



The State of Play

How Play Affects Developmental Outcomes



Center on Media
and Child Health

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Boston Children's Hospital
Until every child is well™



**HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL**

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The Issue

While children's play may appear to be a lively and entertaining diversion, the learning, socialization, and growth that occur during play have led developmental psychologists and human rights activists alike to consider play a fundamental right of all people. According to the International Play Association, "every child has the right to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts."¹ Despite the importance of play, several circumstances can affect how often children play:

- A majority of parents (88%) believe that children are under pressure to grow up too quickly.²
- Fewer parents are playing outdoors with their children.³
- Parenting paradigms are shifting to overprotecting children from risk-taking.⁴
- Safety concerns, facilities at parks and playgrounds, and urban design can impact how often parents let their children engage in play.⁵
- Parents may believe that their children will benefit more from structured activities (such as music lessons, organized sports, community work, etc.) as opposed to unstructured play and activities.⁶
- Toy marketing may influence parents to believe that only expensive toys are beneficial for their children.⁷

Taking these and other issues into consideration, how do we ensure that young children are actively engaged in healthy play that leads to acquiring positive life skills?

How Do We View Play?

On an international level, the United Nations has weighed in on the status of play in the lives of children. UNICEF's Convention on the Rights of the Child, created in 1989, is a human rights-based law aiming for global ratification. While the

treaty includes a range of different human rights, Article 31 discusses how children have the right to play.

Convention on the Rights of the Child⁸

1. States Parties recognize the right of the child to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts.
2. States Parties shall respect and promote the right of the child to participate fully in cultural and artistic life and shall encourage the provision of appropriate and equal opportunities for cultural, artistic, recreational and leisure activity.

While the United States has not yet ratified this due to complications with United States law, many American associations recognize the importance of play. The American Academy of Pediatrics' clinical statement, *The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds*, highlights the need for healthcare professionals to advocate on behalf of the benefits of play and provides concrete guidelines for helping families and communities recognize the importance of play in the developing child.⁹

The National Association for the Education of Young Children (NAEYC) strives to raise awareness about the positive role of play in the development of young children, both inside and outside the classroom. Several of the NAEYC's position statements refer to play, including *Principles of Child*

Development and Learning that Inform Practice, which states, “children of all ages love to play, and it gives them opportunities to explore the world, interact with others, express and control emotions, develop their symbolic and problem-solving abilities, and practice emerging skills.”¹⁰ The NAEYC acknowledges that digital play is a common component of contemporary play, and advises that technology and interactive media must be used in healthy ways “with the same opportunities and cautions related to children’s developmental stages” as traditional play.¹⁰

Is There Really a Play Deficit?

Several reports have indicated that there is indeed a growing trend toward less play in the lives of children. The Play Deficit, a report by the American non-profit Kaboom, outlines the consequences of a play deficit, and attributes the decline to various factors including a decrease in recess, media use, and the lack of appropriate outdoor play spaces.¹¹ In Building “Generation Play”: Addressing the Crisis of Inactivity Among America’s Children, a report by Stanford University, the researchers state that while play is acknowledged by developmental psychologists as being essential to optimal child development, “opportunities for unstructured or self-structured play have diminished.”¹² Children’s Nature Deficit: What We Know – and Don’t Know,¹³ a report from the Children & Nature Network co-authored by Richard Louv, reviews a myriad of research to support the claim that children are engaged in less outdoor play than they once had been.

One major hurdle to understanding the play deficit is the lack of consensus on, or in some cases, acknowledgment of, how the definition of play is changing. All three of the reports above include a common theme – screen time is a key contributor to the play deficit. However, these statements are based on the assumption that traditional play and digital play are separate activities. For example, play is often separated from other activities to be studied; one study comparing how children spent their time in 1997 versus 2003 divided data into categories such as playing, sports,

outdoors, hobbies, art activities, and television.¹⁴ With the increase in digital gaming over the past 15 years, the lines are becoming blurred as to what constitutes play. Screen media technology provides for a new type of play that is rarely examined alongside traditional play. Video games, mobile phones, and tablets allow for integration into traditional play and facilitate, even encourage more open-ended play durations than has ever previously been possible. To fully understand the play experience of today’s young people, we must consider the nature of digital play, understand how it influences traditional play, and explore its impact on critical developmental outcomes.

Despite the global adoption of electronic screen media as a key, if not predominant, activity during children’s free time, even recent research¹⁵ continues to study digital play separately from traditional, analog play. In this study, “watching tv” was categorized separately from “playing outside” or “taking part in imaginative play,” illustrating that electronic play is typically defined as media use rather than “play.”

Because of this research legacy, and despite the undeniable lessons that can be learned from traditional about digital play (and vice versa), this issue brief must report existing research on traditional and digital play as it was conducted, separately.

The Goal of this Issue Brief

The purpose of this issue brief is to review a selection of the most recent experimental research on the relationship between play and four areas of developmental outcomes; cognitive, social, affective, and physical. We review both traditional play research and digital play research, highlighting trends, gaps, and overlaps. Lastly, we offer future directions for this field of research. By understanding the impact of play on a child’s developmental process, we can encourage more developmentally optimal play-related activities.

Methodology

For this review, we created comprehensive search strategies, employing both keyword searches and controlled vocabularies, for three academic databases: MEDLINE, ERIC, and PsycINFO. Results were limited to peer-reviewed articles published between 2012 and mid-2015, and to articles discussing children under the age of 12. Additional articles were located by reviewing reference and citation lists. Of the over 2,600 articles identified, 441 were deemed relevant. Research reports considered representative of an important area of investigation, using particularly effective methodologies, or especially relevant to one of our key outcomes were included.

Defining Cognitive Outcomes

Cognitive outcomes can be divided into two broad categories: cognition and executive function. Cognition includes the intellectual or mental processes that a child uses to obtain knowledge, while executive functions control complex goal-directed thought and behavior.

Traditional Play

Sandra Russ,¹⁶ one of the most cited play researchers, identifies four cognitive processes that are expressed during pretend play: Organization, telling a complex and structured narrative; Divergent thinking, creating different stories and using a variety of symbols; Symbolism, using objects to represent other objects; and Fantasy/make-believe, pretending to be a different person or thing or to be in a different time or place.

Research from the last four decades indicates that pretend play that activates these processes is linked to numerous cognitive skills and functioning including divergent thinking, problem solving, language, intelligence, symbolic transformation, and creativity. Some of this work has been critiqued by scholars who identify methodological limitations, including unblinded experimenters, heavy reliance on correlational studies, and considerable inconsistency in the strength of the findings.

Recent studies have examined longitudinal associations between play and creativity, observed the importance of the social environment of play to cognitive outcomes, and investigated links between construction play and math skills. Unfortunately, this work suffers from small sample sizes (with samples of 31 and 14 in two of the studies) and cross-sectional data that cannot provide strong evidence that play precedes the cognitive skills with which it has been shown to be associated.

- Researchers contacted 31 girls from an earlier play study and measured their divergent thinking and academic achievement four years later.¹⁷ Pretend play

during kindergarten to fourth grade that was organized and imaginative was predictive of increases in scores on an alternate uses task. Children whose play was more imaginative and expressed more positive affect had higher computational math skills at the four-year follow-up. Although this study used a small and homogeneous sample, it provides some evidence that the symbolic representation in pretend play translates to creativity and math skills later in a child's school career.

- With a sample of 225 participants, researchers explored relationships between specific types of play, play settings, and language and creativity scores.¹⁸ Preschool students were observed playing in their schools and their creativity and language were assessed with a number of standardized tools. Results showed that children who exhibited less sophisticated social play, including onlooker play and parallel play, had lower creativity scores. Children who participated in more complex types of social play had more extensive vocabularies. While this study is unable to establish a causal direction to these findings, the work does support the possibility that higher-level social play provides a setting for the development of creativity and language skills.

Higher-level social play provides a setting for the development of creativity and language skills.

- In a study examining the home-based play of 56 first grade students in Canada, researchers found little evidence that such play was related to positive school behavior and academic achievement.¹⁹ Creativity, on the other hand, was positively related to play with commercial toys and negatively related to solitary play. This study had the unique finding that children's ability to choose their free time activities at different times of day predicted an increase in report card grades, thus warranting further research to

Creativity was positively related to play with commercial toys and negatively related to solitary play.

understand the mechanism by which a child's freedom to choose how they play affects academic achievement.

- Examining the complexity of 75 4- to 5-year olds' role play, researchers found that such play was linked to age-appropriate measures of creativity.²⁰ Having imaginary friends or a pretend identity was associated with being more creative in a narrative task. Interestingly, the sophistication of other types of pretend play was not related to creativity. While this study cannot establish causality between role play and creativity, the novel measures used in this study do help strengthen its argument against previous studies that found no associations between this type of imaginative play behavior and creativity.

- Using a Lego-based task to assess the construction ability of 66 7-year-olds, researchers examined the associations between construction play, math skills, and visuospatial memory.²¹ Findings of positive relationships between Lego building skills and math performance and visuospatial memory but not verbal memory or reading ability suggest that construction skill is linked specifically to math ability and not general academic skills. Although the authors of this study can only speculate about the direction of effect between math skills and toy construction ability, they do suggest a Lego-based intervention to teach visuospatial memory.

- Investigators found a strong relationship between constructive play activities (Lego building, puzzles, and blocks) and the ability to solve math word problems in 128 Dutch 6th-grade children.²² This association was partially explained by a link between constructive play and children's spatial memory (mental rotation task). Reliance on a short parental report for

construction play and the correlational nature of these data are limitations of this study.

- While the relationship between language and pretend play has been well established, it is not known if symbolic representation in play actually contributes to the development of language. Testing different potential relationships between language and play, researchers observed the play of 14 6-month-olds for 1 year and assessed their early language development.²³ Findings support a direct effect hypothesis in which single-object play influences the development of language, but language development does not affect play. Although this study uses a very small sample, the extensive observations and sophisticated analyses strengthen the applicability of the results and conclusions.

Digital Play

While there has been extensive research focused on video game play by children with attention disorders, basic research on how video game play affects cognition is also emerging. Many video games require complex problem solving skills and researchers are beginning to explore the links between cognition and gaming. Related to cognition, video game addiction, while not yet an official clinical diagnosis, is another growing area of concern and study. A recent systematic review explored how cognitions such as reward systems, motivation, preoccupation, rumination, and procrastination were affected by video game addiction.²⁴ Due to the complex underlying issues in regards to addictive disorders (including video game addiction), these types of studies were excluded for the purposes of this issue brief. Another note is that video games are often used in classroom settings to engage children and encourage learning; however, for the purposes of this review, digital games in an educational setting were not reviewed.

- Attention is controlled by executive functioning. A three-year longitudinal

study of 3,034 youth in Singapore found that video game playing was linked to more attention problems.²⁵ Youth between the ages of 8 and 17 answered a questionnaire every year for three years about their video game playing habits. Results indicated that violent video game play often led to more problems with attention and impulsiveness, but the amount of time youth spent engaged with video games was a stronger influence.

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- One study examined whether active video gaming affected cognition. 124 students aged 11 to 18 played an exergame and were then tested using the Bender Visual-Motor Gestalt Test, which tests an individual's ability to receive, interpret, and respond to sensory information. The purpose of the study was to determine whether there was an increase in cognitive functioning.²⁶ Youth were tested after playing against a computer and again after playing against a live person playing offsite. Cognitive gains were greater after playing against another person, which could be attributed to youth being more engaged when knowing they were playing against a real person.

- A study of 106 six-year-old children playing a problem-solving video game measured executive control and various in-game measures. Specifically, the researchers defined executive control as being comprised of attentional control, in which children had to pay attention to one aspect of the game, and action control, in which children had to press a button that corresponded to the location (left or right) of an image on the screen.²⁷ Children with more attentional control completed the tasks faster when playing the game for the

first time, and those with higher action control were able to sustain game play even as they mastered the game in repeating sessions. The researchers conclude that educational game designers should consider creating games that are continually challenging in order to engage children.

Identifying the Gaps

The recent studies in this area are severely limited by their reliance on small samples and correlational methodologies. While there are considerable theoretical reasons for play to be linked to cognitive abilities and the development of language, more research is certainly needed that examines the temporal relationships between different types of play and various cognitive outcomes. While many children believe (and try to convince their parents) that playing video games can improve their cognitive development, more research is needed to determine whether this is actually the case.²⁸ There is a specific lack of research on how digital gaming by very young children affects their cognitive development.²⁹

Defining Social Outcomes

Children's social behavior includes interactions with peers, family members, teachers, and other caretakers. Common positive outcomes of well-developed social interactions include pro-social behaviors and the development of social skills. Aggression and other anti-social behaviors are regularly considered the outcome of poor social skills and experiences.

Traditional Play

Play has long been viewed as a childhood activity that develops social skills through the negotiations and interactions with other children that play requires. It provides children with the opportunity to cooperate and work together to overcome challenges and solve problems, all within a context of enjoyment and fun. When children play, they enhance their bonds with their parents, siblings, and peers and develop more complex social understanding.³⁰ Play is a critical component of children's healthy socio-emotional development and contributes strongly to the creation of mature social competence skills.

These social benefits of play are dependent, in part, on the social context of the activity. Social play (play with other people) develops over the course of childhood moving from solitary play to parallel play to cooperative play.³¹ Among preschoolers and older children for whom cooperative play and associative play (where communication and toy sharing is common) are the norm, certain types of solitary play may be detrimental or indicative of limited social skills. Solitary play among preschool children has been linked to insecurity, negative self-perceptions, social anxiety, loneliness, peer rejection, and academic and social problems in adolescents and adulthood.^{30, 32, 33} A preference for solitary play among preschool children has been shown to be associated with more social withdrawal, less social engagement and fewer prosocial behaviors. Other work, however, found positive links between solitary pretend play and social competence.³⁴

Play has been shown in cross-sectional and

longitudinal studies to be predictive of behaviors indicating positive social skills, including control of aggressive behavior, emotion regulation, and fewer behavior problems.³⁵ Recent studies in this area explore the impact of pretend play skills on positive and aggressive behaviors, the links between role play and social skills, and the ability of a structured, child-directed, play-based task to enhance communication and cooperation. Lastly, educators have recognized that in some play situations social skills do not manifest naturally and have designed play-based interventions to enhance these skills.

- In a study of 128 preschool children in Greece, solitary play was associated with higher levels of fear, anxiety, and hyperactivity, and a less developed sense of humor.³⁰ This work, however, does not address the outstanding question of "Does solitary play contribute to the development of poor social skills?" The observed correlations in this study and others are at least in part accountable to the likelihood that peers reject an individual with existing poor social skills. Additional work is necessary to determine if there are certain types of solitary play that can be detrimental to social skills.

- In a study of 57 kindergarten and pre-kindergarten children, more sophisticated pretend play skills in a standardized play experience were linked to more prosocial and less aggressive behaviors during observed classroom time.³⁵ Furthermore, aggressive language during play was associated with less physical aggression and more prosocial behaviors in the classroom, indicating that children who have the opportunity to explore aggressive themes in their pretend play may be working through these issues in a constructive way.

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Other children who have strong imagination skills may use fantasy and other types of pretend play to work through similar issues and regulate negative behaviors to play settings.

- Working with 208 3–6 year olds, researchers examined the special significance of role play in the development of children’s social skills.³⁶ Role playing with imaginary friends and personified toys was linked to less shyness. This type of play, it seems, is not just a substitute for social interactions invented by shy children to fulfill an unmet need. Considering that role play was also linked to the sophistication of a pretend conversation in an experimental task, this activity might help children practice and become skilled and confident during social interactions.

- In a study of 76 preschool children, half of the participants completed a child-driven, play-like building task and the other half completed a structured, adult-led task.³⁷ In a follow-up building task, the children in the play-like condition produced more complete and complex buildings, participated in more communication, and took more joint responsibility for the task than the children in the more structured condition. Results of this study support the concept that play elicits and develops cooperation and communication skills in young children.

- In a study of 186 low income mothers and their young children, half of the parent-child dyads were randomly assigned to a child-oriented play intervention in

Increasing play between mothers and children is beneficial to social skills and benefits are enhanced when the play is child-oriented.

which mothers are taught to allow children to lead the play sessions.³⁸ The play style includes focusing attention on the child, avoiding instructional or controlling behaviors. Although outcomes improved

for parents and children in both the intervention and control (play as usual) group, the amount of child-oriented play reported by mothers was related to increases in their child’s social-emotional competence (including empathy and prosocial peer relations) and the child’s cooperation with their mother’s instructions in a laboratory setting. It seems that increasing play between mothers and children is beneficial to social skills and that benefits are enhanced when the play is child-oriented.

Researchers¹⁹ found that playing with commercially-branded toys led to more social and creative children.

- A year-long, longitudinal study of 122 preschool children examined the relationships between pretend play and different aspects of their affective social competence – understanding other people’s emotions and expressing and controlling your own.³⁹ Children observed in their preschool results showed that sociodramatic play (i.e. taking on pretend roles during play) was linked to increases in their emotional expressiveness, emotion knowledge, and emotion regulation one year later. The longitudinal nature of this work and the analyses performed add to evidence supporting the hypothesis that sociodramatic play contributes to the advancement of children’s social and emotional skills.

- One concern about toys and games based on existing characters and narratives is that they prescribe certain types of pretense during play and negate the need for children to create shared meaning, an activity that enhances social connections. A study of 58 preschool aged boys found evidence contrary to these concerns.⁴⁰ When pairs of boys played with superhero toys they displayed more prosocial behaviors, clarifications, and explanations than when they played with generic, but similar action figures. In general, the number of behaviors

indicating the creation of shared meanings between the children did not differ according to the type of toys present. It seems that at least for boys, complex and social pretend play is not diminished by the presence of toys reflecting known characters.

When pairs of boys played with superhero toys they displayed more prosocial behaviors, clarifications, and explanations than when they played with generic, but similar action figures.

Digital Play

The most studied social outcome of video game play is aggression. In particular, the link between violent video game play and its effects on aggressive and prosocial behaviors has received considerable attention from researchers.

- A three-year long longitudinal study of youth (beginning when they were aged 10 to 15) examined whether there was a link between violent video game play and future propensity for weapon carrying.⁴¹ Overall, weapon carrying was reported to be very low as only 1.4% (37 males and 16 females interviewed) reported carrying some sort of weapon to school, but those who did carry weapons reported playing video games that were more violent.

- A study of 333 youth between the ages of 10 and 17 tested for correlations between playing violent video games and aggression, civic behavior, visuospatial cognition, and mathematic ability, both concurrent to play and after one year.⁴² The findings showed no evidence that violent video game play is predictive of either positive or negative outcomes with regard to the behaviors tested.

- In a longitudinal study of 11,014 children, ages 5–7 from families in the United Kingdom, extended daily television

viewing of 3 hours or greater (including videos or DVDs) was identified as a predictor of a slightly increased risk of social behavior problems, including aggression and bullying.⁴³ The same frequency of television viewing was not identified as a predictor of risk for emotional issues or hyperactivity. Conversely, the study found no association between extended daily video game playing (3 hours or greater) and increased risk of conduct issues, which could reflect on greater parental control over game ratings vs. television content. The study noted the need for further research.

- One study examined the promotion of real life pro-social behavior through virtual reality gaming simulation.⁴⁴ Some of the 30 boys and 30 girls in this study received avatars imbued with the power of flight, often associated with superheroes, and others were given avatars that were passengers on a helicopter. All participants were initially assigned the task of saving a child in the virtual environment. The moderator would “accidentally” knock over a cup of 15 pens. Unbeknownst to the participants, the number of pens they helped to pick up was counted. The results indicated that the participants whose avatars had the power of flight were quicker to help and all the participants who did not help were from the passenger avatar group. One hypothesized explanation given is that “inhabiting” an avatar with helping powers has a beneficial effect on shifting participant’s own self-concepts.

- In a study of 191 children ranging in age from 9 to 14 years (104 males and 87 females), short-term prosocial video game play was associated with both increased helpful behaviors and decreased hurtful behaviors.⁴⁵ Conversely, short-term violent video game play was associated with decreased helpful behaviors and increased hurtful behaviors. The participants were administered a pre-experimental aggression trait questionnaire and then asked to play either a prosocial, violent, or neutral E-rated video game for 30 minutes. Helpful and hurtful behaviors were then measured through the tangram

puzzle procedure. Children were asked to select ten puzzles for their partner, varying in ease (easy, medium, or hard puzzles), and that their partner would win a \$10 gift card if they were able to successfully complete the puzzles. As a result, children could either help their partner by selecting the easy puzzles, or hurt them by selecting the hard ones. This empirical study is the first of its kind to investigate the behavioral effects of pro-social video games on children.

Prosocial video game play was associated with both increased helpful behaviors and decreased hurtful behaviors.

- The gaming behavior of 21 boys and 500 online participants between the ages of 8 and 16 was studied within the context of the virtual reality game Whyville.net.⁴⁶ This study sought to investigate gender identity development through game play. The findings of this study indicate that although all players initially exhibited similar behaviors such as establishing home bases and frequenting trading posts that over time, and with increased skill and confidence, play behavior grew increasingly individualized. The researchers observed that the virtual game functioned as a safe, low consequence environment in which the boys used their avatar designs to role-play and explore their identities, as well as experiment with conventional masculine behaviors, such as rough and tumble play.

Identifying the Gaps

While it is generally accepted that play increases social skills, there are actually considerable gaps and inconsistencies in the findings. Older work has demonstrated that play provides a fertile environment for practicing social skills, but still little work has been done to determine whether these play experiences develop life skills over time. Recent studies have addressed some of these gaps with both longitudinal and lab-based studies, but more are necessary to tease apart the complex causal

relationship between play and social skills.

The influence of violent video games on social skills is still a controversial topic, as research findings fall on either side of the debate. Some studies have found violent video game play to be associated with aggressive social behavior, while others have disagreed. Systematic reviews attempting to summarize the evidence more rigorous and methodologically sound research is needed in order to reach conclusive answers to this question.^{47, 48} Similarly, more research is required to investigate apparent prosocial effects of some video games.⁴⁹ As younger children are engaging in interactive play on mobile devices, longitudinal studies starting on early childhood are needed to understand and characterize the developmental effects of early and repeated gaming.⁵⁰

Defining Affective Outcomes

Affective outcomes can be divided into two main categories: emotional outcomes and mental health outcomes. Emotions include those affective states that can be experienced and have arousing and motivational properties, such as anger, fear, and happiness. Mental health outcomes are those that affect a child's state of adjustment, such as depression and anxiety.

Traditional Play

One of five characteristics of good play is based on extensive observations of young people⁵¹ is known as Affective Relations and refers to how children represent different emotions and emotional responses in the symbolic play-worlds they devise. Characters and narratives children create when they play demonstrate fear, loneliness, love, bravery and a multitude of other affective experiences. Pretend play that includes exploration of affect has been shown to be associated with the ability to describe emotional experiences and understand the emotions of others.

The development of more sophisticated understandings of one's own and other's affect has been used to explain the links between play and social functioning and creativity. Affect demonstrated in play can be used to measure specific outcomes of play often linked to social skills, creativity, and cognitive outcomes. While there is considerable work linking pretend play that features expressions of affect with various developmental outcomes, little work has examined these associations over time or otherwise established a causal direction between these constructs.

Recent work in this area has explored the possibility that affect expressed during play influences real life positive affect, emotion regulation, and fewer internalized behavior problems. As with other play research, the application of findings from many of these studies is limited by small sample sizes and cross-sectional study designs. One notable exception⁵² used a sample of over 200 preschool children to track associations between affect in pretend play and problem

behaviors over 1 year (see review of Marcel and Yates for more information).

- In a rare longitudinal study with a substantial sample size, Marcelo and Yates⁵² examined whether expressions of affect and fantasy quality in preschoolers' play predicted their internalized (e.g. withdrawal and depression) and externalized problem behaviors (e.g. aggression and attention problems). The results showed that when children expressed negative emotions during play, they exhibited fewer internalizing problems. Additional analyses suggested that expressing negative emotions during play helps children cope with issues related to stress and anxiety. Given this study's considerable sample size and longitudinal approach, the evidence it presents is convincing. Future work should investigate further what children are experiencing/producing when they use negative affect in their fantasy play.

When children expressed negative emotions during play, they exhibited fewer internalizing problems.

- Examining the impact of pretend play on children's experience of positive mood, researchers retested 29 girls 6- to 11-years-old whose pretend play had been observed for emotion and emotional themes 18 months previously.⁵³ Cross-sectional results showed affect in play to be associated with self-reported positive mood in daily life. Longitudinal analyses approached, but did not reach significance. Although these findings provide some initial evidence that affect-laden pretend play positively influences young children's mood, it is severely limited by a small sample and non-significant longitudinal findings.

- In a study using baseline data of the research described above, scientists examined links between affect in play and a number of processes, including emotion regulation.¹⁴ For 61 girls in kindergarten to grade 4, exhibiting play narratives

featuring numerous emotions and more positive affect was associated to having higher emotion regulation scores from their parents. Although the positive affect expressed in play accounted for 13% of emotion regulation, this study cannot make conclusive statements regarding the causal relationship of these constructs.

- According to one study, play is more of an approach to a task rather than an observable behavior; considering something as play seems to have a positive emotional impact.⁵⁴ Researchers observed 129 children with a mean age of 5 years as they completed a task (stringing beads or completing a puzzle) in a play-like or non-play-like setting. In the play setting the activity was on the floor, had an adult nearby, and included child choice. In the non-play setting the activity was on a table, the adult was sitting with the activity, and the child received instruction on what to do. Children in the play-like condition were coded as exhibiting more emotional well-being during the activity than those in the not-play condition. This study points to the possibility that play may be introduced into different educational settings simply by altering how an activity is presented.

Digital Play

Video gaming has been associated with a variety of negative mental health outcomes, most notably depression and anxiety. Video games are an engaging medium, one that can allow those suffering from negative emotions to escape, and one that can cause stress due to the intensity of the game play.

- In a retrospective study of 5,147 fifth-grade students (average age, 11 years) and their parents, researchers assessed six items from the Major Depressive Disorder Scale: lack of pleasure, lack of interest in activities, concentration difficulties, low energy, low self-worth, and suicidal ideation over the past 12 months.⁵⁵ These items were compared with how much time youth spent playing video games, and whether these games were violent. Youth who played 2 or more hours of violent video games had more depressive

symptoms. Depressive symptoms were not associated with non-violent video game play, or duration of video game play in general.

- In a study of 5,139 middle school and high school students ages 12–18, playing a persuasive social impact video game was compared to reading about homelessness as an educational method for influencing emotional and attitudinal learning.⁵⁶ Both treatment groups earned significantly higher scores on post-experimental affective testing than the control group; the game group earned higher scores than the reading group, both immediately after the experiment and three weeks later. The game group earned highest scores on attitude testing, initially and at three weeks, while the reading group showed only a slight increase initially then a significant decline after three weeks. Overall, the findings suggest that persuasive game design can effectively be used to motivate emotional and attitudinal changes in youth.

- Although research with children under 12 is scant, a Dutch study investigated associations between frequency of video game play and psychosocial health among 194 Dutch youth (98 boys and 96 girls) ranging in age from 7 – 11 years.⁵⁷ The researchers noted that boys played video games more frequently than did girls. Although parents reported greater frequency of play and more conduct and peer problems than did their children, the findings offered no evidence of either negative or positive associations between frequency of play and psychosocial behavior.

Identifying the Gaps

Most of the research in this area focuses on children's use of affect during play rather than play's influence on the development of affect. While there is some evidence that play can improve the well-being of children, much more work, particularly with younger children, is needed to establish the nature and direction of the relationship. In particular, findings showing positive outcomes associated with negative affect pretend

play should be replicated and expanded with additional research.

More research is needed to determine whether those who are suffering from negative moods are drawn to video games, or whether the video games are influencing negative affect. More long-term evidence is needed in order to identify the existence and directionality of a correlation.

Defining Physical Outcomes

Children's physical development has been examined in relation to a range of play activities that incorporate gross and fine motor skills in games, structured sports, and outdoor play. Positive and negative outcomes from body mass index to repetitive stress injuries, cardiovascular fitness to coordination, and sedentary behavior vs. strenuous activities have been found.

Traditional Play

More so than for other types of play, physical and outdoor play are frequently seen as a positive outcome in and of themselves. Adding structure to young children's free play is an established way to increase their physical activity in a school setting. Strategies for increasing physical play in preschools receive considerable attention because research indicates that children in preschool tend to be overly sedentary unless intentional interventions are introduced. Active play is seen as having a positive impact on social development by providing a setting that encourages team play, cooperation, and other positive social experiences. Recent work indicates that certain types of active play increases peer acceptance and may thus ease the transition from preschool to school. Other work performed within the last five years indicates that active play may help develop self-regulation, which is predictive of academic success. Family characteristics and playground and school structure that leads to physical play receive considerable attention in the research.

- Due to concerns that children in preschool tend to be overly sedentary unless intentional programs are introduced, a pilot study examined strategies for increasing physical activity during preschool play. Researchers compared a group that received structured outdoor play intervention with a group that received an equal amount of free play, measuring the physical activity of 67 4-year-olds using actigraph accelerometers.⁵⁸ The structured intervention group spent a higher percentage of their time engaged in

moderate-to-vigorous physical activity. Although this was a pilot study, it does provide some initial evidence that structured interventions can effectively increase young children's physical activity. Additional work with larger samples is necessary to ensure that the findings are not an artifact of the specific educational settings and study methods used in this work.

- In a recent study examining the associations between active play, school behaviors, and academic success, researchers measured preschool students' activity level with accelerometers.⁵⁹ Higher levels of active play were found to be linked to a measure of self-regulation, which, in turn, was associated with higher math and literacy scores. The authors speculate that the links between physical activity and self-regulation are explained by physical activity improving attention and working memory in young children. While this is a possibility, the cross-sectional methods of this study do not provide conclusive evidence of this causal relationship. Additional research is needed to fully understand the observed associations.

- The number of active toys available to children during free time can influence their physical activity level.⁶⁰ In a study of 36 8- to 12-year-olds, participants had 1 hour to play with 1, 3, or 5 appealing active toys along with sedentary activities. Accelerometers worn during play sessions showed that children with 3 and 5 toys available were physically active for longer periods of time than children with 1 toy available. While choice may encourage physical activity during free play, the small sample size of this study could not discern whether increased choice increases activity further.

- Observing the play styles of preschoolers and the gender make-ups of their play groups, researchers examined how different types of play influenced young children's acceptance peers.⁶¹ The free play of 148 4- to 6-year-olds was coded as rough and tumble play, exercise play, or other. Peer acceptance was assessed

through interviews with the children. For both genders, toy-mediated exercise play was predictive of peer acceptance. Boys who participated in rough and tumble fighting play with other boys had higher levels of peer acceptance, while girls' exercise play without toys was also linked to being more liked by peers. Both physiological and social mechanisms could explain these findings—physical activity can improve mood, reduce stress, and provide an opportunity to cooperate and share. The authors suggest that physical activity could be used to help social adjustment at school entry.

Digital Play

Despite perceptions, physical outcomes abound in the realm of digital play. Active gaming (also known as exergaming) has existed for many years, gaining mainstream traction beginning in the mid-2000s, possibly in response to the obesity epidemic as a way to encourage children to get exercise.⁶² Active games are considered those that require a player to move with their body, as opposed to passive games where a player sits still with a controller.⁶³ As well, sedentary time, which includes both passive screen time such as television, and active screen time such as video game play, has increased, and the long-term impact of this type of play is still to be determined.

- In a randomized control trial of nine to twelve-year olds in a home setting, researchers found that children playing active video games were not any more active than the children playing inactive video games.⁶⁴
- One study showed that the majority of children were exceeding the American Academy of Pediatrics recommended daily limit of 2 hours of screen media, and were falling short of the 3 hours per day of active play guidelines of The National Association for Sport and Physical Education's Active Start.⁶⁵ Both of these activities were heavily influenced by parents' own media use and physical activity levels.
- A 2012 study examined whether

electronic gaming could help children build fundamental movement skills that are typically gained through traditional physical activities.⁶⁶ Researchers interviewed parents as to whether their young children played passive console video games or active video games providing an opportunity for gross motor movement. Using the Test of Gross Motor Development with 53 three- to six-year-olds, the researchers assessed locomotor skills (running, galloping, hopping, leaping, horizontal jumping, sliding) and object control skills (striking a stationary ball, stationary dribble, kicking, catching, overhand throwing, and underhand rolling). Researchers found that children who played active video games had better object control skills; however, there was no difference between the groups in locomotor skills. This study was cross-sectional, so it could not be determined whether active video gaming contributed to the development of object control skills or those children who had better skills were more attracted to games requiring the skills.

Researchers found that children who played active video games had better object control skills.

- Researchers examined the role of family members in an active gaming intervention designed to increase physical activity in preschool children.⁶⁷ The randomized control trial studied 77 families with a child aged 3 to 5, with the control group playing an active video game together as a family for 10 weeks. Activity levels increased and sedentary times decreased among those children who participated in the family-focused intervention. The success of this intervention had the added benefit of motivating parents to be more physically active themselves, adopting healthier lifestyles for themselves while modeling them for their preschool children.

Identifying the Gaps

Longitudinal studies with larger sample sizes, in naturalistic as well as laboratory settings, are needed to identify the long-term impact of active video gaming on the physical activity levels of children—especially children who are not overweight or obese.⁶⁸

While healthy physical development with play is a desirable outcome, broader developmental outcomes must be considered. There is a notable lack of studies that have examined cognitive and social outcomes of physical free play. As we have discussed, while structured programs appear to consistently increase physical activity, research on pretend play indicates that child-oriented, less instructive play settings are more likely to have positive cognitive and social outcomes. Considering the possibility for pretend play to be active, future research should explore the mechanisms of achieving positive outcomes in physical, cognitive, and social domains, investigating in a variety of play styles and environments tradeoffs that may occur with structured vs. child-directed, pretend-based physical play. Only by measuring global outcomes of play in the same contexts can strategies for optimizing the development of children through play be determined.

Few studies examine if physical free play has the same types of cognitive, social, and affective outcomes as pretend play. While structured interventions appear consistent in their ability to increase physical activity in free play, research focusing on pretend play indicates that child-oriented and less instructive play settings are more likely to have positive social and cognitive outcomes. Considering the possibility for active play to be pretend play, future research should explore the tradeoffs that exist in structured programs given the broader impact potential of child-directed, pretend-based physical play.

Future Directions

This selected review of the science that has examined the effects of play on the development of children has demonstrated that, while there is a considerable body of evidence on specific aspects of play that reliably predict certain developmental outcomes, these findings are limited in a practical sense by:

- a) Small, often culturally and/or socioeconomically homogeneous sample populations;
- b) Cross-sectional designs that measure immediate or short-term results, but offer no information on long-term developmental trajectories;
- c) Controlled experimental settings that can be difficult to translate into applications in “real life” environments of homes, neighborhoods, and schools;
- d) Investigation of traditional play and digital play in isolation from each other, and from other competing interests and activities;
- e) Measurement of individual or narrow types of play and aspects of development, rather than more naturalistic, complex play contexts and global developmental outcomes.

Future research must pro-actively address each of these limitations in order to generate findings that are applicable for parents, educators, and clinicians guiding and caring for children of the 21st Century who move seamlessly between the traditional and digital realms.

Play Has Changed (And So Has the World)

The Digital Revolution has changed the way that children spend their free time. Interactive screen media have morphed how children learn, communicate, interact with each other, and play. Modern play is evolving. Digital technologies can no longer be treated as a diversion of time and attention away from traditional play – but as part of the tapestry of a child’s life experience that contributes, for better or

for worse, to the adult she or he will become. The characterization of digital play as play (rather than another type of activity) could help alleviate the concern of a deficit. From the review above it is clear that there is still not enough evidence to support the idea that typical forms of digital play are associated with the same types of developmentally important outcomes as traditional play.

The Digital Revolution has transformed not only the experience of childhood, but all of our lives, our lifestyles, and our culture. Complex, sophisticated screen technology available to all has triggered a sea change in our lifestyles and an uncertainty in our economic futures. In the short term, many parents are using technology to divert children while they focus on keeping up with changing demands. But many worry that diversion, whether by technology or traditional free play, may cause their children to fall behind in the competition for the ever-shrinking opportunities of the future. The resultant shift toward more “productive” use of children’s time in structured activities designed to build knowledge may be at the cost of a growing play deficit. If play is the work of childhood, where children take risks, fail, try again, and learn to be imaginative, collaborative, and innovative, a play deficit may mortgage their futures.

Existing work in this field has laid the groundwork for more robust research on how children and their families play. We need to observe play in all its forms, moving seamlessly between traditional play and digital, the physical and the imaginary, and follow those children as they grow into their cognitive, social, and affective selves. We need to study enough children in enough contexts over enough time to be able to make reliable predictions of what aspects of play are important to the healthy development of their bodies, minds and spirits. We need to understand what is nature and what is nurture, what are children’s inherent traits, and how play can alter and optimize their potential.

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Center on Media and Child Health

The Center on Media and Child Health (CMCH) at Boston Children's Hospital (BCH) is an academic research center whose mission is to educate and empower children and those who care for them to create and consume media in ways that optimize children's health and development.