1.3) months	3.13 (0.12) years	0	Longitudinal	Sensitivity[o]	Inhibitory control[t], working memory[t], sustained attention[t, s]
Obradović et al.	2016	Pakistan	1302	48 (-) months	24 (-), 48 (-) months	1	Intervention	Scaffolding[o], home stimulation quality[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Obradović et al.	2019	Pakistan	1302	48 (-) months	24 (-) months	1	Longitudinal	Scaffolding[o], home stimulation quality[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Rolan et al.	2018	USA	505	43.91 (9.30) months	43.91 (9.30) months	0	Cross-sectional	Warmth[pq], punitive strategies[pq]	Global EF[pq, g]
Roskam et al.	2014	Belgium	421	55.28 (11.14), 65.38 (11.86), 75.09 (12.30) months	55.28 (11.14), 65.38 (11.86), 75.09 (12.30) months	0	Longitudinal	Positive parenting[pq], monitoring[pq], rules[pq], discipline[pq], inconsistent discipline[pq], harsh punishment[pq], ignoring[pq], material rewarding[pq], autonomy[pq]	Inhibitory control[t, s]
Schneider-Hassloff et al.	2016	Germany	27	58.7 (6.6) months	58.7 (6.6) months	0	Cross-sectional	Sensitivity[o], structuring[o], non-intrusiveness[o], non-hostility[o]	Inhibitory control[t, s]
Schroeder & Kelley	2010	USA	100	8.54 (2.11) years	8.54 (2.11) years	0	Cross-sectional	Autonomy support[pq]	Inhibitory control[pq], shifting[pq], working memory[pq, s]
Sobkin et al.	2016	Russia	59	5 (-) and 7 (-) years	5 (-) and 7 (-) years	0	Cross-sectional	Authoritarian parenting[pq], democratic parenting[pq]	Inhibitory control[t], cognitive flexibility[t, s]
Sosic-Vasic et al.	2017	Germany	169	Primary school: 9.68 (0.59, middle school: 11.95 (0.82, Gymnasien school: 11.61 (0.66) years	Primary school: 9.68 (0.59, middle school: 11.95 (0.82, Gymnasien school: 11.61 (0.66) years	0	Cross-sectional	Positive parenting behavior[pq], involvement[pq], inconsistent discipline[pq], corporal punishment[pq]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Spruijt et al.	2018	Netherlands	98	6.2 (1.2) years	6.2 (1.2) years	0			

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Table 2 (*continued*)

Author(s)	Year	Country	Sample Size	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of parent behaviors *M* (*SD*)	Low SES	Design	Parental Behavior	EF Measures
							Cross-sectional	Supportive presence[o], intrusiveness[o], verbal scaffolding[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, s]
Spruijt et al.	2019	Netherlands	70	76.25 (14.49) months, approximately 6 months later	76.25 (14.49) months, approximately 6 months later	0	Intervention	Parental support[o], intrusiveness[o]	Global EF[t, g]
St Geoerge et al.	2016	Australia	24	51 (3) months	51 (3) months	0	Cross-sectional	Sensitivity[o], cognitive stimulation[o], positive affect[o], intrusiveness[o], negative affect[o], detachment[o]	Inhibitory control[t, s]
Suor et al.	2016	USA	185	63.12 (2.57) months	3.5 (-) years	0	Longitudinal	Responsiveness[o], warmth[o], harsh discipline[o]	Working memory[t, s]
Suor et al.	2019	USA	160	63.31 (4.03) months	63.31 (4.03) months	0	Cross-sectional	Guided learning[o], reciprocity[o], control[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, b]
Swingler et al.	2018	USA	276	56 (5) months	56 (5) months	0	Cross-sectional	Emotional support[o], negativity[o], intrusiveness[o]	Inhibitory control[t, s]
Vandenbroucke et al.	2017	Belgium	170	7 years 6 months (7 months)	7 years 6 months (7 months)	0	Experimental	Warmth[cq], conflict[cq]	Working memory[t, s]
Vandenbroucke et al.	2018b	Belgium	412	10.49 (1.15) years	10.49 (1.15) years	0	Experimental	Support[cq], conflict[cq]	Working memory[t, s]
Vernon-Feagans et al.	2016	USA	1292	24 (-) and 36 (-) months	36 (-), 48 (-), 60 (-) months	1	Longitudinal	Parental responsiveness and acceptance[o]	Inhibitory control[t], working memory[t, b]
Towe-Goodman et al.	2014								
Weisleder et al.	2018	Brasil	566	37.4 (6.5) months	37.4 (6.5) months	1	Intervention	Cognitive stimulation[o], interactive reading[o], physical punishment[pq]	Working memory[t, s]
Xing et al.	2016	China	328	4.12 (0.32) years	4.12 (0.32) years	0	Cross-sectional	Corporal punishment[pq]	Inhibitory control[t], working memory[t], cognitive flexibility[t, s]
Yu et al.	2020	USA	359	2.5 (-), 3.5 (-), 6 (-), 7 (-) years	2.5 (-) years	1	Longitudinal	Sensitivity[o], intrusiveness[o], detachment[o], cognitive stimulation[o], positive regard[o], and negative regard[o]	Inhibitory control[t, s]
Owen et al.	2013								
Zeytinogl et al.	2016	USA	278	5 (-) years	4 (-) years	0	Longitudinal	Emotional support[o], intrusiveness[o], negativity[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, b]
Zeytinoglu et al.	2018	USA	278	56.37 (4.68), 70.80 (3.86) and 82.76 (4.02) months	56.37 (4.68), 70.80 (3.86) and 82.76 (4.02) months	0	Longitudinal	Emotional responsiveness[o], intrusiveness[o], negativity[o], cognitive support[o]	Cognitive flexibility[t, s]

Note. SES = socioeconomic status; pq = parent questionnaire; tq = teacher questionnaire; cq = child questionnaire; o = observation; t = behavioral task; s = separate EF component; g = global EF score; b = both separate and global EF scores were evaluated. For SES, 1 means that the sample is characterized by a high number of children from low socioeconomic background as described by the authors of the respective studies. *Even though the study has a longitudinal design, child EF and parental behaviors were assessed at the same time point.

Table 3
Overview of Teacher Studies' Characteristics.

Author(s)	Year	Country	Sample Size (Teacher/ Children)	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of teacher behaviors *M (SD)*	Low SES	Design	Teacher Behavior	EF Measures
Ansari & Pianta	2018	USA	325/ 1407	4.17 (0.47) months, fall and spring semester	4.17 (0.47) months, fall and spring semester	0	Intervention	Instructional support[o]	Inhibitory control[r, s]
Bardack & Obradović	2019	USA	33/813	9.90 (0.83) years	9.90 (0.83) years	0	Cross-sectional	EF-related behaviors[o]	Inhibitory control[r], working memory[r], cognitive flexibility[r, g]
Berry	2012	USA	-/1364	pre-kindergarten (4.5 years old), first and fourth grade	Kindergarten, second grade	0	Longitudinal	Teacher-child conflict[tq]	Inhibitory control[r, s]
Blair et al.	2016	USA	487/ 1005	48 (2) months	71 (3) months	1	Longitudinal	Teacher-child relationship[tq]	Inhibitory control[r], working memory[r], cognitive flexibility[r, g]
Cadima et al.	2015	Belgium	30/145	Beginning of kindergarten	Beginning and end of kindergarten	0	Longitudinal	Closeness[tq], conflict[tq]	Inhibitory control[r, s]
Cadima et al.	2016	Portugal	93/485	60.05 (9.51) months	60.05 (9.51) months	0	Cross-sectional	Classroom interactions[o]	Inhibitory control[r], cognitive self-regulation[r, g]
Choi et al.	2016	USA	51/169	Fall semester, spring semester of kindergarten (56.07 (6.38) months)	Fall semester	1	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[r, s]
De Wilde et al.	2016	Netherlands	-/1109	5.52 (1.00), 6.02 (1.00), 6.98 (1.01) months	5.52 (1.00), 6.02 (1.00), 6.98 (1.01) months	0	Longitudinal	Warmth[cq], conflict[cq]	Working memory[r, s]
Dias & Seabra	2017	Brasil	4/58	Experimental group: 77 (3.8) months, control group: 77.4 (3.35) months at the beginning of the first grade, end of the first grade	Experimental group: 77 (3.8) months, control group: 77.4 (3.35) months	1	Intervention	EF-related activities	Inhibitory control[pq, tq], working memory[pq, tq], cognitive flexibility[r, s]
Fuhs et al.	2013	USA	60/803	Fall semester (54 (4) months), spring semester	Fall semester, midyear, spring semester	0	Longitudinal	Behavior approving[o], teacher listening to children[o], emotional tone[o], cognitive learning environment[o]	Inhibitory control[r], working memory[r], cognitive flexibility[r, g]
Goble & Pianta	2017	USA	325/ 1407	4 (-) years at fall semester, spring semester	Midyear of preschool	1	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[r, s]

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Table 3 (*continued*)

Author(s)	Year	Country	Sample Size (Teacher/ Children)	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of teacher behaviors *M (SD)*	Low SES	Design	Teacher Behavior	EF Measures
Goble et al.	2019a	USA	269/ 1179	4.18, (0.46) at fall semester, spring semester	Fall and spring semester	1	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[t, s]
Goble et al.	2019b	USA	954/ 1364	54 (-) months, 7.02 (-) years	7.02 (-) years	0	Longitudinal	Closeness[tq], conflict[tq], teacher-child interaction quality[o]	Inhibitory control[t], working memory[t, s]
Hamre et al.	2014	USA	325/ 1407	4.17 (0.47) years at fall semester, spring semester	Midyear of preschool	1	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o], teacher-child interaction quality[o]	Inhibitory control[t], working memory[t, s]
Hatfield et al.	2016	USA	222/875	4.11 (0.0.50) years at fall semester, spring semester	Midyear of preschool	0	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[t, s]
Hernández et al.	2017	USA	26/301	5.48 (0.35) years at fall of kindergarten	Spring of kindergarten	0	Longitudinal	Closeness[tq], conflict[tq]	Inhibitory control[tq, t, s]
Hu et al.	2017	China	59/589	4.99 (0.55) years	4.99 (0.55) years	0	Cross-sectional	Emotional support[o], instructional support[o], classroom organization[o]	Global EF[pq, g]
Hu et al.	2020	China	59/588	6.12 (0.44) years, 6 months later, 12 months later	6.12 (0.44) years, 6 months later	0	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[t, s]
Keilow et al.	2019	Denmark	52/1160	End of grade 1, beginning of grade 2, end of grade 2	End of grade 1, beginning of grade 2, end of grade 2	0	Intervention	Classroom management	Selective attention[t, s]
Langeloo et al.	2019	Netherlands	19/69	5.5 (4.54) years, 3 time points during school year	5.5 (4.54) years, 3 time points during school year	0	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[t], working memory[t], cognitive flexibility[t, g]
Leyva et al.	2015	Chile	91/1868	4 years, at the beginning and end of the prekindergarten	End of the prekindergarten	1	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[t], cognitive flexibility[t, s]
McKinnon & Blair	2018	USA	82/759	5 years 9 months (4 months) at fall of kindergarten, spring of kindergarten, fall of 1st grade	5 years 9 months (4 months) at fall of kindergarten, spring of kindergarten, fall of 1st grade	0	Longitudinal	Closeness[tq], conflict[tq]	Inhibitory control[t], cognitive flexibility[t, g]

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Table 3 (*continued*)

Author(s)	Year	Country	Sample Size (Teacher/ Children)	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of teacher behaviors *M (SD)*	Low SES	Design	Teacher Behavior	EF Measures
Neuenschwander et al.	2017	USA	33/171	68.9 (4.2) months at fall of kindergarten, spring of kindergarten	Spring of kindergarten	0	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[f], cognitive flexibility[f, g]
Nguyen et al.	2020	USA	156/ 1498	55.01 (3.51) months at fall of preschool, spring of preschool	55.01 (3.51) months at fall of preschool, spring of preschool	1	Longitudinal	Closeness[tq], conflict[tq], teacher-child interaction quality[o]	Inhibitory control[f], working memory[f, g]
Pianta et al.	2020	USA	126/ 1498	4.40 (0.29) years at fall of preschool, spring of preschool	4.40 (0.29) years at preschool	1	Longitudinal	Instructional content[tq], interaction quality[o]	Inhibitory control[f], working memory[f, s]
Rimm-Kaufmann et al.	2009	USA	36/172	5.41 (0.34) years	5.41 (0.34) years	0	Cross-sectional	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[f], cognitive self-regulation[tq, s]
Sandilos et al.	2019	USA	156/899	53.91 (3.75) months at fall of preschool, spring of preschool	53.91 (3.75) months at fall of preschool, spring of preschool	0	Longitudinal	Closeness[tq], conflict[tq]	Inhibitory control[f], working memory[f,s]
Schmitt et al.	2019	USA	40/102	53.57 (5.42) months	53.57 (5.42) months	0	Cross-sectional	Emotional support[o], instructional support[o], classroom organization[o]	Inhibitory control[f, s]
Sosic-Vasic et al.	2015	Germany	150/208	Primary school: 9.18 (0.77), middle school: 11.29 (0.88), Gymnasium school: 11.07 (0.80)	Primary school: 9.18 (0.77), middle school: 11.29 (0.88), Gymnasium school: 11.07 (0.80)	0	Cross-sectional	Autonomy support[tq]	Global EF[f, g]
Suntheimer & Wolf	2020	USA	-/18200	5.6 (-) years at the fall of kindergarten, spring of kindergarten	5.6 (-) years at the fall of kindergarten, spring of kindergarten	0	Longitudinal	Closeness[tq]	Inhibitory control[tq], working memory[f], cognitive flexibility[f, s]
Swanson et al.	2015	USA	116/291	7.66 (0.39) years	7.66 (0.39) years	0	Cross-sectional*	Closeness[tq], conflict[tq]	Inhibitory control[pq, t, i]
Vandenbroucke et al.	2017	Belgium	18/170	7 years 6 months (7 months)	7 years 6 months (7 months)	0	Experimental	Warmth[cq], conflict[cq]	Working memory[f, s]
Vandenbroucke et al.	2018b	Belgium	31/412	10.49 (1.15) years	10.49 (1.15) years	0	Experimental	Closeness[cq], conflict[cq]	Working memory[f, s]
Vandenbroucke et al.	2018c	Belgium	33/107	5.58 (0.29), 6.88 (0.28) years	5.97 (0.26) years	0	Longitudinal	Closeness[tq], conflict[tq], dependency[tq]	Working memory[f, s]
White et al.	2019	USA	37/411	4.47 (0.51) years at the fall of preschool, spring of preschool	Winter period of preschool	1	Longitudinal	Emotional support[o], instructional support[o], classroom organization[o]	Global EF[f, g]
Weilan et al.	2013	USA	83/414			0	Longitudinal	Emotional support[o],	Inhibitory control[f],

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Table 3 (*continued*)

Author(s)	Year	Country	Sample Size (Teacher/ Children)	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of teacher behaviors *M (SD)*	Low SES	Design	Teacher Behavior	EF Measures
				4 (-) years (fall and spring of kindergarten)	4 (-) years (spring of kindergarten)			instructional support[o], classroom organization[o], language and literacy support[o]	working memory[t, s]
Williford et al.	2013	USA	100/341	46.9 (6.6) months at fall semester, spring semester	Spring semester	1	Longitudinal	Positive engagement with teacher[o]	Inhibitory control[t], cognitive self-regulation[t, g]

Note. SES = socioeconomic status; pq = parent questionnaire; tq = teacher questionnaire; cq = child questionnaire; o = observation; t = behavioral task; s = separate EF component; g = global EF score; b = both separate and global EF scores were evaluated. For SES, 1 means that the sample is characterized by a high number of children from low socioeconomic background as described by the authors of the respective studies. *Even though the study has a longitudinal design, child EF and teacher behaviors were assessed at the same time point.

performance (e.g., McKinnon & Blair, 2018).

The relationships that children have with parents and teachers have some commonalities and differences that may be relevant for how they impact child development. With regard to commonalities, children are emotionally connected to both parents and teachers with whom they spend a considerable amount of time from an early age (Commodari, 2013; Roorda et al., 2011). Further, both parents and teachers provide a learning environment where they support children emotionally and offer cognitively stimulating activities. The similar characteristics of the relationships children have with parents and teachers can inform overarching theories concerning the role of social context in child EF development. For example, the Attachment Theory posits that an emotional bond between children and parents helps children to feel secure around their parents (Bowlby, 1982). The secure feeling around parents allows children to explore their environments independently and learn from those explorations more easily (Commodari, 2013; O'Connor & McCartney, 2007). Empirical research corroborates that secure attachment between children and parents reinforces child EF development (Bernier et al., 2012, 2015). Children can emotionally attach to teachers as well (Commodari, 2013; Verschueren & Koomen, 2012), potentially affecting children's exploration behaviors and learning. Similarly, it has been suggested that when children have a close bond with teachers, they may benefit from their input and instructions more which could improve their cognitive abilities, including EFs (Cadima et al., 2015; Nguyen et al., 2020).

There are also differences between parents and teachers in regard to child development. While parents are generally untrained about child education and they may lean more towards providing emotional support, teachers receive educational training and tend to additionally focus on stimulating cognitive development (Slot et al., 2015; Verschueren & Koomen, 2012). Relationships also differ in other aspects such that children share genetic codes and engage with parents from birth while they typically do not share genetic codes with their teachers and start interacting with them a few years after birth (mostly in daycares and preschools). Another important difference is the stability and continuation of these relationships: the parent–child relationship is (in most cases) more stable over time while the teacher-child relationship is typically transient: most children engage with different teachers throughout their school lives. The number of children in families and classrooms also differs such that, compared to parents, the attention and time of teachers is mostly distributed over more children. Despite these distinctions, parents and teachers share the importance of being significant adults in children's development.

Considering that parental behaviors have been investigated to a larger extent compared to teacher behaviors, the field of teacher studies may benefit from the literature of parental behaviors, specifically in terms of EF development. Moreover, the differences between parents and teachers can help researchers to unravel the mechanisms behind the effect of significant adults on EF development. If similar findings exist in terms of the role of parental and teacher behaviors in child EF, we can conclude that, apart from genetic transmission, social interactions play significant roles in child EF development. In addition, previous studies indicated that the strength of the impact of parent and teacher behaviors on child EF varies in different populations. For example, a meta-analysis of Valcan et al. (2018) showed that a stronger effect size for the association between parents' cognitively supporting behaviors and child EF was found in younger children compared to older children. Further, Vandenbroucke, Spilt, Verschueren, Piccinin, and Baeyens (2018) demonstrated that effect sizes were larger for the relationship between teacher behaviors and child EF in studies including a higher percentage of boys than girls and higher socioeconomic status than lower socioeconomic status. Therefore, it is important to unravel for which populations and under which conditions the effect of parent and teacher behaviors exert their effect on child EF development, and whether similar moderator variables exist in the two fields of literature for the relationship between parent/teacher behaviors and child EF.

Categories of parental and teacher behaviors

Previous research grouped parental behaviors using three general dimensions: positive, negative, and cognitive behaviors (Valcan et al., 2018), and this broad categorization can also be applied to teacher behaviors. Positive parental and teacher behaviors include emotional aspects of the relationship such as warmth, responsiveness, and emotional attachment between parents/teachers and children (Hamre et al., 2014; Landry, Smith, & Swank, 2006; Maccoby & Martin, 1983). Negative behaviors are the degree of parents' and teachers' effort to control children's behaviors, displaying disciplinary behaviors and punishment, which lead to conflictual relationships between parents/teachers and children (Rhee et al., 2015; Vandenbroucke et al., 2018). Cognitive behaviors refer to cognitive support in which parents and teachers encourage children to engage in cognitively stimulating activities, demonstrate scaffolding behaviors (Matte-Gagné & Bernier, 2011), and display autonomy support (Sosic-Vasic et al., 2015).

Previous research suggests that different aspects of parenting and teacher behaviors have their own unique relations with child EF. For example, Bernier et al. (2010) and Hughes and Devine (2017) showed that emotional (e.g., sensitivity), negative (e.g., negative parent–child interactions) and cognitive (e.g., scaffolding) aspects of parenting have differentiated and specific impacts on child EF development. In addition, Nguyen et al. (2020) demonstrated the unique and specific relations between positive (e.g., closeness between teachers and students) and negative (e.g., conflict between teachers and students) aspects of teacher-child interactions and child EF. Even though similar aspects of parent and teacher behaviors were investigated in previous studies, whether these behaviors show similar or different impacts on child EF has not yet been systematically explored before.

Current study

This systematic review study has two goals. Firstly, we aim to draw a comprehensive picture of the theoretical approaches and mechanisms that can explain the association between both parent and teacher behaviors on the one hand and EF development from early to middle childhood (i.e., in 2- to 12-year-olds) on the other hand. Second, by systematically reviewing the literature, we aim to compare and combine the patterns of findings from parent-child and teacher-child interaction studies to determine which positive, negative and cognitive parental and teacher behaviors have similar or different effects on children's EF from early to middle childhood. By bringing the two bodies of literature together, our purpose is to see whether one field may inform the other field in terms of new theoretical approaches and suggest new parent/teacher behaviors or underlying mechanisms that might be relevant to EF development.

Method

Inclusion and exclusion criteria

Two separate searches for scientific literature with the same protocol were conducted for the relation between a) parent–child interactions and child EF, and b) teacher-child interactions and child EF. For inclusion in the study, the following five criteria were used: (1) the article should be published in a peer-reviewed journal in English after 2000, (2) child participants should be between 2 and 12 years old when their EF and parent/teacher behaviors were assessed, (3) cognitive aspects of EF were studied either with a global EF score or with scores for separate subcomponents (i.e., inhibitory control, working memory, cognitive flexibility) through tasks, questionnaires, or observations, (4) parent- or teacher-child interactions should be assessed with either an observation, a parent/teacher self-report questionnaire, or child-report questionnaire, and (5) studies should focus on non-clinical samples. We chose the year of 2000 as a starting point because research on EF development started to emerge in both parent and teacher literature around this period (Valcan, Davis, & Pino-Pasternak, 2018; Vandenbroucke, Spilt, Verschueren, Piccinin, & Baeyens, 2018). We selected the age range of 2 to 12 because children start attending early childhood education and care settings at the age of 2 and finish primary school by the age of 12 in many countries (Bertram & Pascal, 2002; Le Métais, 2003; Leseman et al., 2017; 2015). Also, children spend a large proportion of time with a limited number of teachers throughout the school year and the time intensity of contact with teachers versus parents is more similar during this age range than in older children. That is, children attending secondary schools are exposed to multiple teachers whose impacts on child outcomes may differ (Roorda et al., 2011).

Studies were excluded when (1) they do not report the statistical relationship between parent/teacher-child interactions and child EF, (2) they only assessed the emotional (i.e., emotional self-regulation, delay of gratification) or temperamental (i.e., temperamental aspects of inhibitory or effortful control) aspects of EF, (3) they only focused on populations at risk or atypical samples (e.g., children with developmental disorders, parents with mental health issues such as depression), and (4) the article does not include empirical data (e.g., review, meta-analysis paper). Even though studies assessing effortful control were excluded from the review, we included "effortful control" as a search term because some researchers assess effortful control via tasks such as the Stroop Task (Daneri et al., 2018) or the Continuous Performance Task (NICHD Early Child Care Research Network, 2003) which measures children's inhibitory control abilities. Since we did not want to miss the studies assessing inhibitory control with so-called effortful control tasks (Graziano et al., 2010; Hernández et al., 2017; Swanson et al., 2015), we included this search term in our search procedure.

Search procedure and selection of studies

Search terms were grouped into three topics of interest: EF performance of children, parent–child interactions, and teacher-child interactions. One search entailed the EF-related terms in combination with parent–child interaction terms, and the other search

entailed the same EF-related terms in combination with teacher-child-interaction terms. We also defined some terms that encompass the exclusion criteria (e.g., age range, clinical groups) and we excluded the studies with these terms by using the *not* function during the database searches. All the search terms are presented in Table 1. Titles and abstracts in four databases were searched: Web of Science, Scopus, PsycINFO and ERIC during June-July 2020. The search was restricted to English language and peer-reviewed articles. In addition to the database search, we also searched additional articles cited in previous reviews on either parent or teacher behaviors in relation to child EF development.

The searches identified 1,932 articles for parent–child interactions and 521 articles for teacher-child interactions. The selection process is depicted in Fig. 1 (parent–child interaction) and Fig. 2 (teacher-child interaction). After removing duplicates, titles and abstracts of the remaining articles were screened and judged according to the inclusion criteria by the first author. For the screening process of titles and abstracts, *ASReview* was used (van de Schoot et al., 2021). This machine-learning aided tool displays the abstracts one by one, and the reviewer marks them as relevant or irrelevant based on their selection criteria. The *ASReview* software improves its algorithms with the choices of the reviewer and orders the articles from most relevant to least relevant. The efficacy of the tool has been established by previous studies (Harmsen et al., 2021; Van den Brand & van de Schoot, 2021). The first author screened and marked (as relevant or not) all the abstracts starting from the most relevant ones which speeded up the selection process.

In case it was not clear whether the article fitted the criteria, it was included for the next step of the selection procedure. Then, the full texts of the articles were screened which resulted in 71 selected articles for parent–child interactions and 33 articles for teacher-child interactions. After we added the additional articles identified through other review papers (Moriguchi, 2014; Valcan et al., 2018; Vandenbroucke, Spilt, Verschueren, Piccinin, & Baeyens, 2018), the final sample consisted of 74 articles for parent–child interactions and 37 articles for teacher-child interactions. Two articles examined the relation of both parent and teacher behaviors to child EF, and were included in the selection process of both fields (Vandenbroucke et al., 2017, 2018).

Further examination of the articles revealed that some studies in both fields used the same or overlapping samples for their analyses. In such cases, we included the studies if they met these criteria: (1) studies assessed different parental or teacher behaviors, (2) measured EF and/or parental/teacher behaviors at different time points, (3) assessed different components of EFs, and/or (4) implemented different designs (i.e., while one study examined the effect of an intervention, the other one used a correlational design). Three studies in the parent literature were not included in the analyses since they examined exactly the same relationship between the same parental behaviors and the same EF components at the same time point as another study (Devine et al., 2016; Owen et al., 2013; Towe-Goodman et al., 2014). We put together these three studies with the other study investigating the same associations in Table 2. Further, in the cases in which two studies examined overlapping relationships, we included the first study and only included the differing relationship from the second study. Same sample studies and inclusion/exclusion process can be found in Appendix A.

To check the reliability of the selection process, 20 % randomly selected articles were screened independently by a research assistant in the abstract reading and full text reading phases. The kappa value for the parent articles was 0.83 in the abstract reading phase and 0.85 in the full text reading phase. The kappa value for the teacher articles was 0.95 in the abstract reading phase and 0.93 in the full text reading phase.

Coding

Before we turn to reviewing the empirical findings of the different studies, we provide an overview of the theoretical foundations in the parent and teacher literature to detect overlap as well as differences in explanations and proposed underlying mechanisms. The theoretical frameworks discussed in the articles included in this review can be divided into four categories. The first category involves an overarching theory about development in general (Bioecological Model). The second category includes theories mentioned in both parent and teacher literature and suggest more specific mechanisms that explain why parental and teacher behaviors are linked to child EF (Attachment Theory and Sociocultural Theory). The third category involves theories mentioned only in the parent literature with one theoretical approach focusing on the broader environmental or situational factors that explain variations in parental behaviors and subsequently child EF (Family Stress Model), and another theoretical framework suggesting biological mechanisms and the interaction of biological and social mechanisms to explain the link between parental and child EF (Intergenerational Transmission Model). The last category includes a theoretical framework mentioned only in the teacher literature and focuses on the role of the quality of teacher-child interactions in child development (Teaching Through Interactions). A list of studies that provided explanations based on the above-mentioned theories is presented in Appendix B.

Included articles were coded based on five dimensions: (1) information about the article (i.e., author(s), year of publication, title and research question, design of the study), (2) sample characteristics (i.e., sample size, age, ethnicity and socioeconomic status of the participants), (3) EF assessment (i.e., EF component: inhibitory control, working memory, cognitive flexibility, global vs separate EF component used in the analyses, type of instrument: questionnaires, tasks, or observation), (4) parent/teacher behaviors (i.e., parent/teacher behavior dimensions, type of instrument: self/child report or observation), and (5) main findings related to child EF and parent/teacher behaviors. The list of articles and the coding dimensions are presented in Table 2 and Table 3.

Studies in this review are characterized by large diversity in assessment methods and statistical approaches. While some studies measured the global EF with one task, some studies measured separate subcomponents and created a composite or latent score. Further, some studies used scores of separate EF components which were either assessed with one task or several tasks (e.g., composite or latent score of working memory). Whether EFs were assessed by global or separate EF scores was determined by whether different aspects of EF were used in the analyses. If scores from one EF component (i.e., whether separate EF components of inhibitory control, working memory, or cognitive flexibility measured with one task or measured with multiple tasks and aggregated to a single score for the respected subcomponent) were used for the analyses, it was interpreted as a separate EF component. If scores from multiple tasks

Table 4
Study and Sample Characteristics.

Study and sample characteristics	Parent studies		Teacher studies	
	n	%	*n*	%
Total	71		37	
Child age				
EF assessment				
Preschool	60	84.51	24	64.86
Elementary school	5	7.04	8	21.62
Mixed (preschool + elementary school)	6	8.45	5	13.51
Parent/Teacher behaviors				
Preschool	61	85.91	24	64.86
Elementary school	4	5.63	9	24.32
Mixed (preschool + elementary school)	6	8.45	4	10.81
Assessment method				
EF assessment				
Behavioral Task	62	87.32	31	83.78
Parent/Teacher-report	7	8.86	1	2.70
Behavioral task + parent/teacher report	1	1.41	5	13.51
Behavioral task + observation	1	1.41	–	
Parent/Teacher behaviors				
Observation	50	70.42	19	51.35
Parent/Teacher-report	14	19.72	11	29.72
Child-report	3	4.22	3	8.11
Observation + parent/teacher report	4	5.63	2	5.40
Intervention*	–		2	5.40
EF Scores				
Global	24	33.80	12	32.43
Separate EF subcomponents	39	54.93	25	67.57
Both	8	11.27	–	
Design				
Longitudinal	36	50.70	25	67.57
Cross-sectional	28	39.44	7	18.92
Intervention	4	5.63	3	8.11
Experimental	3	4.22	2	5.40

Note. *Two of the teacher studies did not assess teacher behaviors but instead implemented an intervention to change teacher behaviors and tested whether manipulation had an effect on EF performance of children.

tapping into different aspects of EF were aggregated (i.e., average scores, latent factor), it was interpreted as global EF scores. In cases of using one task as a measure of global EF, we evaluated the task and decided based on the description whether it could serve as a global EF measure or as a specific EF component. For example, we coded the Head-Toes-Knees-Shoulders task as an inhibitory control task while the authors described it as a global EF assessment (e.g., Bindman et al., 2013). Even though we did not include the studies assessing higher-order (e.g., planning) or emotional (e.g., emotional control) EF components, we included a few studies measuring these abilities as part of global EF scores (e.g., Kok et al., 2013). See Appendix C for the list of EF tasks and questionnaires used in the included articles in the current study.

Categorization of parental and teacher behaviors

Parent and teacher behaviors were grouped using the three dimensions based on Valcan et al.'s (2018) categorization: positive behaviors, negative behaviors, and cognitive behaviors. The behavioral aspects were categorized according to the content and definition of the behavior mentioned in the respective article. Behaviors were categorized as *positive behaviors* if they included any positive and emotional aspects. Positive parental behaviors include warmth (i.e., degree of parents' demonstration of liking, appreciation, praise, and care; Baker & Kuhn, 2017), sensitive and responsive behaviors (i.e, promptly and appropriately responding to a child's interests and needs; Graziano et al., 2010), emotional support (i.e., degree of parents' global supportive behaviors including responsiveness and positive affect; Swingler et al., 2018), attachment security (i.e., the degree of security in the relationship between caregivers and children; Cassidy et al., 2017), parent–child synchrony (i.e., reciprocal and mutually guided behaviors of parents towards their children; Clark & Woodward, 2014), positive parenting (i.e., having an open communication with the child when the child has a problem; Roskam et al., 2014), and rewarding behaviors (i.e., rewarding the child in the case of exemplary behavior; Roskam et al., 2014). Positive teacher behaviors were emotional support (i.e., degree of positive affect and sensitivity from teachers towards children and positive climate in the classrooms; Neuenschwander et al., 2017), and closeness between teachers and children (i.e, the affectionate and warm relationship between teacher and children; Hernández et al., 2017).

Behaviors were categorized as *negative behaviors* if they encompassed any negative emotional and controlling aspects. Parental negative behaviors included intrusiveness/controlling behaviors (i.e., parents' efforts to control their children's behaviors by means of inconsistent and harsh discipline, or punishment; Meuwissen & Carlson, 2018), negative affect (i.e., the degree of parents' negative verbal or non-verbal emotions towards children, including criticism, frowning, irritability, or impatience; Cuevas et al., 2014),

parental inconsistency (i.e., unstable attitudes of parents towards children in regard to disciplinary behaviors; Sosic-Vasic et al., 2017), detachment (i.e, parents' degree of not responding contingently to child's emotional needs; Yu et al., 2020), protection (i.e., the degree of parents' concern and anxiety about their children; Kamza et al., 2016), and ignoring (i.e., ignoring children when they do something that is not allowed; Roskam et al., 2014). Negative teacher behaviors were conflict (i.e., negative interactions between teachers and students; Sabol & Pianta, 2012) and dependency (i.e., a clingy relationship between student and teacher and overreliance of the student on the teacher; Ahnert et al., 2012).

Behaviors were grouped as *cognitive behaviors* if they refer to supporting behaviors to encourage children to engage in cognitively stimulating activities. Cognitive parental behaviors included cognitive stimulation (i.e., parents' efforts to create a learning environment for children by means of activities and parental practices; Bradley & Caldwell, 1995), scaffolding (i.e., helping children during problem solving tasks that they cannot perform independently by enhancing support after failure and withdrawing after success; Matte-Gagné & Bernier, 2011; Lewis & Carpendale, 2009), language input (quantity and the quality of the language directed to children; Eason & Ramani, 2016), autonomy support (i.e., encouraging children to take an active role tasks by offering choices, taking children's perspective, and providing explanations; Grolnick & Ryan, 1989; Matte-Gagné & Bernier, 2011; Pianta et al., 2008; Ryan & Deci, 2006; Sosic-Vasic et al., 2015), attention-related behaviors (supporting and elaborating on a child's attentional focus vs redirecting the child's attention and establishment of joint attention between parents and children; Conway & Stifter, 2012; Gueron-Sela et al., 2018), and parents' EF-related activities (i.e., encouraging children to engage in EF-related activities such as playing a game together that requires the child to stop, think, then act; Korucu et al., 2019). Teachers' cognitive behaviors were instructional support (i.e., teachers' encouragement in learning and developmental activities, quality of feedback, and language modeling for children to use and comprehend language; Pianta et al., 2008; Hamre & Pianta et al., 2013), classroom organization (i.e., the extent to which teachers maximize the time spent in learning activities, facilitate activities and materials to increase children's engagement, and manage the behaviors of children by setting clear expectations and rules; Pianta et al., 2008), EF-related behaviors (i.e., teachers' own EF-related and scaffolding behaviors in the classroom; Bardack & Obradović, 2019), autonomy support (i.e., teachers' encouragement in volitional functioning and fostering a sense of individuality in students; Sosic-Vasic et al., 2015), and language and literacy activities (i.e., teachers' encouragement of students to engage in literacy activities; Weiland et al., 2013). See Appendix D for the list of parental and teacher behaviors.

In total, 19 different parental and 9 teacher behaviors were found to be measured in the selection of articles for the review. Further, a few studies in the teacher literature measured the global quality of teacher-child interactions instead of focusing on a specific behavior. We describe those articles and their findings separately. The behaviors were grouped together when they were described by different names but refer to the same construct. For example, in the article of Clark and Woodward (2014), *supportive presence* of parents was defined as parents' timely assistance and structuring behaviors during problem-solving activities and therefore grouped together with *scaffolding* behaviors. How the behaviors were labeled by the original authors in the articles is listed in Tables 2 and 3.

Results

In the Results section, we will firstly describe the general characteristics of the articles found. Then, we present the theoretical approaches that explain the link between parent/teacher behaviors and child EF. After that, we summarize the empirical findings for the associations between positive, negative, and cognitive parent/teacher behaviors and child EF. Lastly, we present empirical findings concerning under which conditions and for which populations parent and teacher behaviors optimally support EF development.

For the empirical findings, we interpreted the results of the reviewed studies as a significant association if (1) they reported a statistically significant correlation, and/or (2) a significant predictor role of parent/teacher behaviors (via regression analyses) on child EF. Further, we added the direction of the relationships (i.e., positive, negative) between parent/teacher behaviors and child EF where we describe the empirical findings.

Study and sample characteristics

In most of the parenting ($n = 71$) and teacher articles ($n = 37$), children's EFs in relation to parental and teacher behaviors was assessed at preschool age (i.e., before or at age 6), while a smaller number of articles assessed these associations in elementary school or in mixed age groups (see Table 4 for Study and Sample Characteristics).

In both the parenting and the teacher studies, behavioral tasks were more frequently used to assess EF than questionnaires and observations. Parent and teacher behaviors were mostly assessed through observation (i.e., during free play/regular classroom time), and less frequently through parental/teacher report, child-report or a combination of parent/teacher report and observation. While some studies focused on only one parent or teacher behavior, other studies analyzed multiple behaviors falling under the same dimension (i.e., several positive, negative, or cognitive behaviors).

For the EF scores, almost half of the parenting studies reported scores of separate EF subcomponents (i.e., one or more subcomponents of EF assessed with one or more tasks each), less studies reported global EF scores (i.e., aggregated or latent scores from at least two EF tasks assessing different EF subcomponents), and a smaller number of studies reported both. Of the teacher studies, most reported separate EF task scores while a lower number of studies reported global EF scores.

The majority of the studies in both the parenting and teaching literature examined the relationship between parent/teacher behaviors and child EF with a longitudinal design while a smaller number of studies used cross-sectional designs. Further, a small number of studies implemented interventions or used experimental designs to examine the effect of manipulated parent and teacher behaviors on child EF.

Theoretical approaches and mechanisms explaining the relation of parental and teacher behaviors to child EF

An overarching theoretical approach in various studies that we reviewed (e.g., Baker & Kuhn, 2017; 2007) is the *Bioecological Model*, which posits that proximal processes in children's daily environment are critical for children's cognitive development (Blair, 2002; Bronfenbrenner & Morris, 2006). This model assumes that children develop by interacting with their environment which is composed of nested structures each contained within the next, and these structures are ordered from the most to least direct interactions with children (Bronfenbrenner, 1977, 1995). The child is at the center of this model. The first level in this model is the *microsystem* which includes contexts that children have direct contact with such as family and school. The proximal processes in the microsystem include parent and teacher behaviors toward children such that the way parents and teachers interact with children reinforces or adversely influences the development of cognitive abilities including EF (e.g., Baker & Kuhn, 2017; Hoffman et al., 2006; McKinnon & Blair, 2018; Towe-Goodman et al., 2014). It is proposed that the relationships in the proximal processes are bidirectional: parents and teachers can influence child development while child characteristics (e.g., personality, disorders) can also impact how parents and teachers change their actions towards children. The second level is called the *mesosystem* which refers to the interactions between microsystems such as parent-teacher interactions. The next level is called the *exosystem* which encompasses the contexts that children do not directly interact with but that influence the microsystems such as facilities present in the neighborhood where family lives or working conditions of teachers. The next level is the *macrosystem* referring to societal and cultural elements such as the wealth of the country. The last level is called the *chronosystem* which refers to environmental changes throughout children's lives such as moving to a new city. The Bioecological Model functions as an umbrella theory in the sense that other theoretical approaches apply to specific ecosystems that are part of the overarching model.

Attachment Theory

The *Attachment Theory* was discussed in both parent (e.g., Heylen et al., 2017; Merz et al., 2016; Schneider-Hassloff et al., 2016) and teacher articles (e.g., Cadima et al., 2015; McKinnon & Blair, 2018; Vandenbroucke, Spilt, Verschueren, & Baeyens, 2017) to explain how positive and negative parental and teacher behaviors play a role in the development of child EF (Bowlby, 1982). According to the attachment perspective, parents' sensitive and warm behaviors help children to develop secure attachment relationships and trust in their parents' availability when needed. Similarly, teachers can act as post hoc attachment figures to whom children can emotionally connect at a later developmental stage (Commodari, 2013). When children receive emotional support and warmth from teachers, and have a close relationship with their teachers, they establish secure attachment with their teachers (Pianta, 1999). The Attachment perspective supports the idea that proximal processes in the *microsystem* where children have direct contact with parents and teachers have crucial effects on child development. Secure attachment with parents and teachers makes children feel confident about exploring their environments and engaging in challenging and stimulating activities, and, as a result, they may benefit more from parents' and teachers' instructions (Bowlby, 1982; Landry, Smith, & Swank, 2006; Mills-Koonce et al., 2012; Sroufe, 1988; Verschueren & Koomen, 2012). Such positive experiences with parents and teachers provide key conditions for EF development both at a behavioral and neural level (Bernier et al., 2012, 2015; Blair, 2002; Carlson, 2009). For example, Swingler et al. (2018) showed that maternal emotional support predicted larger right hemisphere fronto-centrally distributed negative component (N2) responses in children. This greater neural activity was related to better performance during inhibition tasks, suggesting that maternal emotional support is associated with EF performance on both a neurocognitive and behavioral level.

Sociocultural Theory

Regarding the positive role of cognitive parental and teacher behaviors in EF development, the *Sociocultural Theory* has been utilized as an explanation in both parenting (e.g., Baptista et al., 2016; Conway & Stifter, 2012) and teacher studies (e.g., Williford et al., 2013). According to this theory, EF skills emerge and develop in the context of social interactions (Luria, 1961; Vygotsky, 1978) in which more skilled experts (i.e., parents, teachers) guide and teach children how to use and rely on their cognitive and self-regulatory skills (Stetsenko & Vianna, 2009). The pioneers of the Sociocultural Theory suggested that *scaffolding* is the key mechanism by which skilled adults support and guide children during tasks requiring attention, memory, or language skills beyond the children's level (Hughes & Ensor, 2009; Wood & Wood, 1996; Wood et al., 1976). As children become more competent in the tasks, adults can provide more autonomy to children by decreasing the level of support and letting children take more responsibility (Vygotsky, 1934, 1986; Wertsch, 2008). By means of parents' and teachers' scaffolding and autonomy support, children internalize EF-related strategies and learn to solve problems independently (Hughes, 2011; Landry et al., 2002). This argumentation supports the view that quality of children's interactions as proximal processes in the *microsystem* is vital for child development (Bronfenbrenner, 1977, 1995). Further, a few studies indicated that a candidate mechanism explaining the relation between parents' cognitive behaviors and EF development is children's language ability. It has been repeatedly shown that parents' scaffolding predicts child EF through children's verbal skills (Hammond et al., 2012; Landry et al., 2002; Lee et al., 2018; Obradović & Finch et al., 2019). It has been suggested that parents' scaffolding efforts promote the language abilities of children, specifically self-directed speech (Fernyhough & Fradley, 2005). In turn, children's self-directed speech has been theorized as a tool to regulate thoughts and behaviors which reinforces the performance during EF tasks (Vallotton & Ayoub, 2011; Vygotsky, 1978).

Family stress model

The *Family Stress Model* is a theoretical approach which explains possible environmental and situational reasons for variation in parental behaviors (Conger et al., 1984; Lengua, 2012; Repetti et al., 2002). This model posits that family risk factors such as low socioeconomic status (SES) or mental health problems can lead to parental stress which affects parenting behaviors and subsequently

exerts impact on social and cognitive development of children. Environmental factors such as family income can be situated at the *exosystem* in the Bioecological Model while parents' mental health problems can be placed at the *microsystem*. These factors at both levels have effects on how parents interact with their children which in turn impacts the EF development of children. Reviewed studies supported this view by showing that mothers with depressive symptoms displayed less warmth, stimulation, maternal child-reading, and more intrusive behaviors towards their children; all these behaviors were associated with lower child EF (Baker & Kuhn, 2017; Baker, 2018; Gueron-Sela et al., 2018). Moreover, many studies revealed that parents from lower SES families are less likely to demonstrate scaffolding, cognitive stimulation, sensitivity, language input and more likely to show intrusive behaviors; these behaviors also influence the EF abilities of children (Daneri et al., 2018; Lengua et al., 2014; Suor et al., 2016; Yu et al., 2020). Similarly, Gustafsson et al. (2015) showed that higher levels of intimate partner violence are associated with less sensitive parental behaviors, which subsequently are related to lower EF performance of children. Although stressors in teachers' work environments and daily lives may also influence teacher behaviors, thereby affecting child EF development, no studies included in this review referred to such a teacher stress model.

Intergenerational transmission model

While most theoretical models focus on how social interaction mechanisms explain the relationships between parental/teacher behaviors and child EF, the *Intergenerational Transmission* account suggests that parents transfer abilities, traits and outcomes to their children through both genetic and non-genetic processes (Bridgett et al., 2015; Deater-Deckard, 2014). In contrast to non-genetic processes, genetic make-up is not situated within a specific ecological system but can be placed at the (central) child level in the Bioecological model. Regarding genetic transmission, the extensive literature on the genetics of EF revealed that the heritability is moderate to high (ranging from 60 to 90 %) while environmental variance is modest to moderate (ranging from 10 to 40 %; Bridgett et al., 2015; Miyake & Friedman, 2012). So, genetic transmission can only partially explain the link between parental and child EF. Non-genetic socialization processes, taking place in the *microsystem*, such as how parents behave towards their children, also function as a mediator between parental EF and child EF. For example, parents with lower EF scores have been shown to display less sensitivity and more negative caregiving behaviors during their interaction with children (Deater-Deckard et al., 2012; Gonzalez et al., 2012). Further, some studies showed that parental EF impacts child EF through parental behaviors. For example, Distefano et al. (2018) showed that parents with higher EF skills showed more autonomy support behaviors, and this was related to better child EF skills. Similarly, Zeytinoglu, Calkins, Swingler, and Leerkes (2017) demonstrated that maternal effortful control is indirectly and positively related to child EF through maternal emotional support. Lastly, Cuevas et al. (2014) found that maternal EF predicted the change in child EF from 36- to 48-months via negative aspects of parenting (i.e., negative affect, intrusiveness).

Teaching through interactions

The *Teaching Through Interactions* framework, proposed by Hamre and Pianta (2007) is focused on a specific daily environment, namely the school context. This framework suggests that the quality of daily interactions between teachers and students influences the learning and sociocognitive development of children. Teacher-child interactions, including the factors that impact on them and how they are valued, can be situated in many levels of the Bioecological Model. Interactions between teachers and students themselves are part of the *microsystem*. Interactions between teachers and other agents such as parents can be situated in the *mesosystem* and the quality of these interactions may have an impact on child development. Interactions may be impacted by working conditions of the teachers which can be considered as part of the *exosystem*. Finally, the *macrosystem* may play a role because teacher-child interactions may be valued differently across societies.

Empirical findings on the relation between parent and teacher behaviors and children's EF

Positive parental and teacher behaviors and EF

In total, 44 studies examined the relationship between 7 different positive parental behaviors and children's EF. The majority of the studies examined the association between *parental warmth* and children's EF ($n = 23$). Most of these studies ($n = 15$) reported that higher degrees of warmth were associated with higher child EF scores (e.g., Baker & Kuhn, 2017; Mathis & Bierman, 2015), although some studies reported no relationship ($n = 7$; e.g., Ekerim & Selcuk, 2017; St George et al., 2016), and one study reported a negative relationship (Vandenbroucke, Spilt, Verschueren, & Baeyens, 2017). The link between parental sensitive and responsive behaviors and children's EF has also been studied frequently ($n = 22$; e.g., Graziano et al., 2010, Lengua et al., 2014). Most of these studies ($n = 15$) found a positive relationship between parents' sensitive and responsive behaviors and children's EF abilities (e.g., Holochwost et al., 2016; Lucassen et al., 2015; Suor et al., 2016) while a small number of studies did not observe a significant relationship with EF ($n = 7$; Gärthner et al., 2018; Gündüz et al., 2015; Halse et al., 2019; Korucu et al., 2019). Three studies examined the relation of parents' emotional support with child EF, and all studies found a positive significant association (Bosquet Enlow et al., 2019; Swingler et al., 2018; Zeytinoglu, Calkins, Swingler, & Leerkes, 2017). All three studies that investigated the association between *attachment security* to the parents and child EF found a positive relationship (Cassidy et al., 2017; Heylen et al., 2017; Low & Webster, 2015). Two out of 3 studies examining the link between *parent–child synchrony* and child EF found a positive relationship (Clark & Woodward, 2014; Suor et al., 2019) while one study did not observe a significant relationship (2007). One study found a positive relation between *positive parenting* and child EF while the same study did not report a significant association between parents' *rewarding* behaviors and child EF (Roskam et al., 2014).

Twenty-seven articles investigated the role of 2 different positive teacher behaviors in EF development. Sixteen studies examined the relation between teachers' *emotional support* at the classroom level and child EF. Although 9 of these studies found that a higher

degree of emotional support is related to higher child EF (e.g., Neuenschwander et al., 2017; White et al., 2019), 6 studies did not observe a significant association (e.g., Hu et al., 2017; Leyva et al., 2015). The relation of *closeness* between teachers and children and child EF has been examined by 12 studies; 7 studies reported a positive relationship (e.g., Hernández et al., 2017; McKinnon & Blair, 2018) while 5 did not observe any relationship (e.g., Cadima et al., 2015; Swanson et al., 2015).

To summarize, out of 56 analyses conducted in 44 studies which examined positive parental behaviors, 39 (69.64 %) cases showed a significant positive association with child EF. Twenty-six (78.79 %) of 33 longitudinal analyses revealed a positive relationship between positive parental behaviors and child EF, while 11 (55 %) of 20 cross-sectional analyses showed a significant positive effect. One intervention study found a significant positive association while 2 experimental studies did not find an effect of positive parental behaviors on child EF.

In the teacher literature, out of 27 analyses conducted in 27 studies which examined positive teacher behaviors, 15 (55.55 %) cases found a significant positive association between those behaviors and child EF. Out of 21 longitudinal analyses, 16 (76.19 %) found a positive relation between positive teacher behaviors and child EF while all of the 4 cross-sectional and 2 experimental studies did not find an effect.

Even though most studies found that positive parental and teacher behaviors were associated with better child EF outcomes, some studies did not observe such a relationship. These inconsistent findings might be due to methodological differences between studies: one possible reason is shared between parent and teacher studies, one is specific to parent studies, and one is specific to teacher studies. First, the studies which reported no relationship between positive parental (Ekerim & Selcuk, 2017; Gärtner et al., 2018; Gündüz et al., 2015; Kamza et al., 2016) and teacher behaviors (Goble & Pianta, 2017; Leyva et al., 2015; Schmitt et al., 2019) and child EF mostly examined inhibitory control as a separate EF component rather than global EF scores or other components. Second, studies which reported no relationship between positive parental behaviors and child EF predominantly assessed parental behaviors via self-reports (e.g., Gündüz et al., 2015; Roskam et al., 2014; Sosic-Vasic et al., 2017) and one study that reported a negative association between parents' emotional support and child EF used child-report as an assessment method of parental behaviors (Vandenbroucke, Spilt, Verschueren, & Baeyens, 2017), rather than observation. Third, the age of the children may be another reason for the inconsistent results in the teacher studies. Particularly, closeness between teachers and children has been found to be a positive predictor of EF in children younger than 6 (e.g., Hernández et al., 2017; 2020), but not in most of the studies that assessed child EF in children older than 6 (e.g., Swanson et al., 2015; Vandenbroucke et al., 2018).

Negative parental and teacher behaviors and EF

Forty-two studies investigated the association between 6 negative parental behaviors and children's EF. Thirty-seven studies assessed the effect of parents' *intrusiveness/controlling* behaviors. While the majority of studies (n = 25) found adverse effects of parents' controlling behaviors on children's EF development (e.g., Gueron-Sela et al., 2018; Meuwissen & Carlson, 2018; Xing et al., 2016), fewer studies (n = 12) did not observe a significant relationship, and one study observed a positive association (2016). Regarding *negative affect,* out of 9 studies, 7 studies found that parents' negative affect was adversely related to child EF (e.g., Cuevas et al., 2014; Swingler et al., 2018; Zeytinoglu, Calkins, Swingler, & Leerkes, 2017; Zeytinoglu, Calkins, & Leerkes, 2018), while 2 studies did not observe such a relationship (St George et al., 2016; Yu et al., 2020). Three studies examined the role of *parental inconsistency* on child EF; while one study found a negative effect (Sosic-Vasic et al., 2017), 2 studies did not observe a significant relationship (Kamza et al., 2016; Roskam et al., 2014). Out of the 2 studies investigating the role of *detachment*, one found a negative relation with child EF (Yu et al., 2020) while the other study did not find any relationship (St George et al., 2016). One study investigating parental *protection* found that more concerned and anxious behaviors by the parents were related to higher child EF (Kamza et al., 2016). One study examining the relationship between *ignoring* and child EF did not reveal a significant relationship (Roskam et al., 2014).

Two types of negative teacher behaviors were examined in thirteen studies. *Conflict* is the most studied construct (n = 13; e.g., 2012), and the majority of studies (n = 11) revealed a negative association between conflict and children's EF development (e.g., Goble et al., 2019; McKinnon et al., 2018; Sandilos et al., 2019) while 2 studies did not find a significant relationship (Vandenbroucke, Spilt, Verschueren, & Baeyens, 2018; Vandenbroucke et al., 2018). One study examined *dependency*, and found that it was negatively related to child EF (Vandenbroucke et al., 2018).

To summarize, in 52 analyses conducted in 42 studies in which parental negative behaviors were examined, the majority of cases (n = 34, 65.38 %) found a significant negative association with child EF. Out of 24 longitudinal analyses, 20 (83.33) found a significant negative link between parents' negative behaviors and child EF while 12 (50 %) of 24 cross-sectional studies found an effect. One (33.33 %) of the 3 experimental studies found a significant negative association and one intervention study did not find an effect.

In 14 analyses in 13 studies in which teachers' negative behaviors were examined, the majority (n = 12, 85.71 %) found a significant negative association with child EF. Most of the longitudinal analyses (n = 10, 90.91 %) in 11 studies revealed a significant negative relationship between teachers' negative behaviors and child EF. One cross-sectional study and one (50 %) of 2 experimental studies found a significant negative impact of teachers' negative behaviors on child EF.

Findings with respect to the association between negative parental and teacher behaviors and child EF are thus inconsistent. Even though there was no clear pattern of differences among studies finding significant and non-significant relationships between teachers' negative behaviors and child EF, inconsistencies between findings in the parent field might be related to the method of assessment and age of the children. Studies which assessed parental behaviors through self-reports (e.g., Gündüz et al., 2015; Roskam et al., 2014; Sosic-Vasic et al., 2017) revealed more inconsistent results compared to studies using observational methods. Further, negative relations between child EF and negative parental behaviors, especially controlling and negative affective behaviors, are more pronounced for younger children (Holochwost et al., 2018; Rolan et al., 2018) compared to older ones (Sosic-Vasic et al., 2017; Spruijt,

Dekker, Ziermans, & Swaab, 2019).

Cognitive parental and teacher behaviors and EF

In total, 43 studies examined the role of 6 different parental cognitive supportive behaviors in children's EF development. The majority of the studies examined parents' *scaffolding* ($n = 15$). The positive role of parents' scaffolding behaviors has been demonstrated by 11 studies (e.g., Hammond et al., 2012; Hughes & Devine, 2017; Lengua et al., 2014) while 4 studies did not show a significant relation (e.g., Clark & Woodward, 2014; Lowe et al., 2014). *Cognitive stimulation* has also been studied frequently. While 9 out of 14 studies found that parents' cognitive stimulation played a positive role in child EF development (e.g., Berkes et al., 2019; Obradović, Yousafzai, Finch, & Rasheed, 2016; Obradović & Finch et al., 2019; Yu et al., 2020), 3 studies did not observe a significant association (e.g., Hughes & Devine, 2017;; St George et al., 2016), and two studies observed a negative relationship (Korucu et al., 2019; Zeytinoglu, Calkins, & Leerkes, 2018). With regard to parents' *language input* ($n = 10$), both higher quantity (Daneri et al., 2018) and more qualitative content (mental state talk, using elaborative language compared to directive language; e.g., Baptista et al., 2018; Bibok et al., 2009; Bindman et al., 2013; Weisleder et al., 2018) have been shown to be positively related to child EF performance in 7 studies, although 3 studies did not find a significant association (e.g., Eason & Ramani, 2016; Hughes & Devine, 2017). The findings regarding the association between *autonomy support* of the parents ($n = 9$) and child EF were inconsistent: while 3 studies found a positive effect (e.g., Cipriano-Essel et al., 2013; Meuwissen & Carlson, 2018), 5 studies found no significant effects (e.g., Roskam et al., 2014; Schroeder & Kelley, 2010), and one study found a negative effect (Kamza et al., 2016). Two studies showed that parents' *attention-related behaviors* were positively associated with child EF (Conway & Stifter, 2012; Gueron-Sela et al., 2018). Lastly, one study investigated the role of parents' *EF-related behaviors* and found a positive relation with children's EF development (Korucu et al., 2019).

Twenty studies examined the relationship between 5 different cognitive supportive behaviors by teachers and child EF. Teachers' *instructional support* has been studied repeatedly in relation to child EF development ($n = 16$). Findings revealed contradictory results: while 7 studies found a positive association between instructional support and child EF (e.g., Goble et al., 2019; Hatfield et al., 2016), 8 studies did not observe a significant association (e.g., Choi et al., 2016; Hu et al., 2017; Neuenschwander et al, 2017), and one study found a negative relation (Rimm-Kaufman et al., 2009). The role of teachers' *classroom organization* in child EF has been studied by 15 studies. Eleven articles reported a positive relationship between classroom organization and child EF (e.g., Goble et al., 2019; Hu et al., 2020; Rimm-Kaufman et al., 2009) while 4 articles did not observe such a relationship (e.g., Goble & Pianta, 2017; Langeloo et al., 2019). *EF-related behaviors* of teachers have been investigated by 2 studies which revealed a positive association with children's EF performance (Bardack & Obradović, 2019; Dias & Seabra, 2017). Teachers' *autonomy support* has also been examined by one study which found a significant positive relationship with child EF (Sosic-Vasic et al., 2015). Lastly, one study found a positive association between teachers' *language input* and child EF (Weiland et al., 2013).

To summarize, out of 51 analyses in 43 studies in which cognitive parental behaviors were investigated, most cases ($n = 33$, 64.70 %) found a significant positive association with child EF. Seventeen (68 %) of the longitudinal analysis in 25 studies and 12 (60 %) of the 20 cross-sectional analyses found a significant positive impact of parents' cognitive behaviors on child EF. While one experimental study did not find an effect, all 5 studies that implemented an intervention found a significant positive effect of parents' cognitive behaviors on child EF.

Similarly, in 35 analyses in 21 studies in which cognitive teacher behaviors have been investigated, most ($n = 22$, 62.86 %) found a significant positive association with child EF. Fifteen (62.5 %) of 24 longitudinal analyses, 5 (62.5 %) of 8 cross-sectional analyses, and all of 3 intervention studies displayed significant associations between teachers' cognitive behaviors and child EF.

Comparisons of the studies suggest that inconsistent findings could be related to scoring of EF in both fields, assessment methods of parental behaviors, and how EF was measured in the teacher field. First, studies using global EF scores more consistently revealed a positive association between cognitive parental behaviors (e.g., Gueron-Sela et al., 2018; Meuwissen & Carlson, 2018; Obradović, Yousafzai, Finch, & Rasheed, 2016) and teacher behaviors (e.g., Fuhs et al., 2013; Neuenschwander et al. (2017), ; White et al., 2019) and child EF, while findings from studies using separate EF components (i.e., inhibitory control, working memory, cognitive flexibility) appear to be more inconsistent in parent (e.g., Ekerim & Selcuk, 2017; Lowe et al., 2014; Meuwissen & Carlson, 2015) and teacher studies (e.g., Leyva et al., 2015; Pianta et al., 2020). With regard to the assessment method of parental behaviors, studies which used observational methods report significant positive relationships with EF scores (e.g., Bindman et al., 2013; Merz et al., 2017; Suor et al., 2019), while studies using self-report predominantly found null results (e.g., Baker, 2018; Hughes & Devine, 2017; Schroeder & Kelley, 2010). Lastly, one study which reported a negative association between teachers' instructional support and child EF obtained child EF scores via teacher report which is different from the rest of the studies (Rimm-Kaufman et al., 2009).

Global teacher-child interaction quality and EF

Six studies combined several aspects of teacher behaviors (e.g., taking the average of teachers' emotional support, classroom organization, and instructional support behaviors or closeness and conflict between teachers and children) and created overarching *teacher-child interaction quality* scores (e.g., Blair et al., 2016; Cadima et al., 2016). Out of these studies, 5 found a positive role of teacher-child interaction quality in child EF (e.g., Goble et al., 2019; Hamre et al., 2014) while one study did not observe such an association (Nguyen et al., 2020). Among these studies, 4 (80 %) out of 5 longitudinal analyses and one cross-sectional study found a positive effect of global teacher-child quality on child EF.

Variables moderating the relationship between parent and teacher behaviors and children's EF

Apart from the relationships between parental/teacher behaviors and child EF, studies also revealed some moderator variables,

addressing under which circumstances and for which populations these behaviors exert their effects on child EF. Various studies demonstrated that the nature of the relationship between parental/teacher behaviors and child EF depends on characteristics of parents, teachers and classrooms, and children. As an example of parental characteristics, Cassidy et al. (2017) showed that an intervention which targets improving the attachment quality between caregivers and children, showed positive effects on children' inhibitory control performance only when caregivers had lower maternal attachment anxiety prior to administering the intervention (i.e., individuals' fear of interpersonal rejection and abandonment).

In addition, the effect of teacher behaviors on child EF is moderated by teacher and classroom characteristics. For example, an increase in emotional support was related to an increase in inhibitory control abilities of preschoolers, but these gains were smaller when teachers started at a lower level of emotional support at the beginning of the year (Goble et al., 2019). Further, Ansari and Pianta, 2018 showed that the relationship between teachers' instructional support and child EF is stronger for 4-year-olds in less age-diverse classrooms (i.e., high proportion of 4-year-olds to other age groups) compared to classrooms with more age diversity.

Some studies found that the effect of adults' behaviors on child EF depends on children's characteristics. For example, the effect of parents' autonomy support, attention maintaining behaviors, and scaffolding on EF are stronger for temperamentally negative children (i.e., being easily frustrated), inhibited and exuberant children, and children high on surgency (i.e., the degree to which children display impulsivity, pleasure, and approach) respectively (Cipriano-Essel et al., 2013; Conway & Stifter, 2012; Suor et al., 2019). Another study found that the effect of teacher-child closeness on child EF was moderated by children's externalizing behavior problems such that higher teacher-child closeness was related to lower EF gains only for children with externalizing behavior problems (Goble et al., 2019). An experimental study by Vandenbroucke, Spilt, Verschueren, and Baeyens (2018) showed that students who received a manipulated supportive message from teachers and who perceived themselves as socially less accepted performed less well on a working memory task after they were socially excluded in the experimental manipulation. Furthermore, it has been shown that the effect of teachers' classroom organization and emotional support on inhibitory control is stronger for children who have lower inhibitory control scores in the beginning of the school year (Choi et al., 2016) and in high-quality classrooms (i.e., classrooms with high scores on instructional support; Weiland et al., 2013). Taken together, findings point out that, for some parent/teacher behaviors, children in more optimal conditions benefit more from the adult behaviors while for some parent/teacher behaviors children in less optimal conditions benefit more.

Discussion

In this study we reviewed research on the relationship between parental behaviors and child EF development as well as teacher behaviors and child EF development. We aimed to compare and combine explanations and findings from these two bodies of literature focusing on the period from toddlerhood to middle childhood. Our review shows that studies investigating the role of parent and teacher behaviors used both similar and different theoretical frameworks to explain the link between parent/teacher behaviors and child EF. While some theories explain the impact of both parent and teacher behaviors, other theories focus on mechanisms specific to parents or teachers. To review empirical findings, we divided parental and teacher behaviors into positive, negative, and cognitive behaviors. Parental behaviors were investigated much more frequently and with attention to more diverse and specific behavioral dimensions compared to teacher behaviors. In general, parents' and teachers' positive and cognitive behaviors have a positive association with child EF while negative parent and teacher behaviors have negative relationships with child EF. These findings will be discussed in more detail below.

Theoretical approaches and underlying mechanisms

An overarching theory and two specific theories mentioned in both parent and teacher literature are respectively the Bioecological Model (Bronfenbrenner & Morris, 2006), the Attachment Theory (Bowlby, 1982), and the Sociocultural Theory (Vygotsky, 1978). Two theoretical approaches that have been used only in the parent literature are the Family Stress Model (Repetti et al., 2002) and the Intergenerational Transmission Account (Bridgett et al., 2015; Deater-Deckard, 2014). One theoretical framework mentioned only in the field of education is Teaching Through Interactions (Hamre & Pianta, 2007). Three of these theoretical approaches suggest mechanisms for parent–child interactions and child EF and these suggestions can be informative for the teacher literature.

First, the Family Stress Model focuses on parents, but teacher stress may impact child EF development as well. Previous research demonstrated that better wage conditions and professional well-being of teachers are correlated with more sensitive, nurturing and less punitive behaviors of teachers (Ghazvini & Mullis, 2002). Moreover, Cassidy et al. (2016) showed that teachers' autonomy in the workplace and perception of fairness in their salary were associated with classroom emotional support, and teachers' wage was related to toddlers' positive emotional expressions and behaviors in the classroom. To our knowledge, only one study investigated the relation between a stressful school environment or workload and teacher behaviors in the context of child EF. Neuenschwander et al. (2017) found that teachers' work-related stress is negatively associated with their emotional support and classroom organization levels, and a marginally significant relationship between teachers' stress and child EF was found. However, they did not find that classroom quality

mediated the relationship between teacher stress and child EF. The authors suggested that the global classroom quality measures they used may not have captured the effect and that adopting measures of dyadic level child-level teacher behaviors may be more appropriate.

Second, in the framework of Sociocultural Theory, one candidate mechanism offered for explaining the relation of parents' cognitive support to child EF is children's verbal ability (Hammond et al., 2012; Landry et al., 2002; Lee et al., 2018; Obradović & Finch et al., 2019). It could be that while parents use strategies to support the cognitive abilities of their children, they can enhance language abilities simultaneously (e.g., Landry et al., 2002). An extended body of research illustrated that children's lexical (e.g., Blom & Boerma, 2019; Vugs et al., 2015), syntactic (e.g., Kaushanskaya et al., 2017), and private speech abilities (e.g., Alarcón-Rubio et al., 2014; Aro et al., 2014; Winsler et al., 1999) are positively correlated with their EF performance. It has been theorized that children can use verbal skills as a means while they are regulating their behaviors and thoughts which in turn reinforces their performance in EF tasks (Vallotton & Ayoub, 2011; Vygotsky, 1978). It is relevant to note here that children rely on private speech more strongly at younger ages, i.e., preschool age, compared to older ages, i.e., after enrolment into primary school (Winsler et al., 2000). In the teacher literature, relatively fewer studies have examined the relationship between teacher behaviors, language, and EF development. Cadima et al. (2019) demonstrated the positive role of teacher-child closeness in vocabulary development of preschoolers. Moreover, Krafft and Berk (1998) found that type of classroom activities (i.e., make-believe play) and less involvement of teachers during play are related to children's private speech. However, to the best of our knowledge, there is no research examining child language abilities or private speech as mediators in the association between teachers' cognitive support and child EF.

Third, the Intergenerational Transmission Model emphasizes the role of parent behaviors in the link between parental and child EF (Bridgett et al., 2015; Deater-Deckard, 2014). Considering the possibility that teachers' own EF abilities may influence their behaviors towards students, teacher EF may be related to child EF as well. Teachers who have difficulty in regulating their own attention, thoughts, and behaviors may provide less appropriate modeling, which in turn may influence students' EF development. Empirical evidence for this kind of relationship would also support the hypothesis that EF of significant adults is associated with child EF not only through genetic transmission but also through adult behaviors. Some recent studies in the field of education supported the view that teachers' EFs and EF-related behaviors in the classrooms predict EF development (Bardack & Obradović, 2019; Dias & Seabra, 2017). To our knowledge, there are currently no studies examining whether teacher behaviors explain the association between teachers' EF and child EF. In addition, parental genetic and socialization factors may operate on child EF through the school selection process. One study has shown that parents with higher EF have higher income and education (Kao et al., 2018). These parents are more likely to live in higher SES neighborhoods and have easy access to higher quality schools/classrooms which may result in better child outcomes including EFs. Indeed, one study showed that children with more disadvantaged backgrounds (e.g., migrant children with low parental education) are more likely to attend low quality schools (Stahl et al., 2018). Another study also revealed that living in a high SES neighborhood is associated with high quality of teachers' instructional support which is in turn related to EF outcomes of children (Wei et al., 2021). Therefore, it should be noted that the transmission from parental EF to child EF can also partially be achieved through school selection and thus teacher-child interaction quality.

All theories in both fields suggest that social interactions between parents, teachers and children are influential in the process of EF development. As Morris et al. (2007) suggested in their review, there are at least three possible socialization processes explaining how children gain regulation skills from adults. First, children observe behaviors of people around them to learn new skills, including EFs in everyday contexts (Bandura, 1977; Moriguchi, 2014; Vygotsky, 1978). Children observe how parents and teachers act in certain situations and what kind of strategies they use during tasks that require EF skills, such as verbally repeating a phone number to keep it in mind. They imitate these strategies when they encounter a similar situation and thus, gain EF skills via parents' and teachers' modeling. Second, parents' and teachers' practices specifically related to improvements in child EF skills may be helpful (Vygotsky, 1978). When parents and teachers scaffold EF abilities of children by teaching them strategies (e.g., encouraging children to wait for their turn in turn-taking tasks), children may learn to demonstrate these skills in everyday contexts and during EF tasks. Third, co-regulation between significant adults and children is thought to be related to self-regulation abilities of children (e.g., Bernier et al., 2015; Bridgett et al., 2015; Eisenberg et al., 1998). Parents and teachers with stronger EF abilities are probably able to regulate their own behaviors and emotions more, and provide co-regulation through goal-oriented behaviors and expressed affect. A calm and regulated response by a parent or teacher activates a similar response in a child and the level of arousal is matched to the parent. Through repeated co-regulation a child internalizes self-regulation strategies.

Empirical findings

Similar facets of parental and teacher behaviors have been studied in relation to EF development and the studied behaviors in both fields tap into positive, negative, and cognitive aspects. Findings in both fields suggest that positive and cognitive parent/teacher behaviors are positively associated with EF development while negative behaviors adversely related to EF development. The finding that teacher behaviors show similar associations with child EF as parent behaviors, suggests that parenting behaviors are not just merely genetically linked to child EF, but that social constructive mechanisms are also at play, which is in line with the Intergenerational Transmission Account (Bridgett et al., 2015; Deater-Deckard, 2014). The two fields differed in that parental behaviors were

examined with more nuanced terms regarding emotional (e.g., sensitivity, attachment security), negative (e.g., controlling, negative affect), and cognitive (e.g., scaffolding, attention-related behaviors) aspects while teacher behaviors were studied with more global terms such as teacher-child interaction quality, emotional support, or instructional support. One possible reason for this difference is that teacher behaviors are mostly assessed at the classroom level while parental behaviors are assessed at the dyadic level.

A larger portion of the studies revealed a significant relation of positive parental behaviors with child EF compared to teacher behaviors, while the proportion is similar in terms of cognitive parental and teacher behaviors. Yet, with negative behaviors a larger portion of the studies demonstrated a negative relationship between teacher behaviors and child EF than parents' negative behaviors. One potential reason as to why positive parental behaviors were found to be significantly related to child EF in more studies could be that children are more consistently exposed to parental behaviors (i.e., starting from birth), while exposure to teacher behaviors is less stable and continuous (i.e., children start schooling after certain ages, children engage with different teachers throughout school years). However, this cannot explain why negative teacher behaviors show a reverse pattern. Another explanation may be related to the dyadic- versus classroom-level at which behaviors occur or are assessed. That is, while parental behaviors were assessed at the dyadic level (one-to-one parent–child interaction), teacher behaviors were mostly examined at the classroom level which makes it more difficult to link teacher behaviors to each child's EF performance. Moreover, there is less one-to-one interaction between teachers and individual students compared to parent–child interactions. Negative teacher behaviors were relatively often significantly related to child EF. In contrast to other aspects of teacher behaviors, negative teacher behaviors (i.e., teacher-child conflict and dependency) have been studied more often at the dyadic level, similarly to parental behaviors. This pattern of results aligns with the findings of Vandenbroucke et al. (2018) meta-analysis which revealed that teacher-child interactions examined at the dyadic level show stronger effects on child EF compared to classroom level assessments.

Regarding the design of the studies, in both the parent and teacher literature, longitudinal studies revealed significant effects of parent and teacher behaviors on child EF in the expected direction more frequently than cross-sectional studies. Further, intervention studies in both fields found significant positive effects of implemented positive and cognitive parent and teacher behaviors on child EF development while in experimental designs, most of the studies did not find an effect of the manipulated parent and teacher behaviors. This pattern of findings suggests that the quality of adult-child interactions impacts EF development in the long term rather than in the short term.

Although the empirical findings reviewed in our study suggest that parent and teacher behaviors influence child EF, it is important to realize that most of the included studies used correlational designs which limits conclusions about causality. Conceptually, reversed relationships are plausible as children with better EF skills may trigger different parent and teacher behaviors than children who have less well developed EF. Previous studies showed that children's high level of self-regulation abilities predicted positive change in parental responsiveness (Merz et al., 2017). Relatedly, de Ruiter et al. (2020) demonstrated that teachers reacted with more negative emotions to children that they perceived as more disruptive in past events compared to students perceived as less disruptive. A few studies also showed that children's behavioral problems predicted teachers' job-related stress and teachers' higher EF was associated with lower stress (Friedman-Krauss et al., 2013, 2014). Bidirectional relationships could lead to a cascading effect in children with low EF who display more disruptive behaviors, and in turn trigger more negative behaviors in parents and teachers.

Methodological explanations for inconsistent results

Even though most of the studies revealed a positive relation between parents' and teachers' positive and cognitive behaviors and child EF, and pointed to an adverse role of negative behaviors, some studies did not reveal any significant relationship. Possible reasons for inconsistent results could be methodological differences in measurement instruments and data analysis, some of which are shared across parenting and teacher study findings (i.e., use of global vs separate EF scores and child age) while others are specific to the parenting field (i.e., assessment method of parental behaviors). First, the result that global EF scores more frequently revealed a significant relation between parent/teacher behaviors and child EF compared to separate task scores aligns with the finding that, in early childhood, a unitary latent EF factor represents EF performance of children more reliably than separate task scores (Hughes et al., 2009; Wiebe et al., 2011; Willoughby & Blair, 2011). These findings can be explained by the fact that in young children, there tends to be a relatively high amount of measurement error for separate EF tasks because assessment may be more prone to noise due to external factors such as hunger or fatigue. With global latent scores the influence of measurement error drops. Despite the advantages of global EF scores, most of the studies in the two bodies of literature utilized separate EF scores. Secondly, more frequent observation of significant relations between parent/teacher behaviors and child EF at younger ages, compared to older ones, supports the hypothesis that young children rely on co-regulation with adults (i.e., parents' and teachers' external help for children to modify children's behaviors, thoughts, and emotions according to the requirements of the specific context) before they learn self-regulation (Blair & Ursache, 2011; Erdmann & Hertel, 2019; Kurki et al., 2016; Pauen, 2016). Third, patterns of findings in the parenting field showed that when parental behaviors were assessed through observational methods, they displayed significant relations with child EF to a greater extent compared to studies using self- or child-reports. Previous research suggest no (Herbers et al., 2017) or low (Hendriks et al., 2018) correlation between observed and self-reported parental behaviors which may stem from parents' tendencies to present their child-rearing practices in a socially desirable way (Bögels & van Melick, 2004; Schwarz et al., 1985; Waylen et al., 2008). Further, while self-reports rely on parents' own frame of reference for their behaviors, observational methods use the same frame of reference for all parents, possibly making observations a more reliable method to measure differences between parents and to investigate the relationship between parental behaviors and child EF.

Moderator variables

Empirical findings of the studies included in this review also demonstrated that the effect of parents and teachers' behaviors on child EF depends on individual difference factors. Some parent characteristics such as mothers' attachment anxiety moderate the relationship between parent–child interactions and EF development (Cassidy et al., 2017). Likewise, the effect of teacher behaviors depends on classroom and child characteristics. The role of emotional and cognitive support of teachers on child EF seems to vary based on age diversity and general quality of the classrooms (i.e., high level of instructional support of the teachers), support level of teachers in the beginning of the school year as well as children's externalizing behaviors, initial EF levels, and perception of social acceptance from peers (Choi et al., 2016; Goble et al., 2019; Goble et al., 2019; Vandenbroucke, Spilt, Verschueren, & Baeyens, 2018; Weiland et al., 2013). Regarding child characteristics, studies showed that temperamentally more difficult children benefit more from positive parental behaviors (Cipriano-Essel et al., 2013; Conway & Stifter, 2012; Suor et al., 2019). The findings with respect to child temperament can be discussed within the framework of the Differential Susceptibility Model (Belsky & Bakermans-Kranenburg, 2007). According to this model, temperamentally difficult children are more sensitive to quality of parenting; when they receive high quality parental support, they show greater increases in their socio-cognitive abilities related to EF compared to less temperamentally negative children and vice versa (e.g., Cipriano-Essel et al., 2013).

It should be noted that, in some studies, children in more optimal conditions (e.g., high perceived social acceptance, receiving high levels of emotional support in the beginning of the school year, displaying less externalizing behaviors; Goble et al., 2019; Goble et al., 2019; Vandenbroucke, Spilt, Verschueren, & Baeyens, 2018) benefited more from supportive parental and teacher behaviors while, in other studies, children in less optimal conditions (e.g., difficult temperament, low EF scores in the beginning of the school year; Choi et al., 2016; Cipriano-Essel et al., 2013; Suor et al., 2019) benefited more from these supportive behaviors. It could be that children who display more desired behaviors (e.g., less externalizing behaviors) may engage in more high quality interactions with their parents and teachers. On the other hand, children who need more support from significant adults based on their characteristics (i.e., low EF, difficult temperament) have more room to grow in terms of EF skills. These patterns of findings also suggest that when environmental conditions of children are more optimal (i.e., lower maternal attachment anxiety, attending classrooms with high emotional and instructional support), they benefit more from the positive parent and teacher behaviors. In the case of child characteristics, less optimal factors (i.e., having a difficult temperament, low EF scores at the beginning of the school year) are associated with children's higher levels of benefits from parent and teacher behaviors to improve their EF abilities. It could be that characteristics of optimal environments may accumulate such that children's EF abilities benefit most when, for example, parents have lower attachment anxiety and also display high levels of positive parenting. For children with difficult temperament or lower EF abilities, positive parenting and teacher behaviors may play a larger compensatory role. Even though the interaction between child characteristics and parent/teacher behaviors are not explored enough before, some studies demonstrated that children with difficult temperaments and low self-regulation abilities show greater improvements in their self-regulatory behaviors when they receive positive parental (i.e., guided learning; Suor et al., 2019) and teacher behaviors (i.e., emotional and behavioral support; Broekhuizen et al., 2015).

Directions for future research

Even though the above-mentioned theoretical models suggest why and through which mechanisms parent and teacher behaviors may be linked to child EF, it would be an improvement in the field if we test and compare their premises via an empirical approach. A recently developed methodology called micro-randomized trials (Klasnja et al., 2015) can help researchers in this regard. Through micro-randomized trials, researchers can manipulate specific parent and teacher behaviors that are suggested by the theoretical approaches and test the just-in-time effects of those on child EF-related behaviors (Mouton et al., 2018; Te Brinke et al., 2021). For example, responding with warmth or sensitivity to children, and scaffolding efforts of parents or teachers can be manipulated via instructions or interventions. Then, whether these stimulated behaviors, as Attachment and Sociocultural Theory posit, enhance children's EF-related behaviors or whether one is more impactful than the other for the improvement of EF can be assessed. For example, Loop and Roskam (2016) stimulated emotion coaching approaches of parents in a 15-minute laboratory session and found that after the manipulation, parents displayed more positive affective and sensitive behaviors towards their preschool aged children. In turn, children of these parents demonstrated higher persistence and enthusiasm during frustration tasks that trigger negative emotional arousal. Further, mechanisms that explain the link between parent/teacher behaviors and child EF as suggested by the theoretical frameworks can also be tested. For instance, stress levels of parents or teachers can be induced via special paradigms and it can be tested whether stress causes changes in parent/teacher-child interactions and in turn, the EF-related behaviors of children as the Family Stress Model suggests.

Variability in parent/teacher behaviors may also arise from child EF. Although this review study, like many of the studies reviewed as part of it, focuses on how parent/teacher behaviors influence child EF, future research could examine reciprocal relations. For example with cross-lagged panel designs, such as in the study by McKinnon and Blair (2018) which examined the reciprocal relations between teachers' closeness and child EF. Experimental or intervention designs would also enable collecting more information about causality, similar to the studies of Weisleder et al. (2018) and Dias and Seabra (2017) in which parent and teacher behaviors were

manipulated and the effect of the manipulation on children's EF development was investigated.

As in many other components of developmental science, there are confounding variables in the association between socialization factors and child EF. Previous studies examined age, SES and ethnicity as possible moderators and confounding variables in the relation between parent/teacher behaviors and child EF (Valcan et al., 2018; Vandenbroucke, Spilt, Verschueren, Piccinin, & Baeyens, 2018). In addition to these constructs, some studies we reviewed in both fields included verbal abilities as a confounding variable (e.g., Meuwissen & Carlson, 2019; Schmitt et al., 2019). Teacher studies mostly included teacher experience and education (e.g., Goble & Pianta, 2017; Keilow et al., 2019), and number of students in the classrooms (e.g., Pianta et al., 2020). Future research can analyze whether factors such as vocabulary, teacher experience, and number of students in the classrooms moderate the impact of parent and teacher behaviors on child EF to understand better for whom, when, and why these relations exist. It is also important to investigate whether the associations between parent and teacher behaviors and child EF hold after controlling for variables such as child verbal ability. In addition, future research should focus on whether the effect of parent and teacher behaviors hold specifically for EF abilities or more broad aspects of cognition.

While suggesting possible reasons for the inconsistent findings regarding the effect of parental and teacher behaviors on child EF, we mostly relied on methodological differences among studies. However, there might be other reasons that explain inconsistent findings, such as cultural differences. Even though studies were conducted with diverse samples in terms of the cultural backgrounds in both parenting (e.g., Lee et al., 2018; Obradović, Yousafzai, Finch, & Rasheed, 2016; Weisleder et al., 2018) and teacher studies (e.g., Hu et al., 2020; Leyva et al., 2015), to our knowledge, there is no study systematically comparing whether the effect of parental and teacher behaviors on child EF varies depending on the cultural context. There is limited research on the cultural differences in child EF development and the effect of social interactions on child EF (Lewis et al., 2009; Roos et al., 2017). Therefore, more research is needed into how cultural factors shape the association between parent/teacher-child interactions and child EF development.

Our study revealed some limited findings on whether parent and teacher behaviors have different impacts on different age groups. We found that a significant relation between negative parental behaviors and teachers' emotional closeness and child EF is more often observed in preschool aged children compared to primary school children. Even though there are some review studies investigating development of EF across different age spans (Diamond, 2002; Garon et al., 2008; Hughes, 2011), research on how the effect of environmental influences, specifically parent/teacher-child interactions, changes across time is scarce. In their meta-analysis, Valcan et al. (2018) found that the impact of parents' cognitive support on child EF is more pronounced in younger children than older ones in an age group of 0 to 8. Vandenbroucke et al. (2018), on the other hand, showed that teacher behaviors (including different aspects of teacher behaviors such as emotional support, instructional support) have stronger effect sizes on child EF in older children (i.e., beginning of elementary school) across the ages from 2 to 7. Overall, these findings corroborate the hypothesis that young children depend more on parents' support and guidance (Blair & Ursache, 2011; Sameroff, 2010) than older children. However, when children start attending formal schools, they may rely on the teachers' support as an additional resource for improving their EF skills. Thus, more research is needed on how the dynamics between parent-teacher-child interactions change over time and how these changes influence EF development in different developmental periods.

The present study also revealed that even though parents and teachers both play crucial roles in child EF development, fewer studies investigated the impact of teacher behaviors. Moreover, teachers' more nuanced behaviors such as sensitivity towards childrens' needs and interests, controlling behaviors, or scaffolding efforts can be studied to see whether they have positive effects on EF development, similarly to parental behaviors. While designing such future research, it is essential to critically examine whether these concepts in the parenting literature can be transferred to the teacher context one-to-one or whether some modifications are needed to make sure that the assessment methods also work in classroom contexts. Moreover, future research can investigate whether parental and teacher behaviors have differential effects on different aspects (i.e., inhibitory control, working memory, cognitive flexibility) and conseptualizations of EFs (i.e., global vs separate EF components).

Since parents and teachers are significant adults jointly influencing child development, their effects may interact in child EF development. For example, Acar et al. (2018) showed that when children experienced low levels of parent–child closeness and high levels of teacher-child conflict, they had lower levels of behavior regulation compared to their peers. Further, the study of Vandenbroucke, Spilt, Verschueren, and Baeyens (2017) demonstrated that when children had a positive relationship with their parents, emotional support of parents and teachers had little effect on children's working memory performance. However, when they had a negative relationship with their parents, emotional support from teachers reinforced their working memory performance. Furthermore, there is some evidence showing that the family context, such as SES, moderates the relationship between teacher behaviors and child EF. For example, Cadima et al. (2016) found that for children from low-SES families, classroom quality (average of emotional support, classroom organization, and instructional support) was positively associated with EF scores, but not for children from high-SES families. These findings indicate that different levels of support from parents may influence how much children benefit from teachers' supportive behaviors. In addition, future research should consider other unmeasured variables that could explain the relation between parent and teacher behaviors, and child EF. For example, children living in more optimal environments (high SES

neighborhood, rich community resources, and reduced exposure to toxins, etc.) might experience overall better quality parenting and teacher-child interactions compared to children living in less optimal environments (Cuellar et al., 2015; Wei et al., 2021).

Limitations of the study

Even though the present review study contributes to the current research by bringing two large bodies of literature together and systematically comparing their findings, it has some limitations as well. While we identified patterns, we did not perform any statistical analyses to compare the effect sizes of parental and teacher behaviors on child EF, nor did we calculate for which populations and under which circumstances, the effect of parental and teacher behaviors shows stronger effects. Therefore, we cannot draw strong conclusions based on this review. Further, the current study only focused on the cognitive aspects of EFs; comparisons of the effect of parent and teacher behaviors on other aspects of self-regulation such as emotion regulation are also relevant to research but were beyond the scope of the current study. Another limitation of the study is that we restricted the age range of children from 2 to 12. As higher-order EF components such as planning, problem solving, and reasoning develop and are assessed mostly at middle childhood and adolescence (Diamond, 2013), we did not include these more advanced cognitive EF components to have one model for the full age range for consistency. This may limit our findings to only three core components of EF rather than having a more comprehensive conclusion on all cognitive aspects of EF.

Conclusion

The aim of the current study is to bring together the theoretical approaches and underlying mechanisms in the relationship between parental and teacher behavior and child EF development. Further, we compared and combined the findings from the two bodies of literature to examine which parental and teacher behaviors are studied and found to be associated with child EF. Examination of theoretical approaches revealed that theoretical frameworks have been established more strongly in the field of parental behaviors than the educational field. Patterns of findings indicated that while positive and cognitive parental and teacher behaviors are positively associated with child EF development, negative behaviors are negatively related to it. Further, with regard to child EF, more diverse and specific kinds of parental behaviors have been investigated in the parental literature compared to the teacher literature. We can conclude that the teacher literature could benefit from the parent literature with respect to theory development and investigating more specific teacher behaviors rather than focusing on global constructs. This study contributes to current research by identifying venues for future research in the field of parental and teacher behaviors with regard to child EF development based on the theoretical frameworks and empirical findings. Converging findings in parent and teacher literature suggest that, besides the genetic transmission of EFs, environmental factors such as adult-child interactions in the proximal processes are important for EF development. Future research should take the significant role of parents and teachers in child EF development into account, and combine parental and teacher behaviors while studying EF development.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A

See Tables 5 and 6.

Table 5
Overview of the parenting studies reporting data from the same or overlapping samples.

Study	Sample size	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of parent behaviors *M* (*SD*)	Parental Behavior	EF Measures	Included/Excluded - Excluded Relationship	Reason
Bibok et al., 2009	36	24.97 (2.65) months	24.97 (2.65) months	Directive and elaborative parental utterance	Cognitive flexibility	Included	Assessed different parenting variables
Hammond et al., 2012	82	2 years 18 days (81 days), 3 years 21 days (82 days) and 4 years 28 days (110 days)	2 years 18 days (81 days), 3 years 21 days (82 days)	Scaffolding	Inhibitory control, working memory, cognitive flexibility and global EF	Included	Assessed different parenting variables
Blair et al., 2014	1292	37.5 (1.76) and 60.62 (3.26) months	37.5 (1.76) and 60.62 (3.26) months	Responsiveness, cognitive stimulation	Global EF	Included	Predicted EF at different time points, assessed cognitive stimulation
Daneri et al., 2018	1009	48.32 (1.14) months	15 (-), 24 (-), and 36 (-) months	Responsiveness, linguistic input	Global EF	Included	Predicted EF at different time points, assessed cognitive stimulation
Towe-Goodman et al., 2014	620	24 (-) and 36 (-) months	36 (-) months	Sensitivity	Inhibitory control, working memory, cognitive flexibility and global EF	Excluded	Very similar to Vernon-Feagans et al. (2016)'s study
Vernon-Feagans et al., 2016	1292	24 (-) and 36 (-) months	36 (-), 48 (-), 60 (-) months	Parental responsiveness and acceptance	Inhibitory control, working memory, cognitive flexibility and global EF	Included	Predicted EF at different time points, assessed separate EF components
Devine et al., 2016	117	3.94 (0.53) and 5.11 (0.54) years	3.4 (0.53) and 5.11 (0.54) years	Cognitive stimulation, scaffolding, negative interaction	Global EF	Excluded	Very similar to Hughes and Devine (2017)'s study
Hughes & Devine, 2017	117	3.94 (0.53) and 5.11 (0.54) years	3.94 (0.53) and 5.11 (0.54) years	Scaffolding, cognitive stimulation, linguistic input, negative affect	Global EF	Included	Involved more parenting dimensions than Hughes and Devine (2017)'s study
Ekerim & Selcuk, 2017	239	53.29 (10.19) months	53.29 (10.19) months	Maternal warmth, inductive reasoning	Inhibitory control	Included	Assessed different parental behaviors
Gündüz et al., 2015	217	53.66 (9.59) months	53.66 (9.59) months	Sensitivity, power-assertiveness	Inhibitory control	Included	Assessed different parental behaviors
Hughes & Ensor, 2005	140	2.37 (4 months) years and one month later	2.37 (4 months) years	Positive parenting	Global EF	Included	Assessed different parental behaviors
Hughes & Ensor, 2009	125	2 (-) and 4 (-) years	2 (-) years	Scaffolding	Global EF	Included	Assessed different parental behaviors
Holochwost et al., 2016	206	60 (-) months	24 (-) and 36 (-) months	Sensitivity, intrusiveness	Global EF	Included - Excluded the relationship	Assessed different

(*continued on next page*)

Table 5 (*continued*)

Study	Sample size	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of parent behaviors *M* (*SD*)	Parental Behavior	EF Measures	Included/Excluded - Excluded Relationship	Reason
						between intrusiveness and EF	parental behaviors
Holochwost et al., 2018	206	60 (-) months	24 (-) and 36 (-) months	Positive regard, intrusiveness	Global EF	Included	Assessed different parental behaviors
Kok et al., 2013	544	48.5 (1.04) months	3 (-) years	Sensitivity, intrusiveness	Inhibitory control, working memory, planning, shifting, emotional control and global EF	Included	Assessed different EF components and global EF
Lucassen et al., 2015	607	48.4 (0.9) months	3 years, 48.4 (0.9) months	Sensitivity, harsh parenting	Inhibitory control, cognitive flexibility, emergent metacognition	Included - Excluded the relationship between sensitivity and intrusiveness at 3 years and inhibitory control and cognitive flexibility at 4 years	Assessed different EF components and parenting at different time points
2015	752	51.5 (1.3) months	3.13 (0.12) years	Sensitivity	Inhibitory control, working memory, sustained attention	Included - Excluded the relationship between sensitivity and inhibitory control and working memory	Assessed different EF components
Meuwissen & Carlson, 2015	110	37.68 (1.68) months	37.68 (1.68) months	Father autonomy, father control	Inhibitory control, working memory, cognitive flexibility, delay of gratification and global EF	Included	Predicted EF at different time points, assessed separate EF components
Meuwissen & Carlson, 2018	89	57.8 (1.33) months	3 years, 57.8 (1.33)	Father autonomy, father control	Inhibitory control, working memory, cognitive flexibility, delay of gratification	Included	Predicted EF at different time points
Obradović, Yousafzai, Finch, & Rasheed, 2016	1302	48 (-) months	24 (-), 48 (-) months	Scaffolding, home stimulation quality	Global EF	Included	Assessed parental behaviors at different time points, intervention study
Obradović & Finch et al., 2019	1302	48 (-) months	24 (-) months	Scaffolding, home stimulation quality	Global EF	Included	Assessed correlational association
Owen et al., 2013	224	29.79 (0.63) months	29.79 (0.63) months	Child-oriented parenting, hostile parenting	Inhibitory control	Excluded	Very similar to Yu et al. (2020)'s study
Yu et al., 2020	359	2.5 (-), 3.5 (-), 6 (-), 7 (-) years	2.5 (-) years	Sensitivity, intrusiveness, detachment, cognitive stimulation, positive regard,	Inhibitory control	Included	Assessed different parental behaviors and EF at different tie points

(*continued on next page*)

Table 5 (*continued*)

Study	Sample size	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of parent behaviors *M* (*SD*)	Parental Behavior	EF Measures	Included/Excluded - Excluded Relationship	Reason
				and negative regard			
Spruijt, Dekker, Ziermans, & Swaab, 2018	98	6.2 (1.2) years	6.2 (1.2) years	Supportive presence, intrusiveness, verbal scaffolding	Inhibitory control, working memory, cognitive flexibility	Included	Assessed separate EF components
Spruijt, Dekker, Ziermans, & Swaab, 2019	70	76.25 (14.49) months, approximately 6 months later	76.25 (14.49) months, approximately 6 months later	Parental support, intrusiveness	Global EF	Included	Assessed global EF and the effect of intervention
Suor et al., 2016	185	63.12 (2.57) months	3.5 (-) years	Responsiveness, warmth, harsh discipline	Working memory'	Included	Assessed different parenting dimensions at different time points
Suor et al., 2018	160	63.31 (4.03) months	63.31 (4.03) months	Guided learning, reciprocity, control	Inhibitory control, working memory, cognitive flexibility and global EF	Included	Assessed different parenting dimensions at different time points, assessed different EF components and global EF
Swingler et al., 2018	276	56 (5) months	56 (5) months	Emotional support, negativity, intrusiveness	Inhibitory control	Included	Assessed EF at a different time point
Zeytinoglu, Calkins, Swingler, and Leerkes (2017)	278	5 (-) years	4 (-) years	Emotional support, negativity, intrusiveness	Inhibitory control, working memory, cognitive flexibility and global EF	Included	Assessed EF at a different time point, different EF components and global EF
Zeytinoglu, Calkins, & Leerkes, 2018	278	56.37 (4.68), 70.80 (3.86) and 82.76 (4.02) months	56.37 (4.68), 70.80 (3.86) and 82.76 (4.02) months	Emotional support, negativity, intrusiveness, cognitive support	Cognitive flexibility	Included - Excluded the relationship between intrusiveness, responsiveness, negativity at 4 years and cognitive flexibility at 5 years	Assessed different parental behaviors, predicted EF at later ages

Table 6
Overview of the teacher studies reporting data from the same or overlapping samples.

Study	Sample size (Teacher/ children)	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of teacher behaviors *M* (*SD*)	Teacher Behavior	EF Measures	Included/Excluded - Excluded Relationship	Reason
Ansari and Pianta, 2018	325/1407	4.17 (0.47) months, fall and spring semester	4.17 (0.47) months, fall and spring semester	Instructional support	Inhibitory control	Include	Assessed the effect an intervention
Goble & Pianta, 2017	325/1407	4 (-) years at fall semester, spring semester	Midyear of preschool	Emotional support, instructional support, classroom organization	Inhibitory control	Include	Assessed correlational associations
Goble et al., 2019a	269/1179	4.18, (0.46) at fall semester, spring semester	Fall and spring semester	Emotional support, instructional	Inhibitory control	Included	Assessed change in teacher behaviors

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Table 6 (*continued*)

Study	Sample size (Teacher/ children)	Age/grade during EF assessment *M* (*SD*)	Age/grade during the assessment of teacher behaviors *M* (*SD*)	Teacher Behavior	EF Measures	Included/Excluded - Excluded Relationship	Reason
				support, classroom organization			
Hamre et al., 2014	325/1407	4.17 (0.47) years at fall semester, spring semester	Midyear of preschool	Emotional support, instructional support, classroom organization, teacher-child interaction quality	Inhibitory control, working memory	Included - Excluded the relationship between emotional support, instructional support, classroom organization and inhibitory control	Assessed different EF components and teacher behaviors
2012	-/1364	pre-kindergarten (4.5 years old), first and fourth grade	Kindergarten, second grade	Conflict	Inhibitory control	Included	Assessed teacher behavior at a different time point
Goble et al., 2019b	954/1364	54 (-) months, 7.02 (-) years	7.02 (-) years	Closeness, conflict, teacher-child interaction quality	Inhibitory control, working memory	Included	Assessed different teacher behaviors, EF components at different time points
Hatfield et al., 2016	222/875	4.11 (0.0.50) years at fall semester, spring semester	Midyear of preschool	Emotional support, instructional support, classroom organization	Inhibitory control	Included	Assessed different teacher behaviors
Sandilos et al., 2019	156/899	53.91 (3.75) months at fall of preschool, spring of preschool	53.91 (3.75) months at fall of preschool, spring of preschool	Closeness, conflict	Inhibitory control, working memory, cognitive flexibility	Included	Assessed different teacher behaviors
Hernandez et al., 2017	26/301	5.48 (0.35) years at fall of kindergarten	Spring of kindergarten	Closeness, conflict	Inhibitory control	Included	Assessed EF and teacher behaviors at different time points
Swanson et al., 2015	116/291	7.66 (0.39) years	7.66 (0.39) years	Closeness, conflict	Inhibitory control	Included	Assessed EF and teacher behaviors at different time points
Hu et al., 2017	59/589	4.99 (0.55) years	4.99 (0.55) years	Emotional support, instructional support, classroom organization	Global EF	Included	Assessed different EF components, measurement of EF and teacher behaviors at different time points
Hu et al., 2020	59/588	6.12 (0.44) years, 6 months later, 12 months later	6.12 (0.44) years, 6 months later	Emotional support, instructional support, classroom organization	Inhibitory control	Included	Assessed different EF components, measurement of EF and teacher behaviors at different time points
Nguyen et al., 2020	156/1498	55.01 (3.51) months at fall of preschool, spring of preschool	55.01 (3.51) months at fall of preschool, spring of preschool	Closeness, conflict, teacher-child interaction quality	Global	Included	
Pianta et al., 2020	126/1498	4.40 (0.29) years at fall of preschool, spring of preschool	4.40 (0.29) years at preschool	Instructional content, teacher-child interaction quality	Inhibitory control, working memory, cognitive flexibility	Included	Assessed different teacher behaviors and EF components

Appendix B

See Table 7.

Table 7
Studies Providing a Theoretical Approach for the Relationship between Parent/Teacher Behaviors and Child EF.

Theoretical Approach	Parent Studies	Teacher Studies
Bioecological Model	Baker, 2018	Cadima et al., 2015
	Baker & Kuhn, 2017	Hamre et al., 2014
	Holochwost et al., 2018	Langeloo et al., 2019
	Korucu et al., 2019	McKinnon & Blair, 2018
	Lengua et al., 2014	Nguyen et al., 2020
	2007	
Attachment Theory	Cassidy et al., 2017	Cadima et al., 2015
	Heylen et al., 2017	McKinnon & Blair, 2018
	Low & Webster, 2015	2020
	Merz et al., 2017	Vandenbroucke, Spilt, Verschueren, & Baeyens, 2017
	Schneider-Hassloff et al., 2016	Vandenbroucke, Spilt, Verschueren, & Baeyens, 2018
	Vandenbroucke, Spilt, Verschueren, & Baeyens, 2017	
Sociocultural Theory	Baptista et al., 2016	Goble & Pianta, 2017
	Bindman et al., 2013	Williford et al., 2013
	Clark & Woodward, 2014	
	Conway & Stifler, 2012	
	Distefano et al., 2018	
	Eason & Ramani, 2016	
	Ekerim & Selcuk, 2017	
	Hammond et al., 2012	
	Hughes & Ensor, 2009	
	Kamza et al., 2016	
	Landry et al., 2002	
	Lee et al., 2018	
	Meuwissen & Carlson, 2018	
	Meuwissen & Carlson, 2019	
	2016	
	Spruijt, Dekker, Ziermans, & Swaab, 2018	
Family Stress Model	Baker, 2018	
	Baker & Kuhn, 2017	
	Gündüz et al., 2015	
	Halse et al	
	Lengua et al., 2014	
	Suor et al., 2016	
Intergenerational Transmission Model	Cuevas et al., 2014	
	Distefano et al., 2018	
	Zeytinoglu, Calkins, Swingler, and Leerkes (2017)	
Teaching Through Interactions		Goble et al., 2019a
		Hamre et al., 2014
		Hu et al., 2020
		Leyva et al., 2015

Appendix C

See Table 8.

Table 8
List of EF Measures Used in the Selected Studies.

EF Component	Instrument Name	Study
Inhibitory control	Pencil-Tapping Task	Ansari & Pianta, 2018; Baker, 2018; Choi et al., 2016; Conway & Stifter, 2012; Ekerim & Selcuk, 2017; Fuhs, Farran, & Nesbitt, 2013; Goble et al., 2019a; Goble & Pianta, 2017; Gündüz et al., 2015; Hamre et al., 2014; Hatfield et al., 2016; Hu et al., 2020; Leyva et al., 2015; Mathis & Bierman, 2015; Pianta et al., 2020; Rimm-Kaufmann et al., 2009; Nguyen et al., 2020 Sandilos et al., 2019; Schmitt et al., 2019; Williford et al., 2013
	The Child Behavior Questionnaire	Baker & Kuhn, 2017; Hernández et al., 2017; 2020; Swanson et al., 2015
	Head–Toes–Knees–Shoulders Task	Baptista et al., 2016; Berkes et al., 2019; Bindman et al., 2013; Cadima et al., 2016; Distefano et al., 2018; Fuhs et al., 2013; Korucu et al., 2019; Lee et al., 2018; Lengua et al., 2014; Nguyen et al., 2020; Pianta et al., 2020; Sandilos et al., 2019; Schneider-Hassloff et al., 2016; Vernon-Feagans et al., 2016; Yu et al., 2020
	Silly Sounds Stroop Task	Blair et al., 2014; Daneri et al., 2018; Gueron-Sela et al., 2018; Xing et al., 2016
	Go/No Go Game	Blair et al., 2014; Bosquet Enlow et al., 2019; Daneri et al., 2018; Gueron-Sela et al., 2018; Obradović, Yousafzai, Finch, & Rasheed, 2016; Obradović & Finch et al., 2019; Spruijt, Dekker, Ziermans, & Swaab, 2018; Swingler et al., 2018; Zeytinoglu, Calkins, Swingler, and Leerkes (2017)
	Puppet-Says Task	Cassidy et al., 2017
	Shapes Task	Cipriano-Essel et al., 2017; Hammond et al., 2012; 2007
	Day/Night	Cipriano-Essel et al., 2017; Conway & Stifter, 2012; Cuevas et al., 2014; Gueron-Sela et al., 2017; Gustaffson et al., 2015; Holochwost et al., 2016; Holochwost et al., 2018; Hughes & Devine, 2017; Lengua et al., 2014; Matte-Gagné, Bernier, & Lalonde, 2014
	Detour Reaching Box Task	Clark & Woodward, 2014
	Conner's Kiddie Continuous Performance Task	Clark & Woodward, 2014
	Three Pegs Task	Conway & Stifter, 2012
	Simon Says Task	Cuevas et al., 2014; Meuwissen & Carlson, 2018; Suor et al., 2019
	Spatial Conflict Task	Daneri et al., 2018; Gueron-Sela et al., 2018;
	Stroop Task	Blair et al., 2016; Graziano et al., 2010; Hughes & Ensor, 2005, 2009; Hughes & Devine, 2017; Korucu et al., 2019; Low & Webster, 2015; Meece & Robinson, 2014; Obradović, Yousafzai, Finch, & Rasheed, 2016; Obradović & Finch et al., 2019; Roskam et al., 2014;
	Bear-Alligator Task	Hammond et al., 2012
	Handgame Task	Hammond et al., 2012
	Stop-Signal Task	Heylen et al., 2017
	Developmental Neuropsychological Assessment	Lengua et al., 2014; 2016
	Bear-Dragon Task	Lengua et al., 2014; 2014; Matte-Gagné, Bernier, & Lalonde, 2014; Merz et al., 2017; Meuwissen & Carlson, 2015
	Turtle-Rabbit Task	2007
	Behavior Rating Inventory of Executive Function	Lucassen et al., 2015; Schroeder & Kelley, 2010
	Auditory Continuous Performance Task	2015
	Knock-Tap Game	Obradović, Yousafzai, Finch, & Rasheed, 2016; Obradović & Finch et al., 2019
	Big/Little Game	Obradović, Yousafzai, Finch, & Rasheed, 2016; Obradović & Finch et al., 2019
	Three Blobs Task	Roskam et al., 2014
	Luria's Hand Game	Roskam et al., 2014
	Card Sorting Task	Roskam et al., 2014
	Cat, Dog, and Fish Task	Roskam et al., 2014
	Circles Task	St George et al., 2016
	Head and Feet Task	St George et al., 2016
	Whisper Task	St George et al., 2016
	Arrow Game	Xing et al., 2016
	Pig Game	Xing et al., 2016
	Multi-Source Interference Test	Bardack & Obradović, 2019
	Flanker Task	Bardack & Obradović, 2019; Langeloo et al., 2019; McKinnon & Blair, 2018; Neuenschwander et al., 2017
	Continuous Performance Test	2012; Goble et al., 2019b; Hernández et al., 2017; Swanson et al., 2015
	Circle and Star	Cadima et al., 2015
	Childhood Executive Function Inventory	Dias & Seabra, 2017
Working memory	Numbers Reversed Task	Baker & Kuhn, 2017; Zeytinoglu, Calkins, Swingler, and Leerkes (2017); 2020
	Backward Digit Span Task	Baptista et al., 2016; Bardack & Obradović, 2019; Clark & Woodward, 2014; Gueron-Sela et al., 2017; Gustaffson et al., 2015; Holochwost et al., 2016; Holochwost et al., 2018; Hamre et al., 2014; Pianta et la., 2020; Nguyen et al., 2020; Sandilos et al., 2019; Weiland et al., 2013
	Pick the Picture Game	Blair et al., 2014; Daneri et al., 2018; Gueron-Sela et al., 2018; Xing et al., 2016

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Table 8 (*continued*)

EF Component	Instrument Name	Study
	Working Memory Span Task	Blair et al., 2014; Blair et al., 2016; Daneri et al., 2018; Gueron-Sela et al., 2018;
	Nebraska Barnyard Task	Bosquet Enlow et al., 2019
	Backward Corsi Blocks Task	Clark & Woodward, 2014; Vandenbroucke, Spilt, Verschueren, & Baeyens, 2017; Vandenbroucke, Spilt, Verschueren, & Baeyens, 2018
	Spin the Pots Task	Hammond et al., 2012; Hughes & Ensor, 2005, 2009
	Spatial Span Task	Hammond et al., 2012
	Beads Task	Hughes & Ensor, 2005, 2009
	Self-Ordered Pointing Task	Hughes & Devine, 2017
	Spatial Reversal Task	Landry et al., 2002
	Block Recall Task	Lee et al., 2018
	Backward Working Memory Task	2015; Suor et al., 2016
	Forward Word Span Task	Obradović, Yousafzai, Finch, & Rasheed, 2016; Obradović & Finch et al., 2019
	Behavior Rating Inventory of Executive Function	Schroeder & Kelley, 2010
	ANT Spatial Temporal Span	Spruijt, Dekker, Ziermans, & Swaab, 2018
	Path Span	Suor et al., 2016; Suor et al., 2019
	Puzzle Box Task	Vernon-Feagans et al., 2016
	Teste Infantil de Memória de Trabalho	Weisleder et al., 2018
	House Game	Xing et al., 2016
	Visuospatial Working Memory Task	de Wilde et al., 2016
	Childhood Executive Function Inventory	Dias & Seabra, 2017
	Corsi-Block Tapping Task	Fuhs et al., 2013; Langeloo et al., 2019
	Memory for Sentences Test	Goble et al., 2019b
	Automated Working Memory Assessment	Vandenbroucke et al., 2018
	Forward Digit Span	Weiland et al., 2013
Cognitive flexibility	Dimensional Change Card Sort Task	Baker & Kuhn, 2017; Berkes et al., 2019; Cassidy et al., 2017; Cuevas et al., 2014; Fuhs et al., 2013; Hughes & Devine, 2017; Kamza et al., 2016; Korucu et al., 2019; Lengua et al., 2014; Leyva et al., 2015; 2014; Matte-Gagné, Bernier, & Lalonde, 2014; McKinnon & Blair, 2018; Merz et al., 2017; Neuenschwander et al., 2017; Obradović, Yousafzai, Finch, & Rasheed, 2016; Obradović & Finch et al., 2019; 2016; Suor et al., 2019; Zeytinoglu, Calkins, Swingler, & Leerkes, 2017; Zeytinoglu, Calkins, & Leerkes, 2018; 2020
	Executive Function Scale for Early Childhood	Baptista et al., 2016
	Shape Stroop Task	Bibok et al., 2009
	Delayed Alternation Task	Bibok et al., 2009; Hammond et al., 2012
	Reverse Categorization Task	Bibok et al., 2009; Hammond et al., 2012; 2014
	Something is the Same Task	Blair et al., 2014; Daneri et al., 2018; Gueron-Sela et al., 2018; Xing et al., 2016
	Spatial Conflict Arrows Task	Blair et al., 2014
	Detour Reaching Box Task	Clark & Woodward, 2014; Hughes & Ensor, 2005
	Flexible Item Selection Task	Blair et al., 2016; Gueron-Sela et al., 2017; Gustaffson et al., 2015; Holochwost et al., 2016; Holochwost et al., 2018; Lee et al., 2018
	Trucks Task	Hughes & Ensor, 2005, 2009
	Spatial Reversal Task	Landry et al., 2002
	Behavior Rating Inventory of Executive Function	Lucassen et al., 2015; Schroeder & Kelley, 2010
	ANT ROO Task	Spruijt, Dekker, Ziermans, & Swaab, 2018
	Hearts and Flowers Task	Bardack & Obradović, 2019; Langeloo et al., 2019; McKinnon & Blair, 2018; Neuenschwander et al., 2017
	Trail Making Test	Dias & Seabra, 2017
Global EF	Minnesota Executive Function Scale	Distefano et al., 2018; Meuwissen & Carlson, 2015, 2018, 2019
	Behavior Rating Inventory of Executive Function	Eason & Ramani, 2016; Gärtner et al., 2018; Halse et al., 2019; Hu et al., 2017; Kok et al., 2013
	Behavior Assessment System for Children	Rolan et al., 2018
	Eriksen Flanker Task	Sosic-Vasic et al., 2015; Sosic-Vasic et al., 2017
	Amsterdam Neuropsychological Tasks	Spruijt, Dekker, Ziermans, & Swaab, 2019
	Executive Functioning Early Childhood Computerized Task	White et al., 2019

Appendix D

See Table 9.

Table 9
Categorization of parental and teacher behaviors.

Dimensions	Parental Behaviors	Teacher Behaviors
Positive Behaviors	Warmth	Emotional support
	Sensitivity and responsiveness	Closeness
	Emotional support	
	Attachment security	
	Parent-child synchrony	
	Positive parenting	
	Rewarding	
Negative Behaviors	Intrusiveness/controlling	Conflict
	Negative affect	Dependency
	Inconsistency	
	Detachment	
	Protection	
	Ignoring	
Cognitive Behaviors	Cognitive stimulation	Instructional support
	Scaffolding	Classroom organization
	Language input	Autonomy support
	Autonomy support	EF-related behaviors
	Attention-related behaviors	Language and literacy activities
	EF-related activities	

References

References marked with an asterisk indicate studies included in the systematic review

Acar, I. H., Torquati, J., Garcia, A., & Ren, L. (2018). Examining the roles of parent–child and teacher–child relationships on behavior regulation of children at risk. *Merrill-Palmer Quarterly, 64*(2), 248. doi: 10.13110/merrpalmquar1982.64.2.0248.

Ahnert, L., Harwardt-Heinecke, E., Kappler, G., Eckstein-Madry, T., & Milatz, A. (2012). Student–teacher relationships and classroom climate in first grade: How do they relate to students' stress regulation? *Attachment & Human Development, 14*(3), 249–263. https://doi.org/10.1080/14616734.2012.673277

Alarcón-Rubio, D., Sánchez-Medina, J., & Prieto-García, J. (2014). Executive function and verbal self-regulation in childhood: Developmental linkages between partially internalized private speech and cognitive flexibility. *Early Childhood Research Quarterly, 29*(2), 95–105. https://doi.org/10.1016/j.ecresq.2013.11.002

**Ansari, A., & Pianta, R. (2018). Effects of an early childhood educator coaching intervention on preschoolers: The role of classroom age composition. *Early Childhood Research Quarterly, 44*, 101–113. https://doi.org/10.1016/j.ecresq.2018.03.001

Aro, T., Poikkeus, A., Laakso, M., Tolvanen, A., & Ahonen, T. (2014). Associations between private speech, behavioral self-regulation, and cognitive abilities. *International Journal of Behavioral Development, 39*(6), 508–518. https://doi.org/10.1177/0165025414556094

*Baker, C. (2018). Maternal depression and the development of executive function and behavior problems in head start: Indirect effects through parenting. *Infant Mental Health Journal, 39*(2), 134–144. https://doi.org/10.1002/imhj.21698

*Baker, C., & Kuhn, L. (2017). Mediated pathways from maternal depression and early parenting to children's executive function and externalizing behaviour problems. *Infant and Child Development, 27*(1), Article e2052. https://doi.org/10.1002/icd.2052

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

*Baptista, J., Osório, A., Martins, E., Castiajo, P., Barreto, A., Mateus, V., Soares, I., & Martins, C. (2016). Maternal and paternal mental-state talk and executive function in preschool children. *Social Development, 26*(1), 129–145. https://doi.org/10.1111/sode.12183

*Bardack, S., & Obradović, J. (2019). Observing teachers' displays and scaffolding of executive functioning in the classroom context. *Journal of Applied Developmental Psychology, 62*, 205–219. https://doi.org/10.1016/j.appdev.2018.12.004

Bell, M., & Deater-Deckard, K. (2007). Biological systems and the development of self-regulation: Integrating behavior, genetics, and psychophysiology. *Journal of Developmental & Behavioral Pediatrics, 28*(5), 409–420. https://doi.org/10.1097/dbp.0b013e3181131fc7

Belsky, J., Bakermans-Kranenburg, M., & van IJzendoorn, M. (2007). For better and for worse. *Current Directions in Psychological Science, 16*(6), 300–304. doi: 10.1111/j.1467-8721.2007.00525.x.

*Berkes, J., Raikes, A., Bouguen, A., & Filmer, D. (2019). Joint roles of parenting and nutritional status for child development: Evidence from rural Cambodia. *Developmental Science, e12874*. https://doi.org/10.1111/desc.12874

Bernier, A., Beauchamp, M. H., Carlson, S. M., & Lalonde, G. (2015). A secure base from which to regulate: Attachment security in toddlerhood as a predictor of executive functioning at school entry. *Developmental Psychology, 51*(9), 1177. https://doi.org/10.1037/dev0000032

Bernier, A., Carlson, S. M., Deschênes, M., & Matte-Gagné, C. (2012). Social factors in the development of early executive functioning: A closer look at the caregiving environment. *Developmental Science, 15*(1), 12–24. https://doi.org/10.1111/j.1467-7687.2011.01093.x

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation: Early parenting precursors of young children's executive functioning. *Child Development, 81*(1), 326–339. https://doi.org/10.1111/j.1467-8624.2009.01397.x

*Berry, D. (2012). Inhibitory control and teacher-child conflict: Reciprocal associations across the elementary-school years. *Journal of Applied Developmental Psychology, 33*(1), 66–76. doi: 10.1016/j.appdev.2011.10.002.

Bertram, T., & Pascal, C. (2002). *Early years education: An international perspective.* Washington, DC: National Foundation for Educational Research.

Best, J., & Miller, P. (2010). A developmental perspective on executive function. *Child Development, 81*(6), 1641–1660. https://doi.org/10.1111/j.1467-8624.2010.01499.x

*Bibok, M., Carpendale, J., & Müller, U. (2009). Parental scaffolding and the development of executive function. *New Directions for Child and Adolescent Development, 2009*(123), 17–34. https://doi.org/10.1002/cd.233

*Bindman, S. W., Hindman, A. H., Bowles, R. P., & Morrison, F. J. (2013). The contributions of parental management language to executive function in preschool children. *Early Childhood Research Quarterly, 28*(3), 529–539. https://doi.org/10.1016/j.ecresq.2013.03.003

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American Psychologist, 57*(2), 111–127. https://doi.org/10.1037/0003-066x.57.2.111
*Blair, C., McKinnon, R. D., Vernon-Feagans, L., Greenberg, M., Cox, M., Burchinal, P., Willoughby, M., Garrett-Peters, P., Mills-Koonce, R., & Ittig, M. (2016). Moderating effects of executive functions and the teacher-child relationship on the development of mathematics ability in kindergarten. *Learning and Instruction, 41*, 85–93. https://doi.org/10.1016/j.learninstruc.2015.10.001
*Blair, C., Raver, C., & Berry, D. (2014). Two approaches to estimating the effect of parenting on the development of executive function in early childhood. *Developmental Psychology, 50*(2), 554–565. https://doi.org/10.1037/a0033647
Blair, C., & Ursache, A. (2011). A bidirectional model of executive functions and self-regulation. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 300–320). Guilford Press.
Blom, E., & Boerma, T. (2019). Reciprocal relationships between lexical and syntactic skills of children with Developmental Language Disorder and the role of executive functions. *Autism & Developmental Language Impairments, 4,* 239694151986398. doi: 10.1177/2396941519863984.
*Bosquet Enlow, M., Petty, C., Svelnys, C., Gusman, M., Huezo, M., Malin, A., & Wright, R. (2019). Differential effects of stress exposures, caregiving quality, and temperament in early life on working memory versus inhibitory control in preschool-aged children. *Developmental Neuropsychology, 44*(4), 339–356. https://doi.org/10.1080/87565641.2019.1611833
Bowlby, J. (1982). *Attachment and loss.* Basic Books.
Bögels, S. M., & van Melick, M. (2004). The relationship between child-report, parent self-report, and partner report of perceived parental rearing behaviors and anxiety in children and parents. *Personality and Individual Differences, 37*, 1583–1596. https://doi.org/10.1016/j.paid.2004.02.014
Bradley, R. H., & Caldwell, B. M. (1995). Caregiving and the regulation of child growth and development: Describing proximal aspects of caregiving systems. *Developmental Review, 15*, 38–85. https://doi.org/10.1006/drev.1995.1002
Bridgett, D. J., Burt, N. M., Edwards, E. S., & Deater-Deckard, K. (2015). Intergenerational transmission of self-regulation: A multidisciplinary review and integrative conceptual framework. *Psychological Bulletin, 141*, 602–654. https://doi.org/10.1037/a0038662
Brock, L. L., Rimm-Kaufman, S. E., Nathanson, L., & Grimm, K. J. (2009). The contributions of 'hot' and 'cool' executive function to children's academic achievement, learning-related behaviors, and engagement in kindergarten. *Early Childhood Research Quarterly, 24*(3), 337–349. https://doi.org/10.1016/j.ecresq.2009.06.001
Broekhuizen, M. L., Van Aken, M. A., Dubas, J. S., Mulder, H., & Leseman, P. P. (2015). Individual differences in effects of child care quality: The role of child affective self-regulation and gender. *Infant Behavior and Development, 40*, 216–230. https://doi.org/10.1016/j.infbeh.2015.06.009
Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32*(7), 513–531. https://doi.org/10.1037/0003-066x.32.7.513
Bronfenbrenner, U. (1995). Developmental ecology through space and time: A future perspective. In P. Moen, G. H. Elder, Jr., & K. Lüscher (Eds.), *Examining lives in context: Perspectives on the ecology of human development* (pp. 619–647). American Psychological Association. doi: 10.1037/10176-018.
Bronfenbrenner, U., & Morris, P.A. (2006). The bioecological model of human development. In R.M. Lerner (Ed.), *Handbook of child psychology* (6th ed., pp. 793–828). Wiley.
Cadima, J., Barros, S., Ferreira, T., Serra-Lemos, M., Leal, T., & Verschueren, K. (2019). Bidirectional associations between vocabulary and self-regulation in preschool and their interplay with teacher–child closeness and autonomy support. *Early Childhood Research Quarterly, 46*, 75–86. https://doi.org/10.1016/j.ecresq.2018.04.004
*Cadima, J., Doumen, S., Verschueren, K., & Buyse, E. (2015). Child engagement in the transition to school: Contributions of self-regulation, teacher-child relationships and classroom climate. *Early Childhood Research Quarterly, 32*, 1–12. https://doi.org/10.1016/j.ecresq.2015.01.008
*Cadima, J., Enrico, M., Ferreira, T., Verschueren, K., Leal, T., & Matos, P. M. (2016). Self-regulation in early childhood: The interplay between family risk, temperament and teacher–child interactions. *European Journal of Developmental Psychology, 13*(3), 341–360. https://doi.org/10.1080/17405629.2016.1161506
Carlson, S. M. (2009). Social origins of executive function development. *New Directions for Child and Adolescent Development, 2009*(123), 87–98. https://doi.org/10.1002/cd.237
Carlson, S. M., Mandell, D. J., & Williams, L. (2004). Executive function and theory of mind: Stability and prediction from ages 2 to 3. *Developmental Psychology, 40*(6), 1105–1122. https://doi.org/10.1037/0012-1649.40.6.1105
Carriedo, N., Corral, A., Montoro, P. R., Herrero, L., & Rucián, M. (2016). Development of the updating executive function: From 7-year-olds to young adults. *Developmental Psychology, 52*(4), 666–678. https://doi.org/10.1037/dev0000091
Carter, C. S., Botvinick, M. M., & Cohen, J. D. (1999). The contribution of the anterior cingulate cortex to executive processes in cognition. *Reviews in the Neurosciences, 10*(1), 49–58. https://doi.org/10.1515/REVNEURO.1999.10.1.49
*Cassidy, J., Brett, B., Gross, J., Stern, J., Martin, D., Mohr, J., & Woodhouse, S. (2017). Circle of Security–Parenting: A randomized controlled trial in Head Start. *Development and Psychopathology, 29*(2), 651–673. https://doi.org/10.1017/s0954579417000244
Cassidy, D., King, E., Wang, Y., Lower, J., & Kintner-Duffy, V. (2016). Teacher work environments are toddler learning environments: Teacher professional well-being, classroom emotional support, and toddlers' emotional expressions and behaviours. *Early Child Development and Care, 187*(11), 1666–1678. https://doi.org/10.1080/03004430.2016.1180516
*Choi, J. Y., Castle, S., Williamson, A. C., Young, E., Worley, L., Long, M., & Horm, D. M. (2016). Teacher-child interactions and the development of executive function in preschool-age children attending head start. *Early Education and Development, 27*(6), 751–769. https://doi.org/10.1080/10409289.2016.1129864
*Cipriano-Essel, E., Skowron, E. A., Stifter, C. A., & Teti, D. M. (2013). Heterogeneity in maltreated and non-maltreated preschool children's inhibitory control: The interplay between parenting quality and child temperament. *Infant and Child Development, 22*(5), 501–522. https://doi.org/10.1002/icd.1801
*Clark, C., & Woodward, L. (2014). Relation of perinatal risk and early parenting to executive control at the transition to school. *Developmental Science, 18*(4), 525–542. https://doi.org/10.1111/desc.12232
Commodari, E. (2013). Preschool teacher attachment, school readiness and risk of learning difficulties. *Early Childhood Research Quarterly, 28*(1), 123–133. https://doi.org/10.1016/j.ecresq.2012.03.004
Conger, R., McCarty, J., Yang, R., Lahey, B., & Kropp, J. (1984). Perception of child, child-rearing values, and emotional distress as mediating links between environmental stressors and observed maternal behavior. *Child Development, 55*(6), 2234. https://doi.org/10.2307/1129795
*Conway, A., & Stifter, C. (2012). Longitudinal antecedents of executive function in preschoolers. *Child Development, 83*(3), 1022–1036. https://doi.org/10.1111/j.1467-8624.2012.01756.x
Cortés Pascual, A., Moyano Muñoz, N., & Quilez Robres, A. (2019). The relationship between executive functions and academic performance in primary education: Review and meta-analysis. *Frontiers in Psychology, 10*, 1582. https://doi.org/10.3389/fpsyg.2019.01582
Cuellar, J., Jones, D. J., & Sterrett, E. (2015). Examining parenting in the neighborhood context: A review. *Journal of Child and Family Studies, 24*(1), 195–219. https://doi.org/10.1007/s10826-013-9826-y
*Cuevas, K., Deater-Deckard, K., Kim-Spoon, J., Watson, A. J., Morasch, K. C., & Bell, M. A. (2014). What's mom got to do with it? Contributions of maternal executive function and caregiving to the development of executive function across early childhood. *Developmental Science, 17*(2), 224–238. https://doi.org/10.1111/desc.12073
*Daneri, M., Blair, C., Kuhn, L., Vernon-Feagans, L., Greenberg, M., Cox, M., & FLP Key Investigators. (2018). Maternal language and child vocabulary mediate relations between socioeconomic status and executive function during early childhood. *Child Development, 90*(6), 2001–2018. https://doi.org/10.1111/cdev.13065
Davidson, M. C., Amso, D., Anderson, L. C., & Diamond, A. (2006). Development of cognitive control and executive functions from 4 to 13 years: Evidence from manipulations of memory, inhibition, and task switching. *Neuropsychologia, 44*(11), 2037–2078. https://doi.org/10.1016/j.neuropsychologia.2006.02.006
Deater-Deckard, K., Wang, Z., Chen, N., & Bell, M. (2012). Maternal executive function, harsh parenting, and child conduct problems. *Journal of Child Psychology and Psychiatry, 53*(10), 1084–1091. https://doi.org/10.1111/j.1469-7610.2012.02582.x
Deater-Deckard, K. (2014). Family matters: Intergenerational and interpersonal processes of executive function and attentive behavior. *Current Directions in Psychological Science, 23*(3), 230–236. https://doi.org/10.1177/0963721414531597

de Ruiter, J., Poorthuis, A., Aldrup, K., & Koomen, H. (2020). Teachers' emotional experiences in response to daily events with individual students varying in perceived past disruptive behavior. *Journal of School Psychology, 82*, 85–102. https://doi.org/10.1016/j.jsp.2020.08.005
*Devine, R., Bignardi, G., & Hughes, C. (2016). Executive function mediates the relations between parental behaviors and children's early academic ability. *Frontiers in Psychology, 7*, 1–15. https://doi.org/10.3389/fpsyg.2016.01902
Devine, R. T., & Hughes, C. (2014). Relations between false belief understanding and executive function in early childhood: A meta-analysis. *Child Development, 85*(5), 1777–1794. https://doi.org/10.1111/cdev.12237
*de Wilde, A., Koot, H. M., & van Lier, P. A. C. (2016). Developmental links between children's working memory and their social relations with teachers and peers in the early school years. *Journal of Abnormal Child Psychology, 44*(1), 19–30. https://doi.org/10.1007/s10802-015-0053-4
Diamond, A. (2002). Normal development of prefrontal cortex from birth to young adulthood: Cognitive functions, anatomy, and biochemistry. In D. Stuss & R. Knight (Eds.), *Principles of frontal lobe function* (pp. 466–503). Oxford University Press.
Diamond, A. (2006). The early development of executive functions. In E. Bialystok & F. I. M. Craik (Eds.), *Lifespan cognition: Mechanisms of change* (pp. 70–95). Oxford University Press. doi: 10.1093/acprof:oso/9780195169539.003.0006.
Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135–168. https://doi.org/10.1146/annurev-psych- 113011-143750
*Dias, N. M., & Seabra, A. G. (2017). Intervention for executive functions development in early elementary school children: Effects on learning and behaviour, and follow-up maintenance. *Educational Psychology, 37*(4), 468–486. https://doi.org/10.1080/01443410.2016.1214686
*Distefano, R., Galinsky, E., Mcclelland, M. M., David, P., & Carlson, S. M. (2018). Autonomy-supportive parenting and associations with child and parent executive function. *Journal of Applied Developmental Psychology, 58*, 77–85. https://doi.org/10.1016/j.appdev.2018.04.007
Doebel, S., & Zelazo, P. (2015). A meta-analysis of the Dimensional Change Card Sort: Implications for developmental theories and the measurement of executive function in children. *Developmental Review, 38*, 241–268. https://doi.org/10.1016/j.dr.2015.09.001
*Eason, S., & Ramani, G. (2016). Parental guidance and children's executive function: Working memory and planning as moderators during joint problem-solving. *Infant and Child Development, 26*(2), Article e1982. https://doi.org/10.1002/icd.1982
Eisenberg, N., Cumberland, A., & Spinrad, T. L. (1998). Parental socialization of emotion. *Psychological Inquiry, 9*(4), 241–273. https://doi.org/10.1207/s15327965pli0904_1
*Ekerim, M., & Selcuk, B. (2017). Longitudinal predictors of vocabulary knowledge in Turkish children: The role of maternal warmth, inductive reasoning, and children's inhibitory control. *Early Education and Development, 29*(3), 324–341. https://doi.org/10.1080/10409289.2017.1407607
Erdmann, K., & Hertel, S. (2019). Self-regulation and co-regulation in early childhood – Development, assessment and supporting factors. *Metacognition and Learning, 14*(3), 229–238. https://doi.org/10.1007/s11409-019-09211-w
Fay-Stammbach, T., Hawes, D. J., & Meredith, P. (2014). Parenting influences on executive function in early childhood: A review. *Child Development Perspectives, 8*(4), 258–264. https://doi.org/10.1111/cdep.12095
Fernyhough, C., & Fradley, E. (2005). Private speech on an executive task: Relations with task difficulty and task performance. *Cognitive Development, 20*, 103–120. https://doi.org/10.1016/j.cogdev.2004.11.002
Flynn, E. (2007). The role of inhibitory control in false belief understanding. *Infant and Child Development, 16*(1), 53–69. https://doi.org/10.1002/icd.500
Friedman-Krauss, A., Raver, C., Morris, P., & Jones, S. (2014). The role of classroom-level child behavior problems in predicting preschool teacher stress and classroom emotional climate. *Early Education and Development, 25*(4), 530–552. https://doi.org/10.1080/10409289.2013.817030
Friedman-Krauss, A., Raver, C., Neuspiel, J., & Kinsel, J. (2013). Child behavior problems, teacher executive functions, and teacher stress in Head Start classrooms. *Early Education and Development, 25*(5), 681–702. https://doi.org/10.1080/10409289.2013.825190
*Fuhs, M. W., Farran, D. C., & Nesbitt, K. T. (2013). Preschool classroom processes as predictors of children's cognitive self-regulation skills development. *School Psychology Quarterly, 28*(4), 347–359. https://doi.org/10.1037/spq0000031
Gathercole, S., Pickering, S., Ambridge, B., & Wearing, H. (2004). The structure of working memory from 4 to 15 years of age. *Developmental Psychology, 40*(2), 177–190. https://doi.org/10.1037/0012-1649.40.2.177
Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin, 134*(1), 31. https://doi.org/10.1037/0033-2909.134.1.31
*Gärtner, K. A., Vetter, V. C., Schäferling, M., Reuner, G., & Hertel, S. (2018). Inhibitory control in toddlerhood – the role of parental co-regulation and self-efficacy beliefs. *Metacognition and Learning, 13*(3), 241–264. https://doi.org/10.1007/s11409-018-9184-7
Ghazvini, A., & Mullis, R. (2002). Center-based care for young children: Examining predictors of quality. *The Journal of Genetic Psychology, 163*(1), 112–125. https://doi.org/10.1080/00221320209597972
*Goble, P., & Pianta, R. C. (2017). Teacher–child interactions in free choice and teacher-directed activity settings: Prediction to school readiness. *Early Education and Development, 28*(8), 1035–1051. https://doi.org/10.1080/10409289.2017.1322449
Goble, P., Nauman, C., Fife, K., & Blalock, S. M. (2019). Development of executive function skills: Examining the role of teachers and externalizing behaviour problems. *Infant and Child Development, 29*(1). https://doi.org/10.1002/icd.2160
*Goble, P., Sandilos, L. E., & Pianta, R. C. (2019). Gains in teacher-child interaction quality and children's school readiness skills: Does it matter where teachers start? *Journal of School Psychology, 73*, 101–113. https://doi.org/10.1016/j.jsp.2019.03.006
Gonzalez, A., Jenkins, J., Steiner, M., & Fleming, A. (2012). Maternal early life experiences and parenting: The mediating role of cortisol and executive function. *Journal of the American Academy of Child & Adolescent Psychiatry, 51*(7), 673–682. https://doi.org/10.1016/j.jaac.2012.04.003
*Graziano, P. A., Keane, S. P., & Calkins, S. D. (2010). Maternal behaviour and children's early emotion regulation skills differentially predict development of children's reactive control and later effortful control. *Infant and Child Development, 19*(4), 333–353. https://doi.org/10.1002/icd.670
Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology, 81*(2), 143–154. https://doi.org/10.1037/0022-0663.81.2.143
*Gueron-Sela, N., Bedford, R., Wagner, N. J., & Propper, C. B. (2017). Children's executive function attenuate the link between maternal intrusiveness and internalizing behaviors at school entry. *Journal of Clinical Child & Adolescent Psychology, 47*(sup1), S435–S444. https://doi.org/10.1080/15374416.2017.1381911
*Gueron-Sela, N., Camerota, M., Willoughby, M., Vernon-Feagans, L., & Cox, M. (2018). Maternal depressive symptoms, mother-child interactions, and children's executive function. *Developmental Psychology, 54*(1), 71–82. https://doi.org/10.1037/dev0000389
*Gustafsson, H., Coffman, J., & Cox, M. (2015). Intimate partner violence, maternal sensitive parenting behaviors, and children's executive functioning. *Psychology of Violence, 5*(3), 266–274. https://doi.org/10.1037/a0037971
*Gündüz, G., Yagmurlu, B., & Harma, M. (2015). Self-regulation mediates the link between family context and socioemotional competence in Turkish preschoolers. *Early Education and Development, 26*(5–6), 729–748. https://doi.org/10.1080/10409289.2015.985148
*Halse, M., Steinsbekk, S., Hammar, Å., Belsky, J., & Wichstrøm, L. (2019). Parental predictors of children's executive functioning from ages 6 to 10. *British Journal of Developmental Psychology, 37*(3), 410–426. https://doi.org/10.1111/bjdp.12282
*Hammond, S. I., Müller, U., Carpendale, J. I. M., Bibok, M. B., & Liebermann-Finestone, D. P. (2012). The effects of parental scaffolding on preschoolers' executive function. *Developmental Psychology, 48*(1), 271–281. https://doi.org/10.1037/a0025519
*Hamre, B., Hatfield, B., Pianta, R., & Jamil, F. (2014). Evidence for general and domain-specific elements of teacher–child interactions: Associations with preschool children's development. *Child Development, 85*(3), 1257–1274. https://doi.org/10.1111/cdev.12184
Hamre, B. K., & Pianta, R. C. (2007). Learning opportunities in preschool and early elementary classrooms. In R. C. Pianta, M. J. Cox, & K. L. Snow (Eds.), *School readiness and the transition to kindergarten in the era of accountability* (pp. 49–83). Paul H Brookes Publishing.
Hamre, B., Pianta, R., Downer, J., DeCoster, J., Mashburn, A., Jones, S., Brown, J. L., Cappella, E., Atkins, M., Rivers, S. E., Brackett, M. A., & Hamagami, A. (2013). Teaching through interactions: Testing a developmental framework of teacher effectiveness in over 4000 classrooms. *The Elementary School Journal, 113*(4), 461–487. https://doi.org/10.1086/669616

Harmsen, W., de Groot, J., Harkema, A., van Dusseldorp, I., De Bruin, J., Van den Brand, S., & Van de Schoot, R. (2021). Artificial intelligence supports literature screening in medical guideline development: Towards up-to-date medical guidelines. (Version V1.0). Zenodo. doi: 10.5281/zenodo.5031907.

*Hatfield, B. E., Burchinal, M. R., Pianta, R. C., & Sideris, J. (2016). Thresholds in the association between quality of teacher-child interactions and preschool children's school readiness skills. *Early Childhood Research Quarterly, 36*, 561–571. https://doi.org/10.1016/j.ecresq.2015.09.005

Hendriks, A. M., Van der Giessen, D., Stams, G. J. J. M., & Overbeek, G. (2018). The association between parent-reported and observed parenting: A multi-level meta-analysis. *Psychological Assessment, 30*(5), 621-633. doi: 10.1037/pas0000500.

Hendry, A., Jones, E., & Charman, T. (2016). Executive function in the first three years of life: Precursors, predictors and patterns. *Developmental Review, 42*, 1–33. https://doi.org/10.1016/j.dr.2016.06.005

Herbers, J., Garcia, E., & Obradović, J. (2017). Parenting Assessed by Observation versus Parent-report: Moderation by Parent Distress and Family Socioeconomic Status. *Journal of Child and Family Studies, 26*(12), 3339–3350. https://doi.org/10.1007/s10826-017-0848-8

*Hernández, M. M., Valiente, C., Eisenberg, N., Berger, R. H., Spinrad, T. L., VanSchyndel, S. K., Silva, K. M., Southworth, J., & Thompson, M. S. (2017). Elementary students' effortful control and academic achievement: The mediating role of teacher–student relationship quality. *Early Childhood Research Quarterly, 40*, 98–109. https://doi.org/10.1016/j.ecresq.2016.10.004

Heyder, K., Suchan, B., & Daum, I. (2004). Cortico-subcortical contributions to executive control. *Acta Psychologica, 115*(2–3), 271–289. https://doi.org/10.1016/j.actpsy.2003.12.010

*Heylen, J., De Raedt, R., Verbruggen, F., & Bosmans, G. (2017). Attachment and self-regulation performance in preadolescence. *Journal of Social and Personal Relationships, 36*(2), 706–716. https://doi.org/10.1177/0265407517742531

Hoffman, C., Crnic, K., & Baker, J. (2006). Maternal depression and parenting: Implications for children's emergent emotion regulation and behavioral functioning. *Parenting, 6*(4), 271–295. https://doi.org/10.1207/s15327922par0604_1

*Holochwost, S. J., Gariépy, J., Propper, C. B., Gardner-Neblett, N., Volpe, V., Neblett, E., & Mills-Koonce, W. R. (2016). Sociodemographic risk, parenting, and executive functions in early childhood: The role of ethnicity. *Early Childhood Research Quarterly, 36*, 537–549. https://doi.org/10.1016/j.ecresq.2016.02.001

*Holochwost, S., Volpe, V., Iruka, I., & Mills-Koonce, W. (2018). Maternal warmth, intrusiveness, and executive functions in early childhood: Tracing developmental processes among African American children. *Early Child Development and Care, 190*(2), 210–218. https://doi.org/10.1080/03004430.2018.1461096

*Hu, B., Fan, X., Wu, Y., LoCasale-Crouch, J., & Song, Z. (2020). Teacher–child interaction quality and Chinese children's academic and cognitive development: New perspectives from piecewise growth modeling. *Early Childhood Research Quarterly, 51*, 242–255. https://doi.org/10.1016/j.ecresq.2019.10.003

*Hu, B., Fan, X., Wu, Z., LoCasale-Crouch, J., Yang, N., & Zhang, J. (2017). Teacher-child interactions and children's cognitive and social skills in Chinese preschool classrooms. *Children and Youth Services Review, 79*, 78–86. https://doi.org/10.1016/j.childyouth.2017.05.028

Hughes, C. (1998). Executive function in preschoolers: Links with theory of mind and verbal ability. *British Journal of Developmental Psychology, 16*(2), 233–253. https://doi.org/10.1111/j.2044-835x.1998.tb00921.x

Hughes, C. (2011). Changes and challenges in 20 years of research into the development of executive functions. *Infant and Child Development, 20*(3), 251–271. https://doi.org/10.1002/icd.736

*Hughes, C., & Devine, R. T. (2017). For better or for worse? Positive and negative parental influences on young children's executive Function. *Child Development, 90*(2), 593–609. https://doi.org/10.1111/cdev.12915

*Hughes, C., & Ensor, R. (2005). Executive function and theory of mind in 2 year olds: A family affair? *Developmental Neuropsychology, 28*(2), 645–668. https://doi.org/10.1207/s15326942dn2802_5

*Hughes, C. H., & Ensor, R. A. (2009). How do families help or hinder the emergence of early executive function? *New Directions for Child and Adolescent Development, 2009*(123), 35–50. https://doi.org/10.1002/cd.234

Hughes, C., Ensor, R., Wilson, A., & Graham, A. (2009). Tracking executive function across the transition to school: A latent variable approach. *Developmental Neuropsychology, 35*(1), 20–36. https://doi.org/10.1080/87565640903325691

Huizinga, M., Dolan, C. V., & van der Molen, M. W. (2006). Age-related change in executive function: Developmental trends and a latent variable analysis. *Neuropsychologia, 44*(11), 2017–2036. https://doi.org/10.1016/j. Neuropsychologia. 2006.01.010

Huizinga, M., & van der Molen, M. (2007). Age-group differences in set-switching and set-maintenance on the Wisconsin card sorting task. *Developmental Neuropsychology, 31*(2), 193–215. https://doi.org/10.1080/87565640701190817

Jacob, R., & Parkinson, J. (2015). The potential for school-based interventions that target executive function to improve academic achievement: A review. *Review of Educational Research, 85*(4), 512–552. https://doi.org/10.3102/0034654314561338

*Kamza, A., Putko, A., & Złotogórska, A. (2016). Maternal parenting attitudes and preschoolers' hot and cool executive functions. *Polish Psychological Bulletin, 47*(2), 236–246. https://doi.org/10.1515/ppb-2016-0028

Kao, K., Nayak, S., Doan, S. N., & Tarullo, A. R. (2018). Relations between parent EF and child EF: The role of socioeconomic status and parenting on executive functioning in early childhood. *Translational Issues in Psychological Science, 4*(2), 122. https://doi.org/10.1037/tps0000154

Kaushanskaya, M., Park, J., Gangopadhyay, I., Davidson, M., & Weismer, S. (2017). The relationship between executive functions and language abilities in children: A latent variables approach. *Journal of Speech, Language, and Hearing Research, 60*(4), 912–923. https://doi.org/10.1044/2016_jslhr-l-15-0310holm

*Keilow, M., Holm, A., Friis-Hansen, M., & Kristensen, R. M. (2019). Effects of a classroom management intervention on student selective attention: Results from a randomized controlled trial. *School Effectiveness and School Improvement, 30*(2), 194–211. https://doi.org/10.1080/09243453.2018.1557701

Klasnja, P., Hekler, E. B., Shiffman, S., Boruvka, A., Almirall, D., Tewari, A., & Murphy, S. A. (2015). Microrandomized trials: An experimental design for developing just-in-time adaptive interventions. *Health Psychology, 34*(S), 1220. doi: 10.1037/hea0000305.

Krafft, K., & Berk, L. (1998). Private speech in two preschools: Significance of open-ended activities and make-believe play for verbal self-regulation. *Early Childhood Research Quarterly, 13*(4), 637–658. https://doi.org/10.1016/s0885-2006(99)80065-9

*Kok, R., Lucassen, N., Bakermans-Kranenburg, M., van IJzendoorn, M., Ghassabian, A., Roza, S., Govaert, P., Jaddoe, V. W., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2013). Parenting, corpus callosum, and executive function in preschool children. *Child Neuropsychology, 20*(5), 583–606. https://doi.org/10.1080/09297049.2013.832741

*Korucu, I., Rolan, E., Napoli, A. R., Purpura, D. J., & Schmitt, S. A. (2019). Development of the Home Executive Function Environment (HEFE) Scale: Assessing its relation to preschoolers' executive function. *Early Childhood Research Quarterly, 47*, 9–19. https://doi.org/10.1016/j.ecresq.2018.09.001

Kurki, K., Järvenoja, H., Järvelä, S., & Mykkänen, A. (2016). How teachers co-regulate children's emotions and behaviour in socio-emotionally challenging situations in day-care settings. *International Journal of Educational Research, 76*, 76–88. https://doi.org/10.1016/j.ijer.2016.02.002

*Landry, S., Miller-Loncar, C., Smith, K., & Swank, P. (2002). The role of early parenting in children's development of executive processes. *Developmental Neuropsychology, 21*(1), 15–41. https://doi.org/10.1207/s15326942dn2101_2

Landry, S. H., & Smith, K. E. (2010). Early social and cognitive precursors and parental support for self-regulation and executive function: Relations from early childhood into adolescence. In B. W. Sokol, U. Müller, J. I. M. Carpendale, A. R. Young, & G. Iarocci (Eds.), *Self and social regulation: Social interaction and the development of social understanding and executive functions* (pp. 386–417). Oxford University Press. doi: 10.1093/acprof:oso/9780195327694.003.0016.

Landry, S. H., Smith, K. E., & Swank, P. R. (2006). Responsive parenting: Establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology, 42*(4), 627–642. https://doi.org/10.1037/0012-1649.42.4.627

*Langeloo, A., Deunk, M., Lara, M., van Rooijen, M., & Strijbos, J. (2019). Learning opportunities of monolingual and multilingual kindergarteners and their early literacy and executive functioning development. *Early Education and Development, 31*(8), 1224–1246. https://doi.org/10.1080/10409289.2019.1697607

Lee, M. K., Baker, S., & Whitebread, D. (2018). Culture-specific links between maternal executive function, parenting, and preschool children's executive function in South Korea. *British Journal of Educational Psychology, 88*(2), 216–235. https://doi.org/10.1111/bjep.12221

Le Métais, J. (2003). *Transition from primary to secondary education in selected countries of the INCA website.* Slough, England: National Foundation for Educational Research.

Lengua, L. J. (2012). Poverty, the development of effortful control, and children's academic, social, and emotional adjustment. In V. Maholmes & R. B. King (Eds.), *The Oxford handbook of poverty and child development* (pp. 491–511). Oxford University Press.

*Lengua, L. J., Kiff, C., Moran, L., Zalewski, M., Thompson, S., Cortes, R., & Ruberry, E. (2014). Parenting mediates the effects of income and cumulative risk on the development of effortful control. *Social Development, 23*(3), 631–649. https://doi.org/10.1111/sode.12071

Leseman, P., Mulder, H., Verhagen, J., Broekhuizen, M., van Schaik, S., & Slot, P. (2017). Effectiveness of Dutch targeted preschool education policy for disadvantaged children: Evidence from the pre-COOL study. In H.P. Blossfeld, N. Kulic, J. Skopek, & M. Triventi, *Childcare, early education and social inequality*. Edward Elgar Publishing. doi: 10.4337/9781786432094.00019.

*Leyva, D., Weiland, C., Barata, M., Yoshikawa, H., Snow, C., Treviño, E., & Rolla, A. (2015). Teacher-child interactions in Chile and their associations with prekindergarten outcomes. *Child Development, 86*(3), 781–799. https://doi.org/10.1111/cdev.12342

Lewis, C., & Carpendale, J. (2009). Introduction: Links between social interaction and executive function. *NewDirections for Child and Adolescent Development, 2009* (123), 1–15. https://doi.org/10.1002/cd.232

Lewis, C., Koyasu, M., Oh, S., Ogawa, A., Short, B., & Huang, Z. (2009). Culture, executive function, and social understanding. *New Directions for Child and Adolescent Development, 2009*(123), 69–85. https://doi.org/10.1002/cd.236

*Li-Grining, C. P. (2007). Effortful control among low-income preschoolers in three cities: Stability, change, and individual differences. *Developmental Psychology*, 43 (1), 208–221. doi: 10.1037/0012-1649.43.1.208.

Loop, L., & Roskam, I. (2016). Do children behave better when parents' emotion coaching practices are stimulated? A micro-trial study. *Journal of Child and Family Studies, 25*(7), 2223–2235. https://doi.org/10.1007/s10826-016-0382-0

*Low, J., & Webster, L. (2015). Attention and executive functions as mediators of attachment and behavior problems. *Social Development, 25*(3), 646–664. https://doi.org/10.1111/sode.12166

*Lowe, J., Erickson, S. J., MacLean, P., Duvall, S. W., Ohls, R. K., & Duncan, A. F. (2014). Associations between maternal scaffolding and executive functioning in 3 and 4 year olds born very low birth weight and normal birth weight. *Early Human Development, 90*(10), 587–593. doi: 10.1016/j.earlhumdev.2014.07.009.

*Lucassen, N., Kok, R., Bakermans-Kranenburg, M. J., Van Ijzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., Lambregtse-Van den Berg, M. P., & Tiemeier, H. (2015). Executive functions in early childhood: The role of maternal and paternal parenting practices. *British Journal of Developmental Psychology, 33* (4), 489–505. https://doi.org/10.1111/bjdp.12112

Luciana, M., & Nelson, C. A. (1998). The functional emergence of prefrontally-guided working memory systems in four- to eight-year-old children. *Neuropsychologia, 36*(3), 273–293. https://doi.org/10.1016/S0028-3932(97)00109-7

Luria, A. R. (1961). *The role of speech in the regulation of normal and abnormal behavior*. Oxford, England: Pergamon.

Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In P. H. Mussen & E. M. Hetherington (Eds.), *Handbook of child psychology: Socialization, personality, and social development* (4th ed.). Wiley.

*Mathis, E. T. B., & Bierman, K. L. (2015). Dimensions of parenting associated with child prekindergarten emotion regulation and attention control in low-income families. *Social Development, 24*(3), 601–620. https://doi.org/10.1111/sode.12112

Marek, S., & Dosenbach, N. U. (2022). The frontoparietal network: Function, electrophysiology, and importance of individual precision mapping. *Dialogues in Clinical Neuroscience, 20*(2), 133–140. doi: 10.31887/DCNS.2018.20.2/smarek.

Matte-Gagné, C., & Bernier, A. (2011). Prospective relations between maternal autonomy support and child executive functioning: Investigating the mediating role of child language ability. *Journal of Experimental Child Psychology, 110*(4), 611–625. https://doi.org/10.1016/j.jecp.2011.06.006

*Matte-Gagné, C., Bernier, A., & Lalonde, G. (2014). Stability in maternal autonomy support and child executive functioning. *Journal of Child and Family Studies, 24*(9), 2610–2619. https://doi.org/10.1007/s10826-014-0063-9

McClelland, M., Geldhof, J., Morrison, F., Gestsdóttir, S., Cameron, C., Bowers, E., Duckworth, A., Little, T., & Grammer, J. (2018). Self-regulation. In Halfon, N., Forrest, C., Lerner, R., & Faustman, E. (Eds.), *Handbook of life course health development* (pp. 275–298). doi: 10.1007/978-3-319-47143-3.

*McKinnon, R. D., & Blair, C. (2018). Bidirectional relations among executive function, teacher–child relationships, and early reading and math achievement: A cross-lagged panel analysis. *Early Childhood Research Quarterly, 46*, 152–165. https://doi.org/10.1016/j.ecresq.2018.03.011

*Meece, D., & Robinson, C. M. (2014). Father-child interaction: Associations with self-control and aggression among 4.5-year-olds. *Early Child Development and Care, 184*(5), 783–794. https://doi.org/10.1080/03004430.2013.818990

*Merz, E. C., Landry, S. H., Montroy, J. J., & Williams, J. M. (2017). Bidirectional associations between parental responsiveness and executive function during early childhood. *Social Development, 26*(3), 591–609. https://doi.org/10.1111/sode.12204

*Meuwissen, A. S., & Carlson, S. M. (2015). Fathers matter: The role of father parenting in preschoolers' executive function development. *Journal of Experimental Child Psychology, 140*, 1–15. https://doi.org/10.1016/j.jecp.2015.06.010

*Meuwissen, A. S., & Carlson, S. M. (2018). The role of father parenting in children's school readiness: A longitudinal follow-up. *Journal of Family Psychology, 32*(5), 588–598. https://doi.org/10.1037/fam0000418

*Meuwissen, A. S., & Carlson, S. M. (2019). An experimental study of the effects of autonomy support on preschoolers' self-regulation. *Journal of Applied Developmental Psychology, 60*, 11–23. https://doi.org/10.1016/j.appdev.2018.10.001

*Mileva-Seitz, V. R., Ghassabian, A., Bakermans-Kranenburg, M. J., van den Brink, J. D., Linting, M., Jaddoe, V. W. V, Hofman, A., Verhulst, F. C., Tiemeier, H., & van IJzendoorn, M. H. (2015). Are boys more sensitive to sensitivity? Parenting and executive function in preschoolers. *Journal of Experimental Child Psychology, 130*, 193–208. doi: 10.1016/j.jecp.2014.08.008.

Mills-Koonce, W., Propper, C., & Barnett, M. (2012). Poor infant soothability and later insecure-ambivalent attachment: Developmental change in phenotypic markers of risk or two measures of the same construct? *Infant Behavior and Development, 35*(2), 215–225. https://doi.org/10.1016/j.infbeh.2012.01.002

Miyake, A., & Friedman, N. (2012). The nature and organization of individual differences in executive functions. *Current Directions in Psychological Science, 21*(1), 8–14. https://doi.org/10.1177/0963721411429458

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., & Howerter, A. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology, 41*, 49–100. doi: 10.1006/cogp.1999.0734.

Moriguchi, Y. (2014). The early development of executive function and its relation to social interaction: A brief review. *Frontiers in Psychology, 5*. https://doi.org/10.3389/fpsyg.2014.00388

Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development, 16*(2), 361–388. https://doi.org/10.1111/j.1467-9507.2007.00389.x

Moses, L. J., Carlson, S. M., & Sabbagh, M. A. (2005). On the specificity of the relation between executive function and children's theories of mind. In W. Schneider, R. Schumann-Hengsteler, & B. Sodian (Eds.), *Young children's cognitive development: Interrelationships among executive functioning, working memory, verbal ability, and theory of mind* (pp. 131–145). Lawrence Erlbaum Associates Publishers.

Mouton, B., Loop, L., Stievenart, M., & Roskam, I. (2018). Child differential sensitivity to parental self-efficacy improvement: A micro-trial perspective. *International Journal of Behavioral Development, 42*(2), 203–213. https://doi.org/10.1177/0165025416687416

*Neuenschwander, R., Friedman-Krauss, A., Raver, C., & Blair, C. (2017). Teacher stress predicts child executive function: Moderation by school poverty. *Early Education and Development, 28*(7), 880–900. https://doi.org/10.1080/10409289.2017.1287993

*Nguyen, T., Ansari, A., Pianta, R., Whittaker, J., Vitiello, V., & Ruzek, E. (2020). The classroom relational environment and children's early development in preschool. *Social Development, 29*(4), 1071–1091. https://doi.org/10.1111/sode.12447

NICHD Early Child Care Research Network. (2003). Do children's attention processes mediate the link between family predictors and school readiness? *Developmental Psychology, 39*, 581–593. https://doi.org/10.1037/0012-1649.39.3.581

O'Connor, E., & McCartney, K. (2007). Attachment and cognitive skills: An investigation of mediating mechanisms. *Journal of Applied Developmental Psychology, 28* (5–6), 458–476. https://doi.org/10.1016/j.appdev.2007.06.007

*Obradović, J., Yousafzai, A. K., Finch, J. E., & Rasheed, M. A. (2016). Maternal scaffolding and home stimulation: Key mediators of early intervention effects on children's cognitive development. *Developmental Psychology, 52*(9), 1409–1421. https://doi.org/10.1037/dev0000182

*Obradović, J., Finch, J. E., Portilla, X. A., Rasheed, M. A., Tirado-Strayer, N., & Yousafzai, A. K. (2019). Early executive functioning in a global context: Developmental continuity and family protective factors. *Developmental Science, 22*(5). https://doi.org/10.1111/desc.12795

OECD. (2015). PF3.2: Enrolment in childcare and pre-school. OECD Family Database, Social Policy Division, Directorate of Employment, Labour and Social Affairs. (Updated: July, 2021). Retrieved from: https://www.oecd.org/els/soc/PF3_2_Enrolment_childcare_preschool.pdf.
*Owen, M. T., Caughy, M. O. B., Hurst, J. R., Amos, M., Hasanizadeh, N., & Mata-Otero, A. M. (2013). Unique contributions of fathering to emerging self-regulation in low-income ethnic minority preschoolers. *Early Child Development and Care, 183*(3–4), 464–482. https://doi.org/10.1080/03004430.2012.711594
Pauen, S. (2016). Understanding early development of self-regulation and co-regulation: EDOS and PROSECO. *Journal of Self-Regulation and Regulation, 2*, 2–16. doi: 10.11588/josar.2016.2.34350.
Pianta, R. C. (1999). *Enhancing relationships between children and teachers.* American Psychological Association.
Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *Classroom assessment scoring system (CLASS) manual, pre-K.* Paul H. Brookes.
*Pianta, R., Whittaker, J., Vitiello, V., Ruzek, E., Ansari, A., Hofkens, T., & DeCoster, J. (2020). Children's school readiness skills across the pre-K year: Associations with teacher-student interactions, teacher practices, and exposure to academic content. *Journal of Applied Developmental Psychology, 66*, Article 101084. https://doi.org/10.1016/j.appdev.2019.101084
Repetti, R., Taylor, S., & Seeman, T. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*(2), 330–366. https://doi.org/10.1037/0033-2909.128.2.330
Rhee, K. E., Dickstein, S., Jelalian, E., Boutelle, K., Seifer, R., & Wing, R. (2015). Development of the general parenting observational scale to assess parenting during family meals. *The International Journal of Behavioral Nutrition and Physical Activity, 12*(1), 49. https://doi.org/10.1186/s12966-015-0207-3
*Rimm-Kaufman, S. E., Curby, T. W., Grimm, K. J., Nathanson, L., & Brock, L. L. (2009). The contribution of children's self-regulation and classroom quality to children's adaptive behaviors in the Kindergarten classroom. *Developmental Psychology, 45*(4), 958–972. https://doi.org/10.1037/a0015861
*Rolan, E. P., Schmitt, S. A., Purpura, D. J., & Nichols, D. L. (2018). Sibling presence, executive function, and the role of parenting. *Infant and Child Development, 27*(4). https://doi.org/10.1002/icd.2091
Romine, C., & Reynolds, C. (2005). A model of the development of frontal lobe functioning: Findings from a meta-analysis. *Applied Neuropsychology, 12*(4), 190–201. https://doi.org/10.1207/s15324826an1204_2
Roorda, D. L., Koomen, H. M. Y., Spilt, J. L., & Oort, F. J. (2011). The influence of affective teacher-student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of Educational Research, 81*, 493–529. doi: 10.3102/0034654311421793.
Roos, L. E., Beauchamp, K. G., Flannery, J., & Fisher, P. A. (2017). Cultural contributions to childhood executive function. *Journal of Cognition and Culture, 8*, 61.
*Roskam, I., Stievenart, M., Meunier, J. C., & Noël, M. P. (2014). The development of children's inhibition: Does parenting matter? *Journal of Experimental Child Psychology, 122*(1), 166–182. https://doi.org/10.1016/j.jecp.2014.01.003
Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality, 74*(6), 1557–1586. https://doi.org/10.1111/j.1467-6494.2006.00420.x
Sabbagh, M. A., Xu, F., Carlson, S. M., Moses, L. J., & Lee, K. (2006). The development of executive functioning and theory of mind: A comparison of Chinese and US preschoolers. *Psychological science, 17*(1), 74–81. https://doi.org/10.1111/j.1467-9280.2005.01667.x
Sabol, T. J., & Pianta, R. C. (2012). Patterns of school readiness forecast achievement and socioemotional development at the end of elementary school. *Child Development, 83*(1), 282–299. https://doi.org/10.1111/j.1467-8624.2011. 01678.x
Sameroff, A. (2010). A unified theory of development: A dialectic integration of nature and nurture. *Child Development, 81*(1), 6–22. https://doi.org/10.1111/j.1467-8624.2009.01378.x
*Sandilos, L., Whittaker, J., Vitiello, V., & Kinzie, M. (2019). Preschoolers' school readiness profiles and the teacher-child relationship: A latent transition approach. *Journal of Applied Developmental Psychology, 62*, 185–198. https://doi.org/10.1016/j.appdev.2019.02.010
*Schmitt, S., Duncan, R., Budrevich, A., & Korucu, I. (2019). Benefits of behavioral self-regulation in the context of high classroom quality for preschoolers' mathematics. *Early Education and Development, 31*(3), 323–334. https://doi.org/10.1080/10409289.2019.1660555
*Schneider-Hassloff, H., Zwönitzer, A., Künster, A., Mayer, C., Ziegenhain, U., & Kiefer, M. (2016). Emotional availability modulates electrophysiological correlates of executive functions in preschool children. *Frontiers in Human Neuroscience, 10*. https://doi.org/10.3389/fnhum.2016.00299
*Schroeder, V. M., & Kelley, M. L. (2010). Family environment and parent-child relationships as related to executive functioning in children. *Early Child Development and Care, 180*(10), 1285–1298. https://doi.org/10.1080/03004430902981512
Schwarz, J., Barton-Henry, M., & Pruzinsky, T. (1985). Assessing child-rearing behaviors: A comparison of ratings made by mother, father, child, and sibling on the CRPBI. *Child Development, 56*(2), 462. https://doi.org/10.2307/1129734
Sheffield, J. M., Repovs, G., Harms, M. P., Carter, C. S., Gold, J. M., MacDonald, A. W., III, Ragland, J. D., Silverstein, S. M., Godwin, D., & Barch, D. M. (2015). Fronto-parietal and cingulo-opercular network integrity and cognition in health and schizophrenia. *Neuropsychologia, 73*, 82–93. https://doi.org/10.1016/j.neuropsychologia.2015.05.006
Slot, P., Leseman, P., Verhagen, J., & Mulder, H. (2015). Associations between structural quality aspects and process quality in Dutch early childhood education and care settings. *Early Childhood Research Quarterly, 33*, 64–76. https://doi.org/10.1016/j.ecresq.2015.06.001
Slot, P. L., & von Suchodoletz, A. (2018). Bidirectionality in preschool children's executive functions and language skills: Is one developing skill the better predictor of the other? *Early Childhood Research Quarterly, 42*, 205–214. https://doi.org/10.1016/j.ecresq.2017.10.005
*Sobkin, V. S., Veraksa, A. N., Bukhalenkova, D. A., Fedotova, A. V, Khalutina, U. A., & Yakupova, V. A. (2016). The connection of socio-demographic factors and child-parent relationships to the psychological aspects of children's development. *Psychology in Russia: State of the Art, 9*(4), 106–122. doi: 10.11621/pir.2016.0409.
*Sosic-Vasic, Z., Keis, O., Lau, M., Spitzer, M., & Streb, J. (2015). The impact of motivation and teachers' autonomy support on children's executive functions. *Frontiers in Psychology, 6*, 1–12. https://doi.org/10.3389/fpsyg.2015.00146
*Sosic-Vasic, Z., Kröner, J., Schneider, S., Vasic, N., Spitzer, M., & Streb, J. (2017). The association between parenting behavior and executive functioning in children and young adolescents. *Frontiers in Psychology, 8*, 1–8. https://doi.org/10.3389/fpsyg.2017.00472
*Spruijt, A. M., Dekker, M. C., Ziermans, T. B., & Swaab, H. (2018). Attentional control and executive functioning in school-aged children: Linking self-regulation and parenting strategies. *Journal of Experimental Child Psychology, 166*, 340–359. https://doi.org/10.1016/j.jecp.2017.09.004
*Spruijt, A. M., Dekker, M. C., Ziermans, T. B., & Swaab, H. (2019). Educating parents to improve parent–child interactions: Fostering the development of attentional control and executive functioning. *British Journal of Educational Psychology, 90*, 158–175. https://doi.org/10.1111/bjep.12312
Sroufe, L. A. (1988). The role of infant-caregiver attachment in development. In J. Belsky, & T. Nezworski (Eds.), *Clinical implications of attachment* (pp. 18–38). Erlbaum.
Stahl, J. F., Schober, P. S., & Spiess, C. K. (2018). Parental socio-economic status and childcare quality: Early inequalities in educational opportunity? *Early Childhood Research Quarterly, 44*, 304–317. https://doi.org/10.1016/j.ecresq.2017.10.011
Stetsenko, A., & Vianna, E. (2009). Bridging developmental theory and educational practice: Lessons from the Vygotskian Project. In O. A. Barbarin & B. Hanna Wasik (Eds.), *Handbook of child development and early education: Research to practice* (pp. 38–54). Guilford Press.
*St George, J., Fletcher, R., & Palazzi, K. (2016). Comparing fathers' physical and toy play and links to child behaviour: An exploratory study. *Infant and Child Development, 26*(1), Article e1958. https://doi.org/10.1002/icd.1958
*Suntheimer, N. M., & Wolf, S. (2020). Cumulative risk, teacher-child closeness, executive function and early academic skills in kindergarten children. *Journal of School Psychology, 78*, 23–37. doi: 10.1016/j.jsp.2019.11.005.
*Suor, J., Sturge-Apple, M., & Skibo, M. (2016). Breaking cycles of risk: The mitigating role of maternal working memory in associations among socioeconomic status, early caregiving, and children's working memory. *Development and Psychopathology, 29*(4), 1133–1147. https://doi.org/10.1017/s095457941600119x
*Suor, J., Sturge-Apple, M., Davies, P., & Jones-Gordils, H. (2019). The interplay between parenting and temperament in associations with children's executive function. *Journal of Family Psychology, 33*(7), 841–850. https://doi.org/10.1037/fam0000558
*Swanson, J., Valiente, C., Bradley, R., Lemery-Chalfant, K., & Abry, T. (2015). Teachers' effortful control and student functioning: Mediating and moderating processes. *Social Development, 25*(3), 623–645. https://doi.org/10.1111/sode.12165

*Swingler, M., Isbell, E., Zeytinoglu, S., Calkins, S., & Leerkes, E. (2018). Maternal behavior predicts neural underpinnings of inhibitory control in preschoolers. *Developmental Psychobiology, 60*(6), 692–706. https://doi.org/10.1002/dev.21742
Te Brinke, L. W., Menting, A. T., Schuiringa, H. D., Deković, M., Weisz, J. R., & De Castro, B. O. (2021). Emotion regulation training as a treatment element for externalizing problems in adolescence: A randomized controlled micro-trial. *Behaviour Research and Therapy, 143*, Article 103889. https://doi.org/10.1016/j.brat.2021.103889
*Towe-Goodman, N., Willoughby, M., Blair, C., Gustafsson, H., Mills-Koonce, W., & Cox, M. (2014). Fathers' sensitive parenting and the development of early executive functioning. *Journal of Family Psychology, 28*(6), 867–876. https://doi.org/10.1037/a0038128
Vallotton, C., & Ayoub, C. (2011). Use your words: The role of language in the development of toddlers' self-regulation. *Early ChildhoodResearch Quarterly, 26*, 169–181. doi: 10.1016/j.ecresq.2010.09.002.
Van den Brand, S. A. G. E., & van de Schoot, R. (2021, September 17). A systematic review on studies evaluating the performance of active learning compared to human reading for systematic review data. doi: 10.17605/OSF.IO/T9HGM.
*Vandenbroucke, L., Spilt, J., Verschueren, K., & Baeyens, D. (2017). Keeping the spirits up: The effect of teachers' and parents' emotional support on children's working memory performance. *Frontiers in Psychology, 8*. https://doi.org/10.3389/fpsyg.2017.00512
Vandenbroucke, L., Spilt, J., Verschueren, K., Piccinin, C., & Baeyens, D. (2018a). The classroom as a developmental context for cognitive development: A meta-analysis on the importance of teacher–student interactions for children's executive functions. *Review of Educational Research, 88*(1), 125–164. https://doi.org/10.3102/0034654317743200
*Vandenbroucke, L., Spilt, J., Verschueren, K., & Baeyens, D. (2018b). The effects of peer rejection, parent and teacher support on working memory performance: An experimental approach in middle childhood. *Learning and Individual Differences, 67*, 12–21. https://doi.org/10.1016/j.lindif.2018.06.007
*Vandenbroucke, L., Verschueren, K., Desoete, A., Aunio, P., Ghesquière, P., & Baeyens, D. (2018c). Crossing the bridge to elementary school: The development of children's working memory components in relation to teacher-student relationships and academic achievement. *Early Childhood Research Quarterly, 42*, 1–10. https://doi.org/10.1016/j.ecresq.2017.08.004
Valcan, D., Davis, H., & Pino-Pasternak, D. (2018). Parental behaviours predicting early childhood executive functions: A meta-analysis. *Educational Psychology Review, 30*(3), 607–649. https://doi.org/10.1007/s10648-017-9411-9
van de Schoot, R., de Bruin, J., Schram, R., Zahedi, P., de Boer, J., Weijdema, F., Kramer, B., Huijts, M., Hoogerwerf, M., Ferdinands, G., Harkema, A., Willemsen, J., Ma, Y., Fang, Q., Hindriks, S., Tummers, L., & Oberski, D. L. (2021). An open source machine learning framework for efficient and transparent systematic reviews. *Nature Machine Intelligence, 3*(2), 125–133. https://doi.org/10.1038/s42256-020-00287-7
*Vernon-Feagans, L., Willoughby, M., & Garrett-Peters, P. (2016). Predictors of behavioral regulation in kindergarten: Household chaos, parenting, and early executive functions. *Developmental Psychology, 52*(3), 430–441. https://doi.org/10.1037/dev0000087
Verschueren, K., & Koomen, H. (2012). Teacher–child relationships from an attachment perspective. *Attachment & Human Development, 14*(3), 205–211. https://doi.org/10.1080/14616734.2012.672260
Vugs, B., Knoors, H., Cuperus, J., Hendriks, M., & Verhoeven, L. (2015). Interactions between working memory and language in young children with specific language impairment (SLI). *Child Neuropsychology, 22*(8), 955–978. https://doi.org/10.1080/09297049.2015.1058348
Vygotsky, L. S. (1934/1986). *Thought and language*. MIT Press.
Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard Univ Press.
Waylen, A., Stallard, N., & Stewart-Brown, S. (2008). Parenting and health in mid-childhood: A longitudinal study. *European Journal of Public Health, 18*, 300–305. https://doi.org/10.1093/eurpub/ckm131
Wei, W. S., McCoy, D. C., Busby, A. K., Hanno, E. C., & Sabol, T. J. (2021). Beyond neighborhood socioeconomic status: Exploring the role of neighborhood resources for preschool classroom quality and early childhood development. *American Journal of Community Psychology, 67*(3–4), 470–485. https://doi.org/10.1002/ajcp.12507
*Weiland, C., Ulvestad, K., Sachs, J., & Yoshikawa, H. (2013). Associations between classroom quality and children's vocabulary and executive function skills in an urban public prekindergarten program. *Early Childhood Research Quarterly, 28*(2), 199–209. https://doi.org/10.1016/j.ecresq.2012.12.002
*Weisleder, A., Mazzuchelli, D. S. R., Lopez, A. S., Neto, W. D., Cates, C. B., Gonçalves, H. A., Fonseca, R. P., Oliveira, J., & Mendelsohn, A. L. (2018). Reading aloud and child development: A cluster-randomized trial in Brazil. *Pediatrics, 141*(1). https://doi.org/10.1542/peds.2017-0723
Wertsch, J. (2008). From social interaction to higher psychological processes: A clarification and application of Vygotsky's theory. *Human Development, 51*, 66–79. https://doi.org/10.1159/000112532
Wiebe, S., Sheffield, T., Nelson, J., Clark, C., Chevalier, N., & Espy, K. (2011). The structure of executive function in 3-year-olds. *Journal of Experimental Child Psychology, 108*(3), 436–452. https://doi.org/10.1016/j.jecp.2010.08.008
*White, L., Fernandez, V., & Greenfield, D. (2019). Assessing classroom quality for Latino dual language learners in Head Start: DLL-specific and general teacher-child interaction perspectives. *Early Education and Development, 31*(4), 599–627. https://doi.org/10.1080/10409289.2019.1680785
*Williford, A. P., Vick Whittaker, J. E., Vitiello, V. E., & Downer, J. T. (2013). Children's engagement within the preschool classroom and their development of self-regulation. *Early Education and Development, 24*(2), 162–187. https://doi.org/10.1080/10409289.2011.628270
Willoughby, M., & Blair, C. (2011). Test-retest reliability of a new executive function battery for use in early childhood. *Child Neuropsychology, 17*(6), 564–579. https://doi.org/10.1080/09297049.2011.554390
Winsler, A., Diaz, R. M., Atencio, D. J., McCarthy, E. M., & Adams Chabay, L. (2000). Verbal self-regulation over time in preschool children at-risk for attention and behavior problems. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 41*, 875–886. https://doi.org/10.1111/1469-7610.00675
Winsler, A., Diaz, R., McCarthy, E., Atencio, D., & Chabay, L. (1999). Mother-child interaction, private speech, and task performance in preschool children with behavior problems. *Journal of Child Psychology and Psychiatry, 40*(6), 891–904. https://doi.org/10.1111/1469-7610.00507
Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry, 17*(2), 89–100. https://doi.org/10.1111/j.1469-7610.1976.tb00381.x
Wood, D., & Wood, H. (1996). Vygotsky, tutoring and learning. *Oxford Review of Education, 22*(1), 5–16. https://doi.org/10.1080/0305498960220101
*Xing, X., Wang, M., & Wang, Z. (2016). Parental corporal punishment in relation to children's executive function and externalizing behavior problems in China. *Social Neuroscience, 13*(2), 184–189. https://doi.org/10.1080/17470919.2016.1258009
*Yu, D., Caughy, M., Smith, E., Oshri, A., & Owen, M. (2020). Severe poverty and growth in behavioral self-regulation: The mediating role of parenting. *Journal of Applied Developmental Psychology, 68*, Article 101135. https://doi.org/10.1016/j.appdev.2020.101135
Zelazo, P. D., Blair, C. B., & Willoughby, M. T. (2016). *Executive function: Implications for education*. NCER 2017-2000. National Center for Education Research.
Zelazo, P. D., & Carlson, S. M. (2012). Hot and cool executive function in childhood and adolescence: Development and plasticity. *Child Development Perspectives, 6*, 354–360. https://doi.org/10.1111/j.1750-8606.2012.00246.x
Zelazo, P. D., & Müller, U. (2011). Executive function in typical and atypical development. In U. Goswami (Ed.), *Handbook of childhood cognitive development* (pp. 574–603). Wiley-Blackwell.
*Zeytinoglu, S., Calkins, S., & Leerkes, E. (2018). Maternal emotional support but not cognitive support during problem-solving predicts increases in cognitive flexibility in early childhood. *International Journal of Behavioral Development, 43*(1), 12–23. https://doi.org/10.1177/0165025418757706
*Zeytinoglu, S., Calkins, S., Swingler, M., & Leerkes, E. (2017). Pathways from maternal effortful control to child self-regulation: The role of maternal emotional support. *Journal of Family Psychology, 31*(2), 170–180. https://doi.org/10.1037/fam0000271