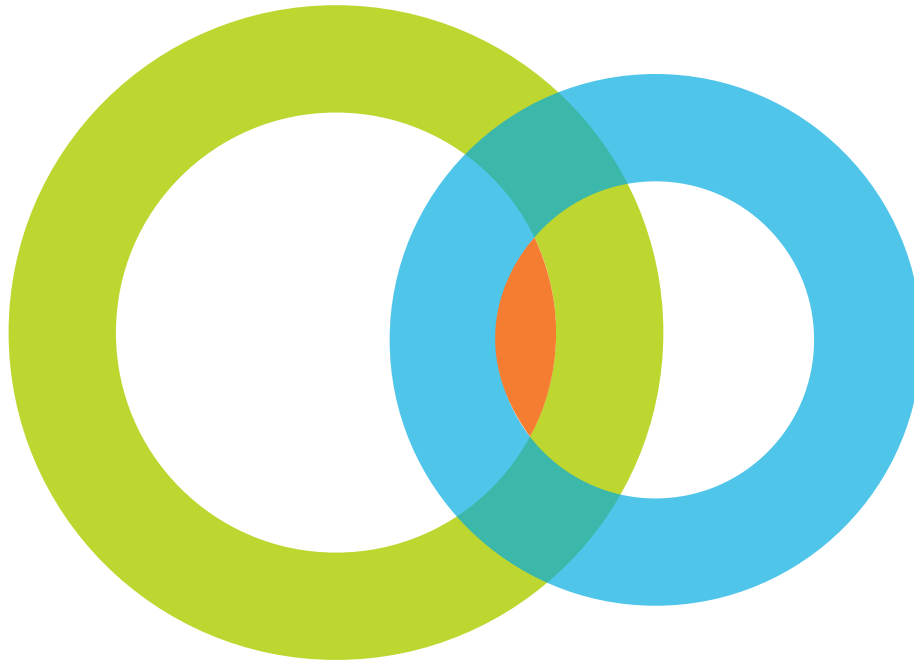


shared discoveries:

positive parent-child relationships and
child development

Our Mission

The mission of the Center for Childhood Creativity is to ignite and advance creative thinking for all children.



shared discoveries:

positive parent-child relationships and
child development

a Center for Childhood Creativity white paper

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introduction

The relationship between a parent and child has an enormous impact on every aspect of the child's development. From the very beginning, the types of shared experiences, activities, and behaviors that parents and children engage in together set the stage for children's cognitive, social, and emotional development.

Researchers from numerous fields including psychology, sociology and education have documented and investigated the impact of parent-child interactions beginning in infancy through adolescence and into early adulthood. The findings from this diverse body of research support the conventional wisdom that parents have a profound and enduring impact on their child's development and path to success in school and beyond. Positive parent-child interactions—how parents and children communicate through language, shared experiences, and mutual discovery—powerfully influence how children learn, grow, and thrive.

One of the most useful theoretical perspectives in this area is that of Lev Vygotsky. Vygotsky was one of the first psychologists to view development as embedded in social context where much of development takes place through participation in shared activities. In contrast to most other major theories of development, sociocultural theories emphasize that development takes place through direct interactions with other people—parents, teachers, siblings, friends—who support and guide children's cognitive and social activities.

A core principal in sociocultural theories is *guided participation*, a process in which a parent, teacher, or more knowledgeable individual organizes an activity in ways that allow children to participate at a higher level than they could manage on their own (Rogoff, 1990). Parents and children participate in these types of interactions in everyday activities such as putting together a puzzle, learning to ride a bike, and discovering how bees make honey. Children, most of the time, are the learner in these interactions, but they can also serve as the teacher. A related concept that we explore in this paper is *shared participation* (or shared discovery), which emphasizes the role

of both the child and the parent in the learning and development process. In this paper, we will use the term “parent” to refer to a child's caregiver because most of the research focuses on the interaction between a parent and child, and in many cases the

Positive parent-child interactions—how parents and children communicate through language, shared experiences, and mutual discovery—powerfully influence how children learn, grow, and thrive.

mother. However, it is reasonable to extract the majority of the findings to parenting adults.

We will explore what factors promote shared participation between a parent and a child in childhood and what types of shared experiences, activities, and behaviors foster a positive parent-child relationship throughout development. The three themes that emerged from the research are cognition and learning, informal learning environments and play, and social and emotional development. More specifically, we will survey some of the most recent and noteworthy research in the following topic areas: language acquisition, motivation, executive function, academic engagement, free-choice learning and informal science environments, play, prosocial behavior, peer relationships, and emotion regulation. Research will focus on formative experiences and relationships with children aged 2 to 12.



theme 1.

cognition and learning

Parents foster children's cognitive development and learning through shared interactions that involve rich linguistic input, praise for hard work, and sensitive support.

Language Acquisition

Parents and young children share a variety of verbal exchanges that form the basis of communication with one another and others. Examining the language acquisition literature provides an ideal way to look at parent-child interactions given the direct link researchers have revealed between the amount and diversity of language input to the child and language abilities. It is clear that linguistic input is crucial for a child to learn words, and parental input is especially beneficial to early language learners. A recent series of studies by Fernald and colleagues (Fernald, Perfors & Marchman, 2006; Fernald & Marchman, 2011; Hurtado, Marchman & Fernald, 2008; Marchman & Fernald, 2008) highlights the vital role of parental input in the early stages of language learning and provides a well-supported explanation for why individual differences are apparent very early in childhood.

Hurtado, Marchman and Fernald (2008) examined the links between features of early maternal talk and children's vocabulary growth and comprehension efficiency in a study with Latina mothers and their Spanish-learning infants. The researchers found considerable variability in maternal talk and these differences were associated with children's vocabulary outcomes. That is, children who heard more child-directed speech at 18 months of age had larger vocabularies at 24 months and made greater gains in vocabulary. Additionally, children whose mothers spoke more words and more complex utterances during a play session at 18 months were significantly faster at a real-time verbal comprehension task 6 months later than toddlers who had heard less maternal talk.

Hurtado et al.'s findings are noteworthy because they suggest that parental input in the very early stages of language learning is linked to vocabulary growth

and comprehension efficiency in young children. Do these differences in early processing efficiency have long-term effects? Marchman and Fernald (2008) explored the nature of predictive relations between early language abilities and later cognitive function in a longitudinal study that examined speed of word recognition and vocabulary size in infancy and linguistic and cognitive abilities in 8-year-olds. The researchers found that the speed of spoken language understanding and vocabulary size in 2-year-olds predict both cognitive and language skills in later childhood. These findings are a meaningful contribution to the language development literature because they clearly show that individual differences in early linguistic abilities have long-term continuity with later language and cognition.

Given the predictive relationship between early language experience in the form of child-directed speech and language abilities in toddlers and young

It is clear that linguistic input is crucial for a child to learn words, and parental input is especially beneficial to early language learners.

children, it is important to explore the continuing impact of parent-child interactions in the form of conversations in everyday settings as a context for shared learning. A recent body of research explores children's participation in the context of everyday conversations as the impetus for developmental change in language and conceptual development. For example, Levine, Suriyakham, Rowe, Huttenlocher



and Gunderson (2010) examined the predictive relations between parent talk about numbers and young children's understanding of the cardinal meanings of number words (e.g., knowing that the word "three" refers to a set of 3 items) in a longitudinal study. Parent-child dyads were visited in the home starting when the children were 14 months of age and videotaped engaging in their ordinary activities. The researchers found that children's performance on a number task at 46 months was positively related to "number talk" from a caregiver in a home environment between ages 14 and 30 months.

Levine et al.'s finding of a strong relationship between parents' early number talk and children's later understanding of the cardinal meaning of number words is one example of a larger body of research suggesting that parent-child language interactions have a profound impact on children's conceptual and language development. A current and growing trend in this area of research is examining parent-child conversations in a museum context since museums provide an ideal setting to observe family interactions in a learning environment. Crowley, Callanan, Tenenbaum and Allen (2001) explored young children's everyday science thinking in the context of parent-child interactions by asking if there are gender differences in parent-child conversations during informal science learning in a museum setting. The researchers were motivated to address this question because of the well-

documented gender gap in science knowledge and the growing attention to encouraging young girls to pursue careers in STEM fields.

Crowley et al. (2001) examined 298 interactions, each from different families with children ranging in age from 1-8 years, in a California children's museum. The interactions were coded for whether parents explained an exhibit, gave directions, or talked about evidence. The researchers found that parents were three times more likely to explain science to boys than to girls while using interactive science exhibits in the museum. More specifically, parents used at least one explanation in 29% of interactions with boys compared with only 9% of interactions with girls. Furthermore, Crowley et al. observed differences in the rate of parents' explanations to the youngest children in the study who were 1 to 3 years old. These findings are noteworthy because they suggest that parents may (unintentionally) be involved in creating a gender bias in science learning even before children enter school.

The research discussed thus far underlines the importance of early experience for language acquisition and the role of parent-child conversations in various learning environments. This growing body of research shows that children learn through conversations and interactions with parents in everyday settings. That is, observing children and parents talking to each other as they play, discover, and explore their environment provides an important perspective on how they learn together. We will re-visit learning through parent-child conversations as we explore family learning in informal science environments in another section of the paper.

Motivation

Most parents would not give a second thought to praising children's abilities to boost their self-esteem and increase motivation. However, three decades of research by Carol Dweck and her colleagues demonstrates that the type of praise that children hear has an impact on the motivational framework that they

adopt, and in turn can predict behavioral outcomes—including motivation, persistence, and achievement—that are associated with learning skills (Dweck, 2006; Gunderson, Gripshover, Romero, Dweck, Goldin-Meadow & Levine, 2013; Kamins & Dweck, 1999; Mueller & Dweck, 1998).

Dweck (2006) and her research team have described two types of mindsets: the fixed mindset, which is the belief that ability is fixed and unchanging, and the growth mindset, which is the belief that abilities can be developed through practice and learning. Individuals with a fixed mindset focus on the performance aspect of challenges, which leads to a negative view of mistakes and helpless responses to failure or setbacks. In contrast, people with a growth mindset believe that attributes are malleable and value learning over performance. They view challenging situations as opportunities to learn and improve. Most people have a fixed mindset in some areas of their lives and a growth mindset in others. Dweck's work shows that our mindset permeates all aspects of our lives and shapes our attitudes, goals, and perspective on work, relationships and how we raise our kids.

"When parents help their children construct growth-minded ideals, they are giving them something they can strive for. They are also giving their children growing room, room to grow into full human beings who will make their contribution to society in a way that excites them."

(Dweck, 2006, p. 186)

In one line of research, Dweck and her colleagues looked at the effect of different types of praise on children, mostly early adolescents (Dweck, 2006; Mueller & Dweck, 1998). First they gave each child a set of ten fairly difficult problems (from a nonverbal IQ test) and then praised some of the children for their ability ("Wow, you got eight right. That's a really good score. You must be smart at this."). They praised other



children for their effort (“Wow, you got eight right. That’s a really good score. You must have worked really hard.”). After receiving either the ability praise or the effort praise, the children began to differ on a number of measures. The ability-praised children rejected a challenging new task that they could learn from. Why? Because they were afraid of failing and did not want to expose any flaws. In contrast, 90 percent of the children who were praised for effort wanted the challenging new task.

The effects of the type of praise did not end there. After the experience with the difficult problems, the researchers looked at the children’s performance on different types of problems and found that the ability-praised children performance plummeted even when given easier problems. They had lost faith in their abilities and were doing worse than when they started. In contrast, the effort-praised children had used the hard problems to improve their skills and showed better and better performance. But here is the kicker—a high percentage (almost 40 percent) of the

ability-praised children lied about their scores on the problems when asked to write an anonymous letter to a child at another school telling them about the types of problems that they completed. Dweck (2006) summarized her important research findings and related them to real-world scenarios in the classroom by pointing out that:

(So) telling children they’re smart, in the end, made them feel dumber and act dumber, but claim they were smarter. I don’t think this is what we’re aiming for when we put positive labels—“gifted”, “talented”, “brilliant”—on people. We don’t mean to rob them of their zest for challenge and their recipes for success. But that’s the danger. (Dweck, 2006, p. 74)

The research by Dweck and colleagues (Kamins & Dweck, 1999; Mueller & Dweck, 1998) on praise and motivation has demonstrated that children’s motivational framework and behaviors can be impacted in the short term by different types of praise. Recently researchers have demonstrated that the type of praise children hear in the toddler years in real-world parent-child interactions can impact their motivational framework in the long term (Gunderson, et al. 2013). When young children (ages 1-3) hear process praise (e.g., “you worked hard”) in a naturalistic environment they are more likely to adopt a growth mindset at later ages (ages 7-8). However, parents’ use of person praise (similar to ability praise, e.g., “you’re so smart”) did not predict children’s later orientation toward a fixed mindset. Gunderson et al.’s findings are noteworthy because they demonstrate the role of process vs. person praise in a naturalistic interaction (not in a lab), show the long-term impact of the type of praise on children’s motivational framework, and suggest that interventions focusing on the type of praise parents give to their toddlers can have a long-term impact on children’s beliefs about intelligence.





In a related study with preschoolers, Cimpian, Markman and Dweck (2007) examined young children's responses to two different types of feedback (generic vs. nongeneric) after a setback that had very subtle differences. The researchers hypothesized that generic feedback ("You are a good drawer.") could lead children to think in trait terms and as a result view mistakes as a negative trait that undermines motivation. In contrast, nongeneric feedback ("You did a good job drawing.") could have the opposite effect of viewing mistakes as specific to the situation and result in greater task persistence. To test these predictions, 4-year-olds acted out several scenarios involving puppets, where the child chose a puppet to use and the experimenter pretended to be the teacher puppet. The teacher puppet asked the child's puppet to draw several different objects and after the child puppet successfully drew the requested pictures, the teacher puppet praised each success generically ("You are a good drawer.") for half of the subjects and nongenerically ("You did a good job drawing.") for the other half. The success scenarios were followed by two "non-success" scenarios, in which

the child puppet made a mistake and then children's helpless/mastery oriented attitudes and behaviors were assessed by asking the children a series of self-evaluation and persistence questions. As predicted, children who received generic praise exhibited significantly more helpless behavior than children who received nongeneric praise. In contrast, children who received nongeneric praise showed more positive self-assessments and greater task persistence.

Together, the research by Dweck and colleagues demonstrates that children who hear praise for effort may have a very different belief system from children who hear praise for traits (Cimpian et al., 2007; Dweck, 2006; Gunderson et al., 2013; Kamins & Dweck, 1999; Mueller & Dweck, 1998). More specifically, praising effort encourages a growth mindset and praising abilities fosters a fixed mindset. These findings have been supported by both laboratory studies with preschool and grade school children and in real-world parent-child interactions.

Executive Function

The development of executive function (EF) has recently received substantial attention from researchers and the popular press because of the links between EF and young children's school readiness and achievement (Blair, 2002) and social understanding (Sabbagh, Xu, Carlson, Moses & Lee, 2006). What are executive functions? A standard definition is a set of high-order processes including working memory, inhibitory control and attentional flexibility (Hughes & Ensor, 2009). Children use components of EF including planning and inhibitory control when they make decisions in everyday settings. For example, when children decide what game to play with a friend, they use planning to generate ideas for games and inhibitory control to follow the rules of the game and also inhibit behaviors that they may regret later. One of the simplest ways to describe EF is to understand the Stroop test, one of the most famous tests of EF

ability. In this test, the word red is written in green letters, and the subject is asked what color the word is. The correct answer is of course “green,” but it takes some effort to keep from responding “red.” The skills that are relied on to answer correctly are executive functions and those skills are especially useful in the classroom.

A new and growing body of research explores the role of parent-child interaction in the development of executive functions, especially in preschoolers since EF undergoes major developmental changes in this period (Garon, Bryson & Smith, 2008). More specifically, researchers have examined the relation between maternal scaffolding of children’s play in everyday activities and children’s executive function. Vygotsky’s sociocultural theory introduced the concept of *scaffolding* as a form of support in which parents provide information and assistance that allows children to accomplish tasks and goals that otherwise are beyond their ability levels. Successful scaffolding is a delicate balance between providing hints and not

giving children the answer or solution, and may require heavy involvement by the parent at times, and at other times backing away and observing. For example, the following interaction shows how a parent can scaffold a child’s learning:

Parent: How many cups do you have?

Child: I have 6! (there are 7)

Parent: How about if we line them up and count them.

Child: (Lines up cups and miscounts again.)

Parent: Maybe you can try tapping each one as you count them.

(See Fig 1 from Hammond et al. (2012) – examples of good and poor scaffolding.)

Landry, Miller-Loncar, Smith and Swank (2002) investigated the role of language input in the form of maternal scaffolding at ages 3 and 4 years, a time when children are rapidly learning language, to children’s EF at age 6. Maternal scaffolding was assessed at ages 3 and 4 years during a one-hour observation of typical activities around the house including 10 minutes of free play. At ages 4 and 6 years, children’s general language and cognitive abilities were assessed using a standardized intelligence test, and two tasks were used to assess children’s EF at age 6. Landry et al. found a significant indirect relation between mothers’ verbal scaffolding at age 3 and EF at age 6. That is, maternal scaffolding of children’s play at age 3 predicted increased verbal ability at age 4, and this verbal ability predicted better EF at age 6. Landry explained this chain of effects by suggesting that more sensitive scaffolding helps children develop better verbal abilities, and those verbal abilities give children the tools to use language to guide their own behavior.

Related work by Hughes and Ensor (2009) and Hammond, Müller, Carpendale, Bibok and Liebermann-Finestone (2012) supports Landry et al.’s general finding of a positive relationship between mothers’ scaffolding and EF in the preschool years. Hughes and Ensor (2009) explored multiple measures of family life including mother-child interactions in



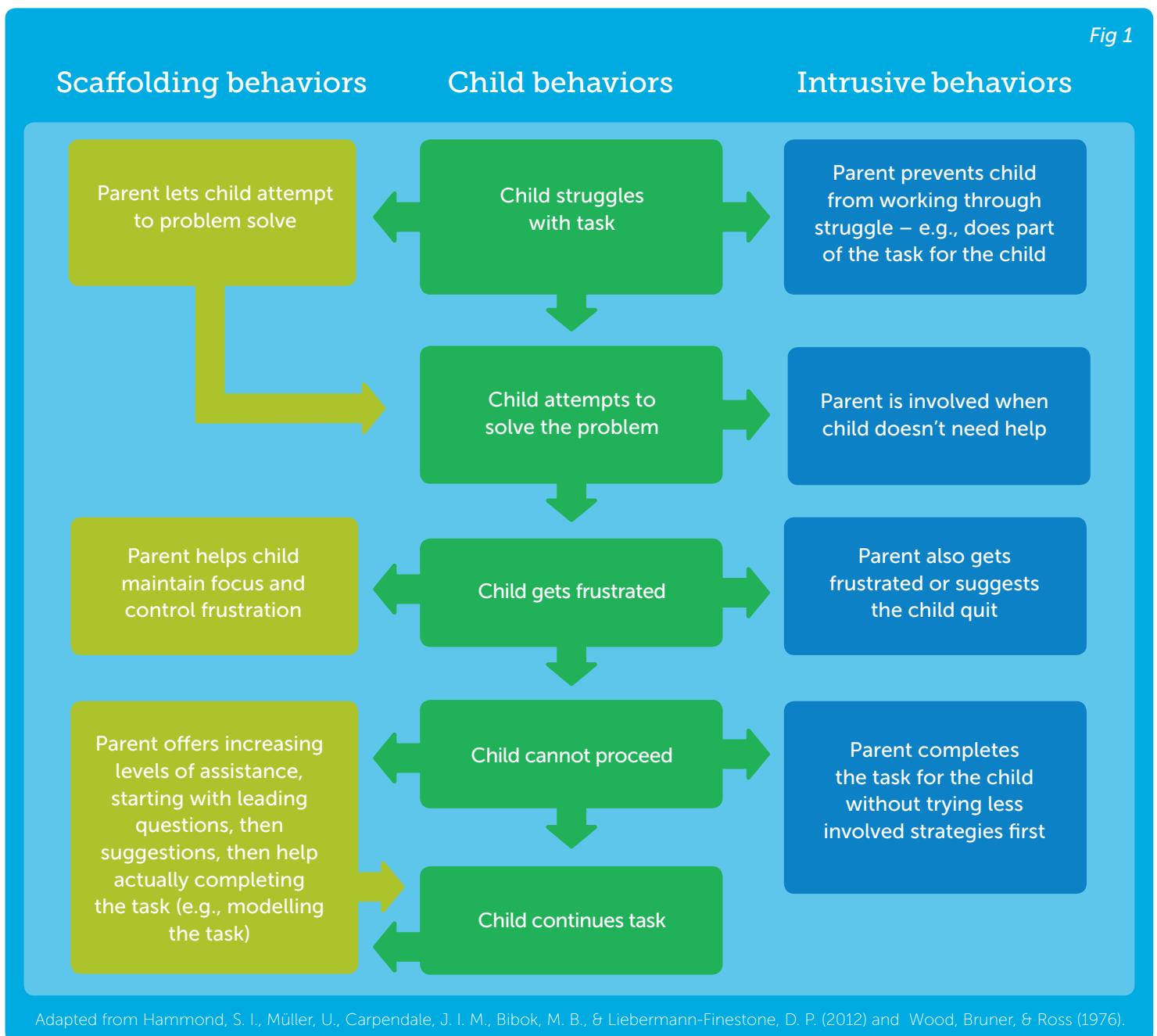
Successful scaffolding is a delicate balance between providing hints and not giving children the answer or solution, and may require heavy involvement by the parent at times, and at other times backing away and observing.

several settings, maternal self-report questionnaires, and measures of maternal planning and self-monitoring. They found that in addition to scaffolding, the mother's own planning skills and the level of family chaos predicted growth in EF.

Hammond et al. (2012) focused on the mediating role of language ability in 2, 3 and 4 year olds, and at each age children completed a battery of five EF tasks that tapped into different dimensions of EF (e.g., working memory, inhibitory control, switching, planning). At ages 2 and 3, parent scaffolding was measured by

observing children and parents solve a challenging ring puzzle together. The researchers defined scaffolding as parent behaviors that supported children with three challenges of the task: recognizing the curvature of the rings, recognizing that incorrect placement resulted in gaps, and managing frustration. Similar to Landry et al. (2002), Hammond and colleagues found that more scaffolding was related to better EF, and that this was at least partially due to the effect of scaffolding on children's language abilities. More specifically, parent scaffolding at age 2 supports verbal ability at age 3, which went on to enhance EF

Fig 1



at age 4. Furthermore, they found that more parental scaffolding at age 3 also predicted better EF at age 4.

One of the tasks used by Hammond et al. (2012) to assess children's EF is the Reverse Categorization task. In this task, the child first watched a demonstration phase in which the experimenter sorted a blue block into a blue bucket and a red block into a red bucket. Then the child was asked to sort four blocks into the bucket with the matching color (red or blue). The "reverse" part of the task was then introduced, and the child was asked to sort the red blocks into the blue bucket and the blue blocks into the red bucket. (See Fig 2.)

Executive function is a growing "hot topic" in both psychology and education research. The studies summarized here show that parental involvement in the form of scaffolding a child's play and everyday activities is an important source of individual differences in EF. Several studies have focused on the mediating role of

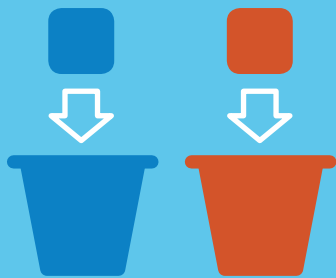
language ability as part of the predictive relationship between scaffolding and EF, and found that developing language skills appear to support the development of stronger EF skills at later ages.

Academic Engagement

As children develop, the type of parental support they receive changes. For example, the interaction between parents and children shifts from parental scaffolding of children's play experiences to parental involvement that influences children's academic engagement and motivation. Many studies examining the link between the role of parents and academic engagement focus on adolescence because the teenage years are typically a time of change for the whole family as the adolescent becomes more independent and autonomous. More specifically, a number of studies have investigated the relationship among parenting

Reverse categorization task (Hammond et al., 2012)

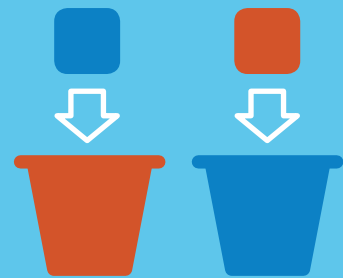
Fig 2



1. The child first watched a demonstration phase in which the experimenter sorted a blue block into a blue bucket and a red block into a red bucket.



2. Then the child was asked to sort four blocks into the bucket with the matching color (red or blue).



3. The "reverse" part of the task was then introduced, and the child was asked to sort the red blocks into the blue bucket and the blue blocks into the red bucket.

Implication: Practicing activities that require a shift in categorization can develop a child's executive function skills.

practices, parenting styles and school achievement between ages 13-18 and found that authoritative parenting (i.e., parenting that is warm but also sets clear limits) supports school success, with a few exceptions (for a review see Spera, 2005). A related line of research investigates younger children's perceptions about their relationships with parents, teachers, and peers and how those perceptions influence how they view other interactions and challenges, especially academic challenges. For example, Furrer and Skinner (2003) examined how a sense of relatedness to parents, peers, and teachers predicted academic achievement and motivation in school from 3rd through 6th grade. More common terms for a sense of relatedness are connectedness or belonging. Children and teachers reported on academic engagement and relatedness (children only) in the fall and spring of one school year by responding to questionnaires and participating in interviews. The engagement measures included both behavioral aspects (e.g., if the child joins discussions in the classroom) and emotional aspects (e.g., if the child feels/appears frustrated in school).

Furrer and Skinner found that parent, teacher, and peer relatedness all uniquely predicted both behavioral and emotional engagement—the message this sends is that everyone matters. Contrary to the prediction that perceived relatedness would be more important for engagement in the younger children, the researchers found that relatedness remains important throughout the elementary school years. A noteworthy finding that highlights the importance of parent-child relationships is that children that had low relatedness to peers and teachers, but high to their parents, had lower emotional engagement, but still high behavioral engagement compared to children who had low relatedness to parents, teachers, and peers. Thus, parents act as an important buffer for those children that do not feel supported by teachers and peers.

Investigating the role of parent involvement in families from lower income or racially diverse families is especially important given the higher risk for poor developmental and academic outcomes. A growing body of research suggests that support from attentive and caring adults is an important protective factor for youth at risk (Scales & Gibbons, 1996). Woolley and Bowen (2007) examined the impact of supportive adult relationships on the school engagement of at-risk middle school students. The researchers administered the School Success Profile (SSP), a questionnaire about school, family, peers, neighborhood, health and well-being to a large sample of 6th-8th grade students from 51 schools in five states and measured exposure to risk, "social capital" (the number of positive relationships with adults), and school engagement. The "social capital assets" were a combined measure of the support and encouragement that children receive from adults in their neighborhood, school, and at home that foster their ability to achieve their goals and manage their daily life demands. For example, children were asked to report on the level of caring that they are shown by adults in their family and if they feel respected and appreciated by their teachers. Woolley and Bowen found that positive relationships with adults mitigates some, but not all, of the detrimental effects of risky environments.

Parents play an important role in their children's success at school. When children feel supported by parents, as well as peers and teachers, they are more engaged in school starting in the elementary grades. Moreover, researchers have demonstrated that school engagement consistently predicts academic achievement (Finn & Rock, 1997). For students in at-risk environments, positive relationships with adults can compensate for risk exposure and lead to higher levels of school engagement, which are predictors of success in school.



theme 2.

free-choice learning, informal science environments, & play

Parents and children learn, explore, and discover together in free-choice learning environments through conversation, problem solving, and play.

Free-choice Learning and the Development of Youth and Families

When many people think of learning, they picture a classroom filled with rows of students with a teacher lecturing at the front of the room. However, as John Falk and Lynn Dierking (2002) describe in their book *Lessons Without Limit*, learning happens all around us:

It [learning] is dozens of earnest folks sitting in on a seminar at Home Depot about how to lay a tile floor, and people cupping their cappuccinos in their hands in an upscale bookstore while listening to a poetry reading. It is also hordes of ten-year-olds at a computer camp, forty-year-olds at a tennis camp, and teenagers on the Internet swapping software solutions (p. 22).

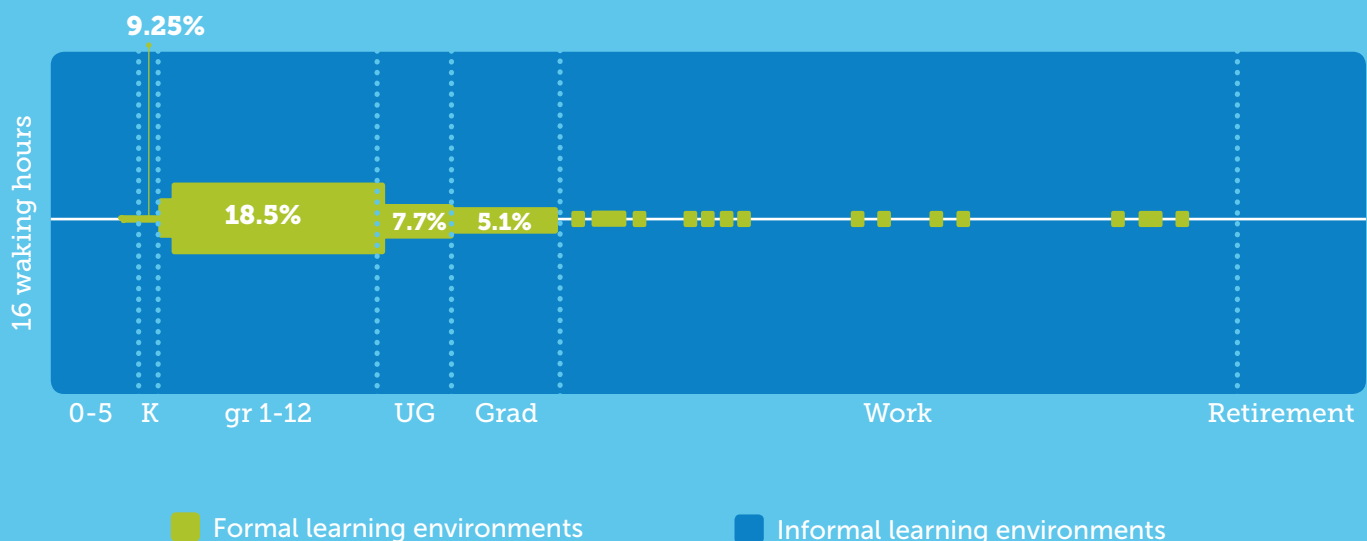
Dierking and Falk introduced the provocative term *free-choice learning* to describe the learning that

happens everywhere you look. They defined free-choice learning as “learning that is guided by learners’ needs and interests—the learning that people engage in throughout their lives to find out more about what is useful, compelling, or just plain interesting to them” (Dierking & Falk, 2003, p. 77).

A first step in optimizing free-choice learning opportunities for children is understanding where and how children spend their daily time, both in and outside of school. Figure 3 is adapted from a model designed by Anne Stevens based on research by Reed Stevens and John Bransford (2005) that visually represents the estimated time spent in school and informal learning environments across the lifespan. This diagram draws attention to the critical role that free-choice learning plays in child development by depicting the large percentage of time that children spend learning outside of school.

Lifelong and lifewide learning

Fig 3



Adapted from LIFE Center: Stevens, R., Bransford, J., & Stevens, A., 2005

If children do spend a large percentage of their time outside of school, are they learning anything of value during that time? A growing body of research, including a number of studies by Dierking and Falk, strongly suggests that they do (Dierking & Falk, 1994; Dierking & Falk, 2003; Falk & Dierking, 2002; Haden, 2010). A current focus of free-choice learning research is science knowledge because billions of dollars in education funds have been spent in an attempt to strengthen the quality of science programs in schools. However, in spite of these efforts, American students of all ages score poorly on standardized tests of science knowledge.

Findings from studies that document the benefits of free-choice learning in science knowledge provide encouraging evidence that public understanding of science is in much better shape than the scores from standardized multiple-choice exams indicate. Adelman, Dierking and Adams (2000) conducted a five-year longitudinal study of participants in the Girls at the Center (GAC) program, a program that provides science experiences for girls and an adult partner in economically disadvantaged communities across the country. The GAC program invites participants to attend a series of Discovery Days at a local science center and enjoy a full day of other activities including watching an IMAX film and enjoying free time at the museum to explore. The program concludes with a Family ScienceFest, where the girls and their parents share their science experiences with friends and family.

Adelman et al.'s findings suggest that the GAC program provided valuable opportunities for girls and their parents to engage in and enjoy positive free-choice science learning experiences. The participants responded very favorably to the key activities of doing science: observing, classifying, experimenting and hypothesizing. In addition, the girls in the GAC program found the science learning experiences personally meaningful and many changed their attitudes towards science from thinking science was boring and hard to describing GAC science as "fun because you get to build and create things and you

don't have to memorize lots of stuff that does not really make sense [to you personally]." (Dierking & Falk, 2003, pg. 84). After participating in more than one GAC event, the number of girls contemplating a science-related related career increased from 13 to 53 percent. Taken together, these findings yield important data to support the benefits of free-choice science learning for girls and parents.

Family Learning in Informal Science Settings

Extending Adelman et al.'s (2000) findings, recent research with younger children also suggests that scientific learning in museums is supported and enhanced by interactions with parents (Ash, 2003; Borun, Chambers & Cleghorn, 1996; for a review see Haden, 2010). Museums provide an ideal context for studying parent-child interactions and family scientific thinking because children and parents often engage in activities such as problem solving, agenda and goal negotiation, and most importantly, conversation (Dierking & Falk, 1994). As we discussed in the section on language acquisition, examining parent-child conversations reveals how children learn with parents in everyday settings.

Crowley, Callanan, Jipson, Galco, Topping and Shrager (2001) examined the role that parents play in structuring young children's everyday science reasoning by analyzing spontaneous episodes of scientific thinking that occurred during family visits to a children's museum. The researchers compared the activity of children who interacted with a zoetrope, a simple animation device that produces the illusion of motion by viewing images through the slots of a spinning drum, by themselves, in peer groups, and in parent-child groups. Participants were families with children between 4 and 8 years old who visited a popular children's museum in Northern California.

Crowley et al. found that children's exploration was longer, broader, and more focused when they engaged with the exhibit with a parent compared to

children who interacted with the exhibit without a parent. Crowley et al. also found that parents helped children to select and encode relevant information in about half of the parent-child interactions. In addition, in about one-third of parent-child interactions, parents



Research on free-choice learning and informal science environments has extended our view of learning to contexts outside of the traditional classroom setting.

explained children's experience in causal terms and connected the experience with the exhibit to prior knowledge or introduced abstract principles. In summary, these findings demonstrate that parents help to shape and nurture children's scientific thinking in an everyday setting. As educators continue to develop programs to engage young children, especially girls, in science, Crowley et al. make the important point that "the most important outcome of everyday parent-child scientific thinking may be that children develop an early interest in science, value science as a cultural practice, and form an identity as someone who is competent in science" (p. 731).

Benjamin, Haden and Wilkerson (2010) provide additional evidence that parent-child conversation in a museum setting affects children's learning. Benjamin et al. provided different types of information to families with children ages 4-8 years before they interacted with a museum exhibit focusing on building and engineering concepts. Some of the parent-child dyads received building instructions (i.e., information about engineering concepts to build strong structures), some of the dyads received conversation instruction (i.e., parents were encouraged to incorporate wh-questions (e.g., "What is this called?") in their conversations with their children) and some of the dyads received both building and conversation instructions in the pre-exhibit experience. All of the pre-exhibit experiences lasted approximately 15 minutes and each parent-child dyad was seen separately. Benjamin et al. found that parents who received conversational instruction used wh-questions in the exhibit more than parents in groups who did not receive this instruction. Furthermore, conversational instruction increased joint verbal interactions between parents and children in the exhibit, and most importantly, the dyads that received both building and conversation instruction were more likely to build frame structures (a learning goal of the exhibit). Thus, these findings suggest that pre-exhibit instructions about relevant exhibit concepts can enhance parent-child interactions in an exhibit.

Research on free-choice learning and informal science environments has extended our view of learning to contexts outside of the traditional classroom setting. A growing body of research, in large part led by Dierking and Falk, poses challenges to educators, parents, and policy-makers to redefine traditional notions of education and examine informal learning environments such as science museums as an ideal setting for family learning. Early research in this area was mainly descriptive in nature, but more recent studies have explored the relationship between parent-child interaction, with a focus on parent-child conversations in museums, and learning outcomes for children.

Play

Decades of research have explored the multi-faceted benefits of play for children of all ages (Brown, 2009; Singer, Golinkoff, & Hirsh-Pasek, 2006). Young children start to play with each other in early toddlerhood, and peers and parents are important to the development of different types of play including cooperative play, pretense, and physical play. In a recent article for the Smithsonian, developmental psychologist and author Alison Gopnik (2012) argued for the vital role of pretend play in young children's cognitive development, especially preschoolers who spend a great deal of time in fantasy worlds:

The idea is that children at play are like pint-sized scientists testing theories. They imagine ways the world could work and predict the pattern of data that would follow if their theories were true, and then compare that pattern with the pattern they actually see . . . pretend play is not only important for kids; it's a crucial part of what makes humans so smart.

A recent study by Bonawitz, Shafto, Gweon, Goodman, Spelke and Schulz (2011) provides experimental evidence to support the benefits of play and exploration in a teaching environment. Bonawitz et al. examined how preschoolers' exploration of a new toy differed after an adult introduced the toy in a pedagogical demonstration versus after an adult that did not know anything about the toy showed the toy to the child. In most learning situations, there is a trade-off between instruction and exploration. Bonawitz et al. predicted that when a knowledgeable teacher demonstrates the function of a toy, children should engage in less exploration compared to when a naïve adult shows children how a toy works. Why? Because in a pedagogical context, children assume that a teacher should demonstrate all of the functions of a toy, so if the teacher only demonstrates one function then children will assume there are no additional functions to discover.

Bonawitz et al. introduced preschoolers to a novel toy with four tubes. Each tube could do something interesting (e.g., one tube squeaked when you pulled on it). In the Pedagogical condition, the experimenter clearly conveyed to the child that she knew how the toy worked ("This is my toy. I'm going to show you how my toy works."), and then demonstrated one function of the toy. In the Naïve condition, the experimenter conveyed to the child that this was her first experience with the toy ("I just found this toy!") and "accidentally" pulled one of the tubes to make a squeaking sound ("Huh! Did you see that?"). In both conditions, the experimenter then let children play with the toy until they indicated they were done. (See Fig 4.)

As predicted, Bonawitz et al. found that children in the Pedagogical condition played with the toy for significantly less time and performed fewer kinds of different actions on the toy than children in the Naïve condition. That is, direct instruction made the children less curious and less likely to discover new information. These findings suggest that teaching can



The double-edged sword of pedagogy (Bonawitz et al., 2011)

Bonawitz et al. introduced preschoolers to a novel toy with four tubes. Each tube could do something interesting (e.g., one tube squeaked when you pulled on it).



NOTE: In both conditions, the experimenter then let children play with the toy until they indicated they were done.

Implication: Avoiding direct instruction can make children more curious and more likely to discover new information.

constrain young children's exploration and discovery and provides important insights for teachers and parents on how to balance direct instruction and exploration in the context of play.

In a study with young children and their parents, Lindsey and Mize (2000) examined the connections between parent-child pretense and physical play and children's social competence. Pretense (or pretend play) are make-believe activities in which children use an object as something else (i.e., using a banana as a telephone). When children engage in physical play, they are using their bodies to run, jump, hit, and catch often in games such as hide-and-seek and tag. Previous research has documented the importance of play in establishing connections between parenting practices and children's ability to develop relationships

with peers (Black & Logan, 1995; Lindsey, Mize & Pettit, 1997). Lindsey and Mize asked parents to complete a set of questionnaires to assess their child rearing values and collect demographic information in the fall. Then in the winter, teachers rated the children on social competence measures and sociometric interviews were conducted. Child interviews to assess emotion understanding and social self-perceptions and parent-child lab observations to assess pretense and physical play were conducted in the spring.

Lindsey and Mize found associations between parental involvement in pretense play and children's social competence. For girls, mother involvement in pretense play was associated with teacher ratings of competence and peer acceptance, and father involvement in pretense play was associated with children's teacher-

rated competence. Furthermore, the findings suggest that mutual compliance between a parent and child (i.e., a balanced pattern of interaction between a parent and child in which neither dominates the play interaction) during play is associated with children's social competence. Specifically, Lindsey and Mize found that mother-child mutual compliance (for both pretense and physical play) was associated with teacher ratings of children's social competence. In addition, father-child mutual compliance during physical play was associated with children's peer acceptance scores. Taken together, these findings document the occurrence of parent-child mutuality in both pretense and physical play contexts and suggest a link to children's social competence.

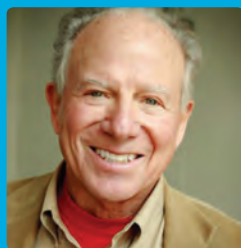
Pretend play has captured the attention of many researchers because make-believe is a particularly striking feature of young children's play. Furthermore, it undergoes dramatic developmental changes in the toddler and preschooler years, and it promotes cognitive and social development. Children who engage in more pretend play tend to be more advanced in language, memory and reasoning (Bergen & Mauer, 2000), and also tend to have a more sophisticated understanding of other people's thoughts and beliefs (Lindsey & Cowell, 2003). Furthermore, a large body of work by Sandra Russ and colleagues examines the link between play and creativity (Russ, 1993; Russ, 2003; Russ, Robins & Christiano, 1999). Russ proposed that pretend play

is important in developing creativity because many of the cognitive and affective processes involved in creativity can also be found in play (Russ, 1993). Specifically, divergent thinking—generating ideas by exploring many solutions to a problem—is one of the main cognitive processes in creativity, and children practice divergent thinking skills in their pretend play by using toys and objects to represent different things and in their role play of fantasy characters (Singer & Singer, 1990).

In a series of longitudinal studies using the Affective Play Scale (APS) developed by Russ (1993), Russ and colleagues provide evidence that pretend play is predictive of divergent thinking over time. Russ and Peterson (1990) investigated the links between the APS and divergent thinking in 1st and 2nd graders and found that affective expression in play was positively related to divergent thinking in the early grade school years. Russ, Robbins and Christiano (1999) followed up on the 1st and 2nd grade children in the Russ and Peterson (1990) study four years later (when the children were in grades 5 and 6) and found that the quality of fantasy and imagination in early play predicted divergent thinking over time, and this finding was independent of IQ. Most recently, Russ and Cooperberg (2003) followed some of the children (29 out of the original 121) into high school, and again found that the quality of fantasy and imagination in the early grade school years was related to divergent thinking ability in high school—an effect that spanned over 10 years.

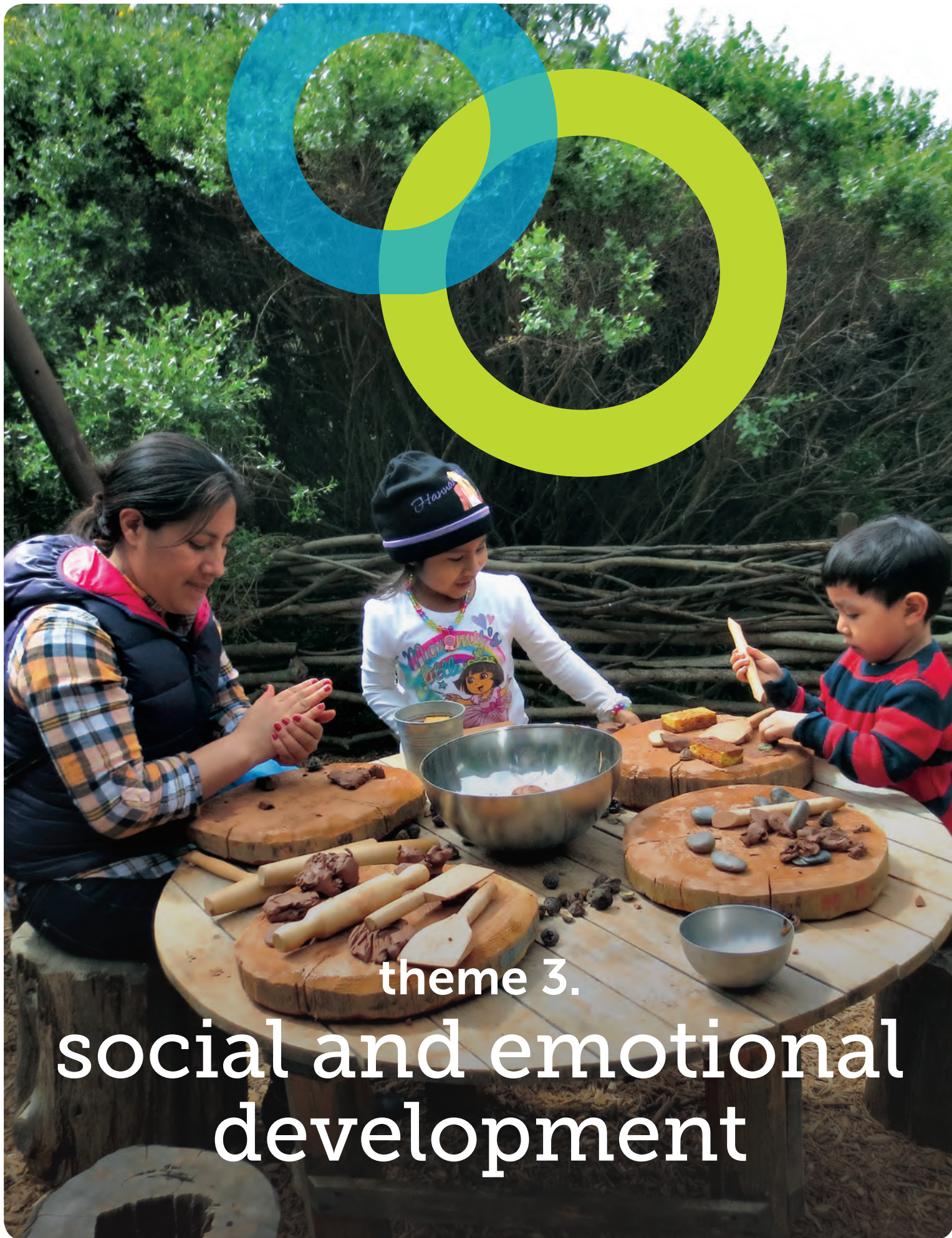
Decades of research support play as an important medium for learning in children (and adults) of all ages. More recently, educators, researchers, and policy makers have re-focused their attention on the merits of play for raising happy and healthy children given the current trend to remove playful and creative learning from the classroom. Correlational, descriptive, and experimental studies have demonstrated the link between different types of play, the role of parental interaction, and child outcomes in cognitive, social, and emotional development.

"The truth is that play seems to be one of the most advanced methods nature has invented to allow a complex brain to create itself."



Stuart Brown

(Brown, 2009, p. 40)



theme 3.

social and emotional development

Warm and supportive parenting practices form the basis of positive parent-child relationships that promote children's social and emotional development.

Prosocial Behavior

Helping, giving, and cooperation are fundamental aspects of human nature. Many scientists believe that humans are biologically predisposed to help, share, and cooperate with others (Hastings, Miller, Kahle & Zahn-Waxler, 2013). *Prosocial behaviors* are actions that benefit others and a large body of research examines the development of prosocial behaviors in toddlers and preschoolers, the period when prosocial behavior is first emerging. What makes some children more likely than others to help and what is the role of parental involvement?

Children as young as 18 months of age show simple prosocial behaviors such as trying to comfort another person that is obviously upset or hurt by hugging him or patting him (Zahn-Waxler, Radke-Yarrow, Wager & Chapman, 1992). In a clever study by Warneken and Tomasello (2008), most toddlers spontaneously helped an adult that "accidentally" dropped an object on the floor. In their study investigating the influence of rewards on young children's helping behavior, Warneken and Tomasello found that toddlers who received a material reward after helping an adult retrieve an out-of-reach object were subsequently less likely to engage in further helping compared to toddlers who had received either social praise or no reward at all. These findings are noteworthy because they suggest that young children are naturally inclined to help others yet rewarding them with material objects actually decreases their tendency to help.

Warneken and Tomasello's findings with very young children suggest that children are inherently helpful. Other studies have focused on the role of parents in fostering or impeding children's inherent helpfulness. Brownell, Svetlova, Anderson, Nichols and Drummond

(2012) explored the role of socialization in the origins of prosocial behavior by examining the link between parents' emotion talk and very young children's sharing and helping behaviors. The researchers conducted two separate studies with 18-30-month-olds using an elegant and developmentally appropriate procedure in which parents read picture books to their children, and coded the content and structure of the parents' emotion-related language. The results showed that children who helped and shared more quickly and more often had parents who more often elicited children's talk about emotions while reading the picture books. Brownell et al.'s findings provide evidence that "in the opening months and years of life, long before children are aware of moral norms, parental socialization contributes to the development of prosociality (p. 115)."

Related research by Eisenberg, Fabes and Murphy (1996) supports Brownell et al.'s evidence for the role of parents in children's development of prosocial behaviors with a population of older children (3rd-6th graders). More specifically, Eisenberg et al. found that parents who are supportive and help problem-solve when their children experience negative emotions tend to have children who are more sensitive to the emotions of others. The researchers assessed children's prosocial behavior in response to a "crying infant" by playing a recording of an infant crying in an adjacent room while children were in a lab room filling out questionnaires with an experimenter. Children could comfort the baby by talking into a baby monitor or escape the distressing stimulus by turning the monitor off. Parental reactions to their children's negative emotions (outside of the lab in everyday situations) were assessed by presenting parents with 12 situations in which children were likely to experience

distress (e.g., being teased by peers) and asking how likely they would be to respond with distress or a punitive response versus a comforting and problem-focused response. Overall, the researchers' findings suggest that when parents showed supportive and problem-focused reactions to their children's negative emotions, children were more likely to engage in more comforting behavior. Furthermore, parents who respond with punitive or harsh reactions to their children's negative emotions may undermine their children's ability to help others in need.

All children are capable of prosocial behaviors, and researchers have explored the role of socialization in the origins of prosocial behavior in a large body of research. Researchers have utilized innovative procedures to measure children's prosocial behaviors including acting out scenarios in which an adult needs help retrieving a dropped object and observing older children's responses to the recording of a crying baby in an adjacent room. This area of research on children's social and emotional development has helped to highlight the vital role of parents in shaping children's inherent propensities to help others.

Peer Relationships

Research provides support for the important role of family relationships in shaping peer relationships (Clark & Ladd, 2000; Kerns, Klepac & Cole, 1996; McDowell & Parke, 2009). Relationships with peers can help children develop many social and emotional capacities that provide the basis for positive relationships with others. What are some features of parent-child relationships that are important for children's development of relationships with peers?

Clark and Ladd (2000) investigated how connectedness (warmth, closeness) and autonomy support (responsive, reflective), two central qualities of parent-child relationships, relate to children's peer relational competence in kindergarteners. To assess these two qualities in mother-child dyads, Clark and Ladd gave parents and children the opportunity to

tell stories about shared and unshared experiences of both positive (e.g., "something fun together") and negative (e.g., "something not so fun together"), and these conversations were coded for parent-child connectedness and autonomy support. Teachers reported on the quality of children's friendships and children's tendencies to interact with peers in a prosocial manner, and mutual friendships and peer acceptance were assessed by asking the children to rate how much they liked peers in their class and asking teachers to report on the quality of children's friendships.

Clark and Ladd found that children who had a stronger emotional bond with their mothers had more mutual friends and were more accepted by peers. Moreover, these children were rated as more prosocial by their teachers. Most notably, these findings help to illuminate a set of parent-to-peer relationship pathways that include the role of prosocial orientation. That is, emotional closeness to parents fosters children's prosocial orientation, which in turn helps children to develop positive peer relationships.



Young children are naturally inclined to help others yet rewarding them with material objects actually decreases their tendency to help.

A number of studies support the hypothesis that a secure attachment to a child's parent is related to peer relationships. Children who have a secure attachment with their parent are able to separate from their parent, greet their parent with positive emotions when they return, and seek comfort from their parent when they are scared. Some of the most interesting studies are longitudinal studies that examined associations between infant-mother attachment and peer relationships in middle childhood. For example, Elicker, Englund and Sroufe (1992) found that children securely attached to their mothers at age 1 were rated by observers in a day camp for middle school students as more socially competent compared to children who had been insecurely attached.

Kerns, Kepac and Cole (1996) investigated the link between peer relationships and children's perceptions of security in the parent-child relationship in middle childhood. Similar to Clark and Ladd (2000), Kerns et al. utilized dyadic conversations as one of their measures, but instead of looking at mother-child dyads to assess the parent-child emotional bond, Kerns et al. examined conversations between two friends to assess the quality of friendships. The researchers hypothesized that "if attachment security influences peer relationships, then relationships between two securely attached children would differ from relationships between two insecurely attached children or relationships of one securely and one insecurely attached child" (p. 460).

Kerns et al. (1996) recruited same gender best friend dyads from 5th and 6th grade and the friend dyads were characterized by two securely attached children or one securely attached child and one insecurely attached. The friend dyads were videotaped discussing two topics: "our moms" and "kids we both know," and the researchers coded several aspects of conversations including criticism, responsiveness, and intimacy. After the friend-dyads completed the conversation session, the children completed questionnaires about their friendship and relationship with their own mother. As predicted, Kerns et al. found

that secure-secure dyads were less critical and more responsive to one another than secure-insecure dyads. Moreover, secure-secure friends reported higher levels of companionship than did secure-insecure friends. These findings provide support for the hypothesis that peer relationships are shaped by family relationships.

McDowell and Parke (2009) provide further evidence for the important role of family relationships in fostering positive social development in middle childhood. The researchers conducted a short-term longitudinal study that examined how three forms of parenting work together to foster positive peer relationships: (1) through the quality of parent-child interactions, (2) offering advice on how to handle peer relationship issues, and (3) providing opportunities to interact with peers. As predicted, McDowell and Parke found that these three components of parenting were positively linked to social competence and social acceptance as rated by both peers and teachers. Furthermore, McDowell and Parke's findings suggest that children who experience high quality parenting strategies may develop a set of problem solving skills that help children interact positively with peers and successfully develop friendships.

Taken together, the findings from these studies increase our understanding of the relation between two of the most important influences on children, parents and peers. Research generally supports associations between nurturing and supportive parenting practices and a range of positive child outcomes including peer relationships. Many researchers investigating parent-child-peer links focus

"Relationships are the prism through which young children learn about the world, including the world of people and the self."

(Thompson, 2002, p. 10)



on middle childhood since this is a time that most children experience a significant shift from parent-focused to more peer-oriented interactions.

Emotion Regulation

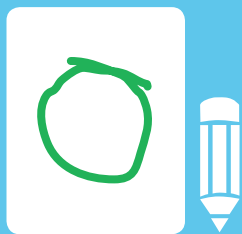
The ability to regulate one's emotions is crucial to achieving one's goals throughout life. The development of emotion regulation in childhood is a long, slow (and sometimes painful) process. As children develop, they experience a variety of intense emotions, such as a fear of strangers or scary movies, and often run to their parents for comfort. The development of emotion regulation is one of the most intriguing and fast growing research areas in emotional development because of the dramatic age-related patterns of change. Infants rely almost totally on other people to help them regulate their emotions (picture a mother cooing softly to her crying baby), while young children are increasingly able to self-regulate by selecting the appropriate cognitive or behavioral strategy. For example, 5-year-olds in Walter Mischel's famous marshmallow experiment could focus their attention away from the desired food to

delay gratification and receive an extra treat (Mischel & Mischel, 1983).

Toddlerhood is a time of intense emotions with sudden and unexpected displays of anger leading to the all-too-common tantrum. Given the significant developmental changes in anger that occur in toddlerhood, many researchers have examined the expression of anger and strategies used to regulate it in toddlers. Feldman, Dollberg and Nadam (2011) investigated how maternal behavior is associated with toddlers' expression of anger and their regulation strategies. The researchers observed mothers playing with their toddlers (2-3-year-olds) and assessed maternal sensitivity (e.g., mother adapts interaction to the child's signals) and intrusiveness (e.g., mother interrupts child's activities). For example, when a mother and child are playing with blocks together, a sensitive mother would observe what her child starts building and then help with building the same structure while allowing the child to lead the activity. In contrast, an intrusive mother would ignore her child's lead to build something, interrupt her child's activities, and lead the interaction. Anger expression and regulatory behavior was assessed using three tasks including the toy removal task in which the child was given an attractive toy to play with for two minutes, then the toy was taken away (in sight but out of reach) for two minutes, and then the child got the toy back. Feldman et al. found that sensitive mothering was related to less anger and the use of appropriate regulatory behaviors in toddlers, whereas intrusiveness was related to more expressions of anger. These findings emphasize the role of sensitive parenting in fostering emotion regulation in very young children.

The preschool years are also a time of constant change and the development of emotional self-regulation is crucial during this time. Dennis (2006) explored the notion of "goodness-of-fit" with respect to parenting practices and the level of the child's temperamental approach in preschoolers. That is, the effect of parent behaviors might be different depending on the characteristics of the child—the parent and child

Impossibly perfect circles task (Dennis, 2006)



1. For 3.5 minutes, the experimenter repeatedly asked the child to draw a “perfect” green circle.



2. The experimenter critiqued every circle for its imperfections. The critiques were specific, but did not include information on how to fix the problem (e.g., “That one is too flat”).



3. After the final circle was drawn, the experimenter conveyed it was a success.

Implication: Children respond differently to frustration depending on context and temperament.

relate as one unit. One task utilized to assess parenting style was a waiting task in which the mothers were supposed to be working on paperwork and the children were given a wrapped present and told they could not open it until their mother finished the paperwork. The mother’s behaviors were coded for several qualities including approach (e.g., focusing on the positive: showing affection, praising child for following directions) and avoidance (e.g., focusing on the negative: talking about failure or unhappy events). Subsequently, Dennis observed children’s emotion regulation during two frustrating tasks. In the impossibly perfect circles task, children were told to draw a perfect green circle, but each attempt was critiqued for not being right. (See Fig 5.) In the second task, the transparent box task, children were given a set of keys to open a clear plastic box with a toy inside of it, but none of the keys worked. (See Fig 6.)

In support of the goodness-of-fit model, Dennis found that maternal approach (e.g., focusing on the positive)

during the waiting task predicted more persistence on the emotion regulation tasks for children who were positively oriented towards engaging in new situations. But children who were low in temperamental approach (i.e., had a fear of novelty) showed more frustration and less persistence in the imperfect circles and transparent box tasks when their mothers tried to focus on the positive in the wait task. Thus, more positive child outcomes were observed when the characteristics of the mother and child “matched.” These findings highlight a general theme in child development—there is no single “right” way to engage with children. The characteristics of the child *and* of the parent, in addition to the context of the interaction, all play an important role in development and learning.

The role of parents on the development of children's emotion regulation continues to be important as children enter grade school and experience novel emotions, both positive and negative. Davidov and Grusec (2006) investigated the links between two important aspects of positive parenting, parent responsiveness to their children's distress and parental warmth, and several specific child outcomes: the regulation of both positive and negative affect, empathy and prosocial behavior and peer acceptance in early grade school children (6-8 years old). Davidov and Grusec predicted specific links between responsiveness to distress and warmth and the aspects of children's emotional and social functioning. More specifically, they expected that responsiveness to distress would predict regulation of negative affect and empathy and prosocial responding. In addition, the researchers predicted that parental warmth would be linked to positive affect regulation and peer acceptance.

A number of different measures were used to assess the two features of positive parenting and the child outcomes including standardized questionnaires, verbal reactions to videos, and observations of free play sessions. One measure used to assess maternal warmth bears mentioning because it seems to capture a more holistic representation of the parent-child relationship. The researchers asked mothers to "write a paragraph or two describing what it's like being the mother of [child's name]" (Hastings & Hersh, 1999). The essays were rated for the level of warmth expressed by the mother on two dimensions: her expression of love and affection toward her child and her feelings of pleasure and enjoyment of her child.

Consistent with their hypotheses, Davidov and Grusec found that parental warmth and responsiveness had specific effects. With regard to the regulation of negative emotions, parents' responsiveness to their children's distress was positively related to more effective regulation of negative emotion and children's empathy and prosocial behavior toward distressed others. Also consistent with their hypotheses, maternal warmth predicted the regulation of positive

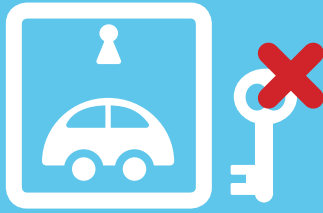
emotions as well as boys' peer group acceptance. Overall, this pattern of results provides support for the interpretation that responsiveness to distress and warmth make unique and distinguishable contributions to children's regulation of different emotions.

A relatively new area of study in emotion regulation research addresses the biological aspects of regulation. Cutting-edge research is showing that differences in parenting practices are related to differences in children's brain regions that process rewards, an important aspect of self-regulation. Whittle, Yap, Yucel, Sheeber, Simmons, Pantelis and Allen (2009) conducted one of the first studies suggesting that normal variations in childrearing conditions are associated with changes in brain structure and function in a study with adolescents (ages 11-13) and their mothers. More specifically, Whittle et al. examined whether maternal responses to adolescents' positive affect behavior was associated with changes in brain structures thought to be relevant to reward-processing, including the amygdala, the orbitofrontal cortex (OFC), and the dorsal anterior cingulate cortex (dACC). Adolescents

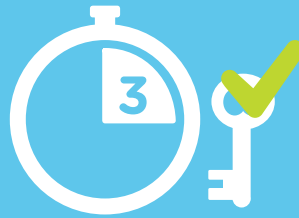
Normal variations in the family environment affect the brain, and in turn the processes that rely on these brain regions, such as executive function and other general cognitive processes, could be affected as well.

and their mothers participated in two types of family interactions that were video recorded: an event-planning interaction and a problem-solving interaction. In the event-planning interaction, the mothers and adolescents worked together to plan a positive event (e.g., taking a trip or vacation), and in the problem-solving interaction the dyads talked through

Transparent box task (Dennis, 2006)



1. Children were able to see a desired toy through a transparent plastic box and were left alone to work on opening the box with a ring of wrong keys.



2. After three minutes, the experimenter returned with the correct key and explained, "I guess I gave you the wrong keys. Let's try this one."



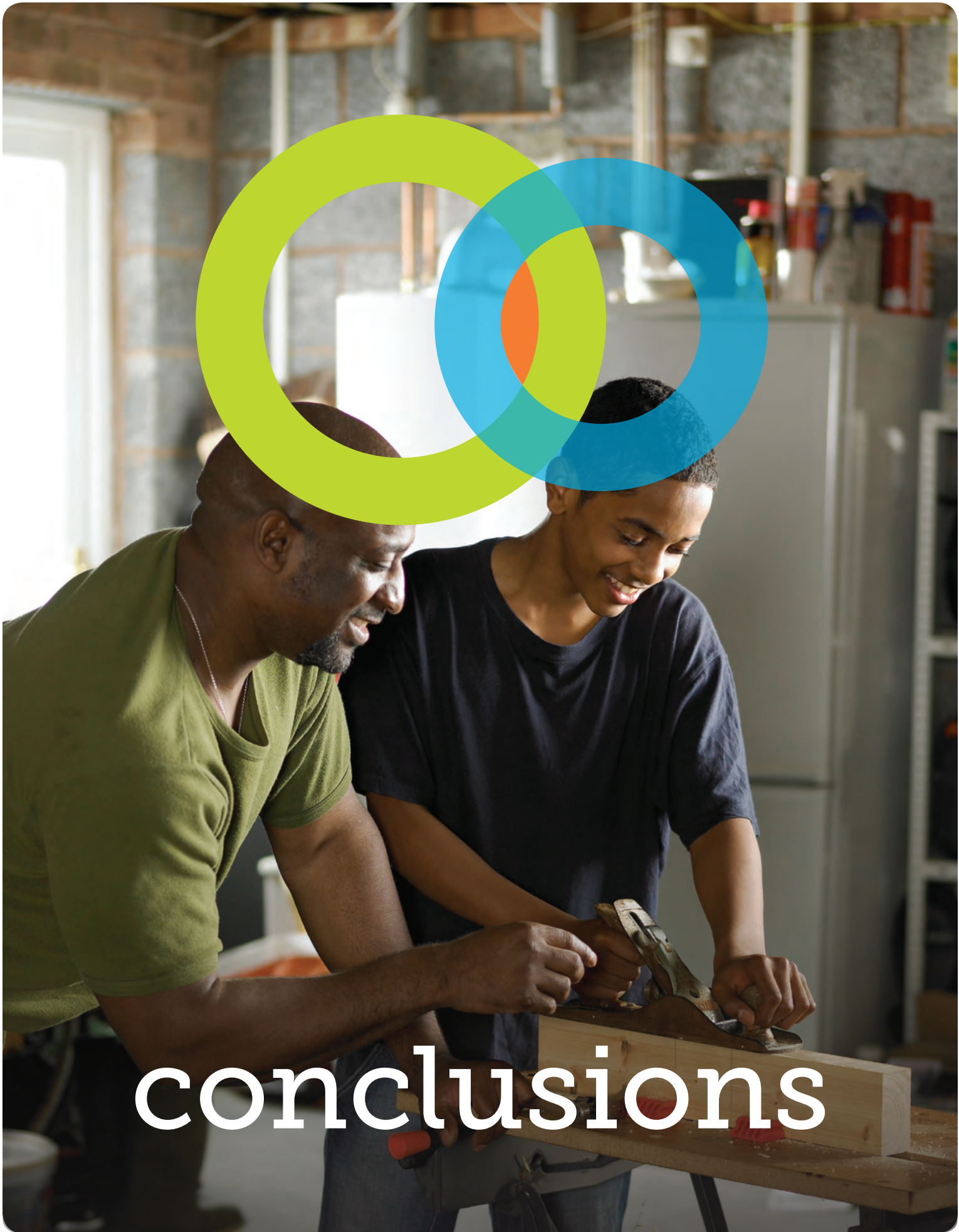
3. The box was then opened; the child was encouraged to play for one minute with the toy.

Implication: Parents can tailor encouragement to better fit their child's temperament.

resolving a conflict (e.g., lying about being late for school). After participating in the family interactions, the adolescents underwent high-resolution structural magnetic resonance imaging (MRI).

Whittle et al.'s findings indicate that maternal behavior during the family interactions (i.e., event-planning and problem solving interactions) is associated with differences in adolescents' brain structure. That is, adolescents with mothers who responded aggressively (e.g., angry affect, disapproving or argumentative statements) to their positive emotions during the problem-solving task had larger OFC (bilateral) and left dACC brain regions. In the event-planning task, adolescents with mothers who responded aggressively had larger left dACC, and in boys only, larger right amygdala. These findings are noteworthy because they suggest that normal variations in the family environment affect the brain, and in turn the processes that rely on these brain regions, such as executive function and other general cognitive processes, could be affected as well.

Children experience and act on a variety of emotions, and the ability to regulate their emotions is a critical part of development. Parents play an important role in helping children to regulate their emotions, and a large body of research supports the links between nurturing and sensitive parenting practices and emotion regulation throughout childhood and into adolescence. More recently, researchers are investigating how parenting practices are "getting under the skin" to affect brain structures that support emotion regulation.



conclusions

All children grow up in a particular social environment and culture, and one of the most important parts of children's sociocultural contexts are the people with whom they interact—parents, siblings, teachers, friends, and so on.

From the time they are very young, children rely on their parents to provide for, protect, and nurture them, and research clearly shows that a positive parent-child relationship is the basis for learning about the world, other people, and themselves.

From a cognitive perspective, language acquisition research suggests that the way that parents talk to children, especially at the youngest ages and with regard to features of maternal talk (e.g., using more words and complex utterances), is critical for later language abilities and possibly academic skills. Furthermore, research on parent-child conversations highlights the importance of explaining scientific concepts to boys *and* girls when engaged in informal science activities. With respect to praising children, decades of research on motivation demonstrates that the *type* of praise parents give to their children has significant and long-lasting effects on their motivational framework. That is, praising effort is linked to more positive self-assessments, greater task persistence, and eagerness to take on challenging tasks, while praising ability is linked to more negative self-assessments, more helpless behavior, and avoidance of challenging tasks. The role of parenting in the development of executive functions is a relatively new area of research, and so far, researchers have found that several aspects of supportive parenting predict better executive function, and these effects seem to have important implications for later learning and success in school. When children feel supported by parents, they are more engaged in school and tend to have more positive academic outcomes starting in the early elementary grades.

A growing focus on learning outside of the classroom highlights the importance of parent-child interactions

in informal learning environments such as museums and science centers. Researchers studying free-choice learning have focused on parent-child conversations in informal learning environments and found that the way families interact and behave can promote learning. Similarly, research on play demonstrates that children learn in a variety of settings and with different people. In a teaching environment, playful learning with little or no direct instruction can lead to more exploration and discovery. A number of researchers have examined the merits of pretend play and links between pretense and creativity, and generally found that the quality of fantasy and imagination in early play predicts some of the cognitive processes in creativity, specifically divergent thinking, over time.

Positive and nurturing parent-child relationships set the stage for children's social and emotional competence. Research generally supports links between warm, supportive parenting practices and a range of positive child outcomes, including prosocial behavior, peer relationships, and emotion regulation. Most children are naturally helpful at a very young age, and positive parenting practices can help foster these helpful tendencies. Furthermore, research supports the conventional wisdom that high-quality parenting practices help children to develop social skills that lead to positive peer relationships. Parents also play an important role in fostering children's ability to regulate their own emotions. A growing body of research examines the links between nurturing and sensitive parenting practices and emotion regulation starting in early childhood, with a more recent focus on how parenting practices affect brain structures related to general cognitive functions.

Recommendations

Based on our review of the research and our own experiences working with families and educators, we offer the following recommendations for parents for fostering positive parent-child interactions and meaningful shared discovery experiences.

Ways to foster cognitive development and learning:

- Take every opportunity to talk to your child even before they start talking. Label objects that your child is interested in and narrate your activities as your child observes (“Look at all of the colors in this picture. Blue, red, green . . .”).
- Once children start talking, ask them lots of open-ended questions (e.g., “Why do you think that happened?”, “Is there another way to . . . ?”) to stimulate conversations. That is, try to ask questions that have more than one answer. Instead of asking “What color is that truck?”, say “Tell me about the truck that you are playing with.” Look for experiences that you can share with your child that allow for rich conversation, such as a visit to a museum, science center, or park.



- Pay close attention to how you praise your children, even at the youngest ages. Does the praise focus on their hard work leading up to the positive result or your child’s intelligence or talent? Try to focus on the processes your child used (e.g., effort, choices) to foster a growth mindset. For example, instead of saying, “Wow, you got an A on that test! You’re so smart!”, try saying something like, “Wow, you did really well on that test! All of the time you spent studying really paid off.”
- Play games with your children that foster planning, self-control, and sustained attention. For the younger ages, Simon Says and Red Light Green Light are great games that encourage children to exercise self-control by NOT touching your toes or running fast. For older children, classic games like checkers, chess, and Monopoly require sustained attention, planning, and memory skills.
- Engage in fun activities with your children that involve planning skills. For example, cooking is a great family activity, and your child can help with planning what to cook, creating a shopping list, and executing each step of the recipe. When you are working on a task or project that requires several steps and planning ahead (e.g., baking cookies), let your child participate as much as possible and talk through the steps you are taking (“I’m turning on the oven now so it is ready when we have made the cookie dough.”) so children start to understand your reasoning and logic.

Ways to support children’s free-choice learning and play:

- Recognize that learning happens in many different environments—at home, in museums, in the classroom, through cultural activities, and so on. Provide opportunities for children to learn in a variety of settings and with different people that provide support and encouragement.
- When visiting museums as a family, engage your children in conversation focused on exhibits (i.e.,



ask and answer questions, comment on the exhibit, explain how to use the exhibit if interactive, relate exhibit concepts to something familiar to child). This family discourse helps children learn about exhibits and related concepts in a deeper way.

- Allow children to explore a new toy and show *you* how it works. Resist the urge to demonstrate how the toy works: let them take the driver's seat when they interact with a new toy. Encourage them to figure out the different functions of the toy by asking questions like, "I wonder what this does?"
- Encourage pretend play in all ages, especially toddlers and preschoolers when children naturally want to engage in fantasy play and create imaginative worlds. Think big *and* small—create a play space in a big empty box or design a tiny world in a shoebox. Provide materials to create with, space to get messy, and time to explore and discover. Remember that play is not only good for kids, but for adults too, so take every opportunity to join the tea party or sail away on a pirate ship.

Ways to nurture children's social and emotional development:

- Try explicitly bringing emotion into daily interactions with your child. Children understand more about their and others' emotions when their everyday interactions are emotionally rich. For example, if you're feeling frustrated with your child, explain why ("I'm angry because you pulled my hair."). You can also explain the outcomes of emotions ("When Adam feels sad, he doesn't feel like playing"). Look for opportunities to share different emotions with your child such as reading a book or watching a movie in which the characters experience a range of emotions.
- When your child is experiencing a negative emotion, like fear when getting a shot at the doctor's office, try to view the situation from your child's perspective. Encourage your child to express his or her feelings and try not to become too emotional yourself (i.e., don't get mad that your child is mad). Try to use problem solving to resolve the situation ("What can we do to feel better? Should we take a deep breath together?"), instead of minimizing the emotion.
- Develop a relationship with your children in which children feel that they can rely on you when they need you. Children's perception of their relationship with their parents often serves as a model for how they learn to interact with others. Children who perceive their parents as being more available and supportive in times of stress are able to learn a set of attitudes and behaviors that help them develop friendships (e.g., expectations that other children will be responsive to them and how to interact with others in a cooperative way).

Play Vignette

Ruby was very excited that her dad was taking her to the children's museum today. Shortly after they entered, Ruby and her dad found a map of the museum and they planned out their visit.

Dad: Tell me about some of the exhibits that you would like to see. Let's decide together which ones we should see first.

Ruby: There are so many good ones! I want to build things, make bubbles, paint pictures . . . where should we go first?

Ruby grabs her dad's hand and they walk quickly over to some tables with building blocks.

D: What do you think we can build with these?

R: I'm going to build a big house with lots of doors and windows! Can you help me?

D: Of course! How do you think we should start building the house?

Ruby starts building the roof of the house with several pieces.

D: Is there another way that we could start building the house? Maybe we could start with one of the walls.

Ruby starts building one of the walls of the house and her dad walks away for a short time to observe Ruby building by herself while other children watch and build next to her. When he returns, Ruby has the frame of the house almost complete.

D: Wow, that's a great start! I like how you planned which walls to build first, made them all the same size, and then put them together to build a strong frame.

A younger child next to Ruby sees some blocks that he would like to use and knocks over Ruby's house as he reaches across the table.

R: Oh no! The house is ruined!

Ruby starts to cry, and her dad walks over to comfort her.

D: I know that you worked very hard on your house, but I think that was an accident. What can we do to feel better? Maybe we can ask that little boy to help us pick up all of the pieces and we can re-build the house together.



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About the Center for Childhood Creativity

Creative thinking begins early in every child's life. It enables original thought and the ability to see solutions where others don't. It unlocks possibilities and fosters innovation. It provides the fundamental building blocks for success in school and beyond.

The Bay Area Discovery Museum launched the Center for Childhood Creativity in 2011 to pioneer new research, thought-leadership, and teacher training programs that advance creative thinking in all children—extending its impact beyond the Museum.

The mission of the Bay Area Discovery Museum and the Center for Childhood Creativity is to ignite and advance creative thinking for all children.

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