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# Children's Play as a Context for Managing Physiological Arousal and Learning Emotion Regulation

Peter LaFreniere

Department of Psychology, University of Maine, USA

## Abstract

In this paper I examine children's play as a context for managing physiological arousal and learning to regulate strong emotions. I define emotion regulation as the process by which children monitor and control their emotional states and their expression to adapt to different social situations or demands. Age trends and gender differences in emotion regulation problems and competencies are described. I then review the development of play, deprivation studies, and the biological functions of different forms of play in primates before discussing children's play. Vigorous social play benefits children by promoting the development of communication, perspective-taking and emotion regulation skills. For boys especially, rough-and-tumble play in early childhood provides a scaffold for learning emotion regulation skills related to managing anger and aggression.

**Keywords:** play, emotion regulation, social competence, peer relations

## Introduction

The preschool years are particularly important with respect to the development of social competence with peers, empathy and emotion regulation skills. In this paper I first define emotion regulation before reviewing cross-cultural data on age trends and gender differences in preschooler's social competence, and two types of emotion regulation problems: anxiety-withdrawal, and anger-aggression. I then review evidence for the adaptive functions of different forms of play in primates and young children with a special emphasis on emotion regulation. Different forms of children's play with peers call for regulating physiological arousal, but in different ways. In situations that call for empathy and nurturance, an inability to manage high arousal may lead the child to experience distress and to avoid the person rather than providing help. In the context of rough-and-tumble play the

✉ Peter LaFreniere, Department of Psychology, University of Maine, 301 Little Hall, Orono, Maine 04469-5782, USA. E-mail: *Peter.lafreniere@umit.maine.edu.*

young child can safely practice the expression and regulation of highly arousing affective states, both positive and negative.

**Emotion Regulation in Early Childhood**

Researchers have consistently documented a gradual decline in anger, frustration, defiance and tantrum behavior during the preschool years (Goodenough, 1931; Kuczynski & Kochanska, 1990). At the same time, children are learning to direct and monitor their own behavior, to resist temptations and inhibit behaviors, to express their internal feeling states in words and to use language and affect to persuade others to meet their emotional needs and goals (Bretherton, Fritz, Zahn-Waxler, & Ridgeway 1986; Dunn, Bretherton, & Munn, 1987), and to engage in affective perspective-taking, empathy and prosocial behavior (Lennon & Eisenberg, 1987; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992).

Together these changes may be understood as evidence for growth in emotion regulation. While this term is used differently by different investigators, emotion regulation generally refers to the processes by which children monitor and control their emotional states and the expression of these states to adapt to different social situations or demands. In this sense it reflects both maturational changes as well as specific socialization effects that may vary within and between cultures. According to Thompson (1994) "emotion regulation consists of the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions especially their intensive and temporal features, to accomplish one's goals" (p. 27). Biological researchers have raised the question of what exactly is being regulated when we use this term. In Thompson's view regulation is being used to encompass a range of interrelated processes, involving neurological activation, physiological arousal, cognitive evaluation, attentional processes, and expressive and behavioral components. Here we use the term in this broad and inclusive sense to refer to all these aspects of the emotion process, to both the amplification and inhibition of emotion, and to the monitoring and control of internal arousal, as well as expressive behaviors.

The preschooler’s emerging capacity to monitor and control emotions is clearly tied to both maturation and socialization. Maturational factors involve changes in CNS functioning, self-awareness, and cognitive and representational skills. Early socialization forces include parental reactions to affective displays during interaction and parent-child talk about emotions. In addition, peers play a vital role in learning to regulate emotions, especially during highly arousing physical play. Emotion regulation becomes more complex and abstract with

increasing self-reliance in the management of negative affect, leading to a new capacity to remain organized in situations of high emotional arousal.

This new capacity did not escape the attention of early researchers who noted a gradual rise in social competence and emotion regulation and a corresponding decline in angry outbursts and aggressive behavior as children acquire greater cognitive maturity and self-control. One of the first researchers to document these age trends was Florence Goodenough (1931) who questioned mothers regarding these behaviors and described a developmental trend in which the expression of anger and aggression peaked at age two and steadily declined during the preschool years, though it remained more common in boys than girls.

Over 80 years later, these same age trends and gender differences in preschoolers' emotions and social behaviors were replicated on an extensive sample using teachers as informants. Over 2000 preschool teachers in 12 countries (United States, Canada, France, Italy, Austria, Russia, Finland, China, Taiwan, Spain, Mexico and Brazil), completed the *Social Competence and Behavior Evaluation* (hereafter SCBE), a rating scale developed to assess patterns of social competence, emotion regulation and expression, and adjustment difficulties (LaFreniere & Dumas, 1995, 1996; LaFreniere et al., 2002). Principal components analyses clearly identified three factors in all samples representing social competence, anxiety-withdrawal, and anger-aggression. This basic division between two broad types of emotional/behavioral disorders has been extensively verified in childhood and adolescence and more recently has been shown to characterize emotional problems in preschoolers as well.

From the standpoint of parents, teachers, clinicians and the children themselves, the most readily apparent type of emotion dysregulation to the preschool classroom involves an inability to tolerate frustration, regulate anger and control aggressive behavior. The anger-aggression scale of the SCBE may be considered as a preschool equivalent of previous broad-band syndromes labeled variously as conduct disorder or externalizing symptoms. The items on this scale describe angry, aggressive, selfish, and oppositional behaviors. Emotion regulation and affective expression were shown to be as central as aggressive behavior to this scale. Indeed, the item with the highest factor loading in all four samples was "irritable, gets mad easily" and poor frustration tolerance and defiance were among the other high loadings. Children with extreme scores on this scale tend to express their negative emotions in ways that hurt or at least disturb others. They function poorly in social situations, where they require almost constant supervision, often to protect others from their outbursts. The angry-aggressive group was found to be the most interactive with peers, but also the most rejected, results that correspond precisely with theoretical expectations, since aggression is a well known behavioral

correlate of peer rejection across a wide age span (Asher & Dodge, 1986; Coie, Dodge, & Kupersmidt, 1990; LaFreniere & Sroufe, 1985).

A second basic type of emotion dysregulation also has a long history of systematic investigation and is referred to variously as affective disorder, internalizing behavioral problem or overcontrolled behavior. Children who illustrate this second type of problem often withdraw from social contact in the face of distress or high levels of emotional arousal and may inhibit behavioral and emotional expression when aroused. The anxiety-withdrawal scale of the SCBE is composed of items describing anxious, depressed, isolated, and overly dependent behavior. The emotional items on this scale describe a child who is often sad, worried, timid, afraid and who rarely smiles or laughs during play with peers. In previous validation research, the anxious-withdrawn group was observed to be significantly less interactive than all other groups, though not necessarily neglected or rejected by their peers. Anxious-withdrawn preschoolers spend much of their time in activities on the periphery of group life, such as on looking and parallel play and are prone to be alone and unoccupied. In keeping with the pattern of affective and behavioral signs of maladjustment, children with extreme scores on this scale are seen by their teachers as sad, depressed, tired and worried, as well as isolated. They show little interest in the activities that their peers typically delight in. These children tend to have poor self-concepts and to show high levels of immaturity, as they often seek adult attention in situations that do not require it, and find it difficult to perform tasks within their capabilities without regular assurance, giving up easily where others would persist.

At this age, child psychologists describe optimal functioning in terms of behaviors that indicate a well-adjusted, flexible, emotionally mature and generally prosocial pattern of social adaptation. The social competence scale of the SCBE taps a broad range of behaviors designed to assess the positive qualities of the child's adaptation, rather than specific behavioral competencies. The emotional items on this scale emphasize emotion regulation, including the child’s ability to remain calm during conflict, show pride and pleasure in their own accomplishments, accept compromises cheerfully, and demonstrate empathic awareness of other children’s needs and goals. Our research has consistently shown that socially competent preschoolers score high on assessments of ego resiliency, show cooperation and affective-perspective taking with peers, express high levels of positive affect and relatively low levels of negative affect during peer interaction, are popular with their peers, and are appreciated by their teacher (LaFreniere & Dumas, 1995, 1996; LaFreniere & Sroufe, 1985).

Given the extensive and diverse samples of children evaluated using the SCBE, these data are particularly robust with respect to age and gender differences.

Developmental trends toward a gradual increase in social competence for boys and girls are clearly evident in all samples. Five and six-year-olds are more able to take the perspective of another child into account and more likely to settle disputes through negotiation rather than aggression. They also show more attention, nurturance and assistance to younger peers, and are more willing to cooperate with the teacher and help out with everyday tasks. All of these changes in social behavior reflect underlying affective and cognitive advances.

Similarly, angry and aggressive behaviors showed a clear decline across this age range. Instrumental aggression is one aspect of behavior that decreases as children learn negotiation and emotion regulation skills. With each advancing year, preschoolers show less frequent displays of temper tantrums, defiance, and frustration over not getting their way. They appear to be better able to tolerate frustration and control their anger, and may verbalize their displeasure rather whine, yell or scream. Despite using teachers, rather than parents, as informants, these results appear to be very similar to those found be Goodenough over 80 years ago. In contrast to these dramatic age changes, anxious-withdrawn behavior appears to show more subtle age changes, with girls and boys showing a modest, though significant, decline in these behaviors over the preschool years.

In agreement with much previous data was the evidence of significant sex differences on two of the SCBE scales. Across all cultures tested, boys were consistently rated substantially higher on measures of anger-aggression and lower on social competence than girls, though no sample showed any trend towards a sex difference in anxiety-withdrawal. Taken together these results would appear to indicate that boys are, on the whole, not as well adapted to the preschool environment as girls, at least from the teacher's standpoint. It should be noted that over 95% of the teachers, from the several hundred programs that provided these data, were female, a proportion that is representative of preschool programs in North America. This may be less important in terms of a female bias in the ratings of the children's behavior, but more so in the construction of a classroom environment that may be more suitable to girls than boys. Alternatively, other socialization factors from parents or peers may account for these differences, or they may reflect underlying genetic differences between males and females. We turn next to an examination of these factors.

**Adaptive Functions of Social Play with Peers**

Evolved patterns of play are thought to help children acquire and practice the culture’s skills and social values, learn to establish friendships and to get along with peers, and to control impulses and emotions. The positive emotions play invokes

encourage children to explore the environment, try out new behaviors and learn with more flexibility – all of which help prepare them for future challenges (Panksepp, 1993; Spinka, Newberry, & Beckoff, 2001). However, in the US and in much of the rest of the developed world, we have witnessed a dramatic decline in children's opportunities for vigorous social play away from adult control (Gray, 2013). Thus, questions about possible functions with respect to the physical and emotional health of children are especially urgent for this type of social play.

From evolutionary biology, we know that the impulse to play in certain ways, and at certain points in the life cycle, is shared across diverse species of mammals. Because play is so ubiquitous in young mammals and combines great energy expenditure and risk with apparent pointlessness, it evolutionary origins and functions have long intrigued evolutionary biologists. The most basic cost of such play is the time and energy devoted to it since this necessarily diminishes the time, effort, and energy available for other activities. Despite such costs, the natural propensity of the young in many mammals is to engage in play as long and as often as ecological constraints and opportunities afford. Play is so ubiquitous in primates that Mason (1965) notes that "playfulness … is rightly regarded as a useful index of the physical and psychological well-being of the young primate. Its prolonged absence raises the suspicion of retardation, illness or distress." (p. 530). Play is so strongly part of the natural motivation of the young that attempts to suppress or deprive the animal of it are followed by sharp rebound effects. This surge in play after deprivation, the amount of time and energy devoted to play despite well documented costs, and the universality of play throughout the mammalian order leads to the conclusion that play serves multiple functions, and is indispensable to the development of a healthy, well-functioning adult.

**Patterns of Primates Play**

Many species of primates are born into troops that provide for a great deal of social play with peers. Squirrel monkeys and rhesus macaques have received the greatest research attention and thus provide us a more comprehensive view of play behavior over the life course than is available for any other non-human primate species. Monkey infants begin to engage in peer social play at about 5 weeks (Biben & Suomi, 1993) and show the typical inverted U curve seen in other species, increasing rapidly in the early months, peaking at about six months and then declining rapidly by the end of the second year as monkeys approach sexual maturity. At about the time play begins, monkey infants of both sexes begin to prefer the company of same-sex peers, and among juveniles, sex segregation is the rule (Rosenblum, Coe, & Bromley, 1975). A general pattern of sex differences in

social play is apparent throughout the primates. These gender-specific forms of play provide important clues to the evolved functions of social play. As is true for humans, sex differences among rhesus and squirrel monkeys are typically relative rather than absolute, with some overlap between the sexes. For example, compared to male peers, young females spend considerably more time in the presence of adult females, and at sexual maturity, they remain with their mothers, sisters, aunts and daughters for the rest of their lives. Female monkeys show considerably more interest in young infants and engage in play parenting, throughout their juvenile years much more than males (Geary, 1998; Pryce, 1995). The functional significance of this type of play is apparent in primates, as research in five species show that the chances of survival of the monkey's firstborn offspring is two to four times higher for mothers with previous experience in caring for infants (Pryce, 1993). Finally, mothers socialize their daughters differently than their sons. For example, female rhesus monkeys hold their daughters closer than their sons and show more concern if they should wander.

In contrast, rhesus mothers more often direct displays of anger toward male than toward female offspring, and they wean males earlier. Young male squirrel monkeys and male rhesus monkeys spend more time in the company of peers, often without the mother close by, and engage in high energy games of chasing and play fighting, and leave their natal troop at sexual maturity (Biben & Suomi, 1993; Drickamer & Vessey, 1973). The social ecology and life history of squirrel monkeys and rhesus monkeys resemble one another in important ways. In each species, as is true of primate species in general, the developmental course of males and females differ in ways that correspond with their adult reproductive roles. Sex differences in social play prepare monkeys for their respective adult roles. Monkey societies provide more structured roles for females, more variable ones for males (Biben & Suomi, 1993). By staying in their natal group, females inherit their status from their mother, and their affiliative relationships with their mother, aunts, and sisters generally remain stable throughout their lives. In contrast, the males, who leave their natal group as sub-adults, must integrate themselves successfully into the dominance hierarchy of the established males in a new troop in order to achieve any reproductive success. During this transition, the mortality rate for males can be as high as 50% in some wild monkey populations (Dittus, 1979). Thus, from an evolutionary standpoint, rough-and-tumble play with peers provides critical practice for males with respect relevant to their eventual dominance status in a new troop. Although the longer and more intense play fighting bouts of males are costly during the early juvenile period, involving high expenditure of energy and risk of injury, they are not as costly as failure to make a successful transition to a new troop. Thus, natural selection would build motivational systems (i.e. at the

hormonal level) in males that are substantially different from females. While females do not shun this rough and tumble play entirely, they participate less often, with less energy, and with far less implication for adult dominance status. In the currency of sexual selection play, fighting skills have very different consequences on reproductive success for male and female monkeys. As a result of this asymmetry, adult male rhesus and squirrel monkeys engage in more aggression than females, who generally avoid aggression and direct competition (de Waal, 1996).

Experimental research also shows that rough-and-tumble play in monkeys is influenced by diverse contextual factors. For example, the amount of play in young squirrel monkeys can vary from 2 or 3 hours per day to less than a half an hour depending upon the ease of availability of food (Baldwin & Baldwin, 1976). Experimental research also provides the clearest evidence for the direct influence of sex hormones on sex differences in play in rhesus macaques. Prenatal exposure to higher levels of androgen in female monkeys is related to increased physical competition and high-energy physical play, regardless of social and contextual factors (Geary, 1998; Wallen, 1996).

In contrast to play fighting, play chasing does not appear to be gender differentiated and females engage in this form of play nearly as much as males. While it can be mixed with bouts of play fighting, it is often distinct and can occur in the absence of play fighting. As part of a broader category of locomotor play, play chasing appears to provide different benefits than play fighting. As Karl Groos (1898) pointed out long ago, predators (e.g. wolves) prefer the chasing position and prey animals (e.g. zebras) prefer the fleeing position in such play. Play chasing also contributes to cardiovascular strength, and certainly assists monkeys in learning to flee from predators and other dangers. Juvenile primates, like most young mammals, engage in a great variety of locomotor play, which can occur as solitary or social play. Other forms of locomotor play in monkeys, such as jumping, climbing trees or swinging from branches, may also serve specific functions, such as building up bone and muscle strength and physical coordination necessary to rapid escape in an arboreal environment.

Not surprisingly social deprivation in primates during infancy produces serious behavioral and emotional disorders as shown in a series of controversial experiments by Harlow, Soumi and colleagues (Harlow, 1969; Harlow & Harlow, 1965; Soumi & Harlow, 1971, 1972, 1975) at the Wisconsin Regional Primate Center in the 1960's and 1970's. In general, these studies provide some of the most convincing evidence in developmental psychology for the importance of early experience. Monkeys who were isolated for their first six months of life from all other monkeys displayed a pattern of abnormal behaviors (e.g. self-clinging,

stereotypic rocking) combined with developmental delays in normal behaviors such as rough-and-tumble social play with peers that resulted in excessive and socially inappropriate aggression later in life. Placing the social isolates with normally reared six-month old monkeys was not at all effective as a means to rehabilitate them. The isolate monkeys were either excessively fearful or excessively aggressive when attempts to engage them in play were made by their normally reared age-mates. Isolates responded to the initiation of these play-bouts with excessive fear and dysregulated bursts of reactive aggression, which elicited retaliation. Later studies demonstrated that successful rehabilitation of the isolates depended on pairing with non-threatening, younger, female juveniles. At six months, isolate-reared male monkeys were paired with normal three-month old female monkey "therapists" who were still in the attachment phase of development. The abnormal patterns of rocking, self-clinging, and self-biting in the isolates were gradually broken down by the experience with a younger peer who would cling to them, groom them and provide other non-threatening forms of social stimulation. As both monkeys developed, a number of aspects of normal social functioning were gradually built up over time, although the isolates remained highly reactive to stress or conflict.

In these studies, mother-reared monkeys were deprived of all contact with age-mates over the first six months, a critical period in the development of social play with peers. Conversely, peer-reared monkeys were permanently separated from their biological mothers at birth, hand-reared in a neonatal nursery for their first month, and then placed with similarly reared age-mates for the rest of their first six months. During this first six months, the peer-reared monkeys developed compensatory attachment relationships with each other. Suomi (2005) describes these peer attachments as almost always anxious in nature because peers are not nearly as effective as mothers in providing a secure base for exploration. Consequently, exploratory behavior in peer-reared monkeys was compromised and their reluctance to approach novel objects extended to unfamiliar peers as well. Even during interaction with familiar peers their social play showed developmental delays in both frequency and complexity. Peer-reared male monkeys were more impulsive and aggressive than were mother-reared male monkeys in the context of peer play, a difference that became more pronounced as they approached puberty. This elevated rate of aggression in males was maintained throughout adolescence.

From the standpoint of the complex social ecology of primates and their gender-differentiated life history challenges, we can confidently argue that maternal and peer deprivation each produce specific handicaps for male and female monkeys. This is true because each of these social partners provide specific and complementary functional relationships that are normally interwoven in the early

development of monkeys living in the wild. In this sense, when deprived of normal maternal caregiving, monkeys exposed only to peer partners do not develop normally even in those domains that are specific to peer socialization. Thus, peer play is compromised in peer-reared monkeys because earlier lessons in emotional regulation, normally acquired during the attachment phase from a competent mother, were never learned.

Suomi (2005) interprets his isolation experiments as demonstrating the critical function of peer play in regulating aggression. I suggest that what is being regulated is emotional arousal. When confronted with other monkeys, the isolates were incapable of dealing with the emotional arousal engendered by such stimulation and responded by mixing expressions of fear and threat, alternating between withdrawal and hyper-aggressiveness. Mason (1965) hypothesized that these inabilities to engage in appropriate social interaction may be exacerbated by deficiencies in their nonverbal communication of emotion.

In order to test this hypothesis Miller, Caul, and Mirsky (1967) compared isolated and normal monkeys in a cooperative conditioning paradigm that assessed their ability to encode and decode facial expressions. This experiment demonstrated that effective emotional cues were not being sent by the isolates. Not only did they not send clear emotional signals, they were also unable to decode clear signals. This lack of competence in nonverbal communication of emotion in isolate reared monkeys directly contributed to their maladaptive social relations with peers. The role of facial expressions in regulating harmonious social interaction in rhesus monkeys is further supported by experiments conducted by Izard (1990). He found that monkeys whose facial nerves had been bisected became the victims of aggression by other monkeys because of their inability to send facial expressions. Both sending and decoding skills contribute to the smooth flow of social interaction and these important abilities to communicate and interpret emotional signals appear to be dependent on social interaction with parents and peers for their full development. Collectively, these diverse experiments with rhesus monkeys in the 1960's and 70's had an enormous impact on the field of child development and served to inspire naturalistic research in children a decade later, including my own observational studies of peer interaction in early childhood.

## Play in Children

Many of the most basic and pervasive research findings on animal play are also true for children, revealing structural and functional similarities with mammals in general and primates in particular. As with most mammals, play appears to be a primary affective/motivational system. It shows the characteristic inverted U

shaped curve, with gradual development in infancy, a peak in childhood, and decline in adolescence as children approach sexual maturity. Children benefit cognitively, in terms of sustained and focused attention, from regular exercise play. Younger children, especially boys, seem to need opportunities for vigorous play more than older children. Studies have shown that young children get increasingly restless in the classroom after long periods of sedentary activity and they play more vigorously when released from them (Smith & Hagan, 1980). This appears to be quite similar to the "rebound effect" in the play deprivation studies of animals reported earlier. When children are deprived of exercise indoors and then given an opportunity for outdoor play, the intensity and duration of exercise has been shown to increase (Pellegrini, 2009). These effects for American 5 to 9-year olds were greater for boys than for girls.

In addition, gender segregation is also evident in children's play groups and the two types of play in which sex differences are widely observed in primates, are also evident in children: play parenting and rough-and-tumble play (Fagen, 1995; Smith, 2010). According to developmental psychologists such as Hartup (1996) and Maccoby (1998), sex differences in social behavior and peer relationships in childhood reveal that male and female "cultures" differ in many important ways. Researchers have generally found that boys are more physically active, engage in more rough-and-tumble play and risk-taking, and exhibit more anger and aggression towards peers than girls. From the point of view of most young girls, these sex-typed behaviors are all good reasons to avoid groups of boys. In addition, boys tend to play in larger groups, occupy more space, monopolize more resources (e.g. attractive toys), and are more likely to do all of the above away from adult supervision than are girls. In contrast, girls engage in more dyadic play than boys do and more often prefer the company of their mostly female preschool teachers than do boys. The picture that emerges from a combination of naturalistic and experimental studies is one of limited, but systematic, sexual dimorphism in play behavior and emotional expression that is well established by early childhood and increases thereafter. These sex differences in children's social and expressive behavior are apparent if one compares the behavior of girls and boys in mixed-sex groups or if one compares the behavior of groups of girls with groups of boys. See Gray (2009) for an extensive review.

If early sex segregated play reflects girl's avoidance of boys, by the end of the preschool years, preference for same-sex peers is transformed into clear avoidance of crossing the gender divide for both boys and girls. Segregation between the sexes increases throughout early childhood. By age 4, the ratio of same-sex to opposite-sex peer play is 3:1, and by age six it has climbed to more than 10:1 in the typical American classroom (Maccoby, 1988). As play groups become more

gender segregated in middle childhood, rough play in boys begins to lose the innocent quality it once had in early childhood.

Naturalistic observation reveals that the types of play and the experiences associated with them appear to differ substantially between girls and boys, and that peers themselves actively develop and maintain these differences. Of course sex differences in play are not due to peer socialization alone. The organizing effects of hormones secreted during pre-natal development shape sex differences in both brain structures and social behavior, particularly play. These steroids help to direct the organization and wiring of the brain during development and influence the structure and neuronal density of various regions. Several researchers have reported sex differences of a variety of brain structures, including the amygdala and hypothalamus, both of which are involved in play behavior (Lewis & Barton, 2006). These two brain structures appear to be implicated in gender differentiated patterns of rough-and-tumble play, and in a comparative study of nonhuman primates, their relative sizes were found to correlate positively with the frequency of social play in a comparative study of nonhuman primates.

Such anatomical dimorphism would be expected to produce sex differences in behavior at an early age, well before the activating effects of sex hormones during puberty. Indeed, experimental research confirms a direct causal influence of sex hormones on early-childhood differences between boys and girls in both play parenting and play fighting (Collaer & Hines, 1995). Prenatal exposure to higher levels of androgen in girls is related to decreased interest in infants and doll play and increased preferences for toys that are usually chosen by boys, such as vehicles and weapons, increased preferences for boys as playmates, and increased interest in rough-and-tumble play, in cross-national samples of girls with CAH (a type of disturbed hormone production) (Hines, 2004).

It follows directly from such biological evidence that gender-differences in play would be universal rather than culturally specific. A general pattern of results in both preindustrial and industrial societies demonstrates consistent sex differences in rough-and-tumble play favoring boys and play-parenting favoring girls. For example, DiPietro (1981) found that boys engaged in rough-and-tumble play involving playful pushing, shoving, hitting, tripping, wrestling, etc, 4 to 5 times as often as girls. It is noteworthy that these dramatic sex differences involve play fighting and wrestling, as opposed to chasing, which several researchers find is equally common in boys and girls (Smith, 2010). For this reason, researchers should be careful to distinguish chasing from play fighting, instead of lumping them together, as is sometimes done. Cross-cultural research indicates that although the magnitude of the sex differences in these two forms of play varies across cultures, the direction of the differences is constant (Eibl-Eibesfeldt, 1989;

Maccoby, 1988). Whiting and Edwards (1988) studied social development in Guatemala, India, Japan, Kenya, Liberia, Mexico, Peru, the Phillipines, and the United States. They concluded that two sex differences were common across these diverse cultures: boys engaged in more dominance behavior than girls, while girls were found to be more nurturing than boys. Sex differences in both empathy and dominance behavior have been widely replicated (Baron-Cohen, 2005; Eisenberg & Lennon, 1983; Geary, 1998). Both the empathy involved in nurturance and the anger that is often displayed in aggression and dominance behavior involve regulating physiological arousal, but in different ways. We next discuss each of these in turn.

**Physiological Arousal, Empathy and Prosocial Behavior**

Empathy has long been considered to be one of the most important social emotions in humans. In its mature form it implies that the child has learned to distinguish between self and other and to recognize another's emotional state. Before these abilities emerge, there is a clear precursor of empathy that may be observed early in infancy. Hoffman (1984), who was one of the first theorists to formulate a developmental theory of empathy, believes that the empathic arousal in the newborn based on motor mimicry is a characteristically human response that is rooted in our primate heritage. Hoffman has observed that newborns tend to cry as a response to the cries of other babies, a phenomenon that may be more characteristic of females than males. This form of primitive empathic distress is experienced through very basic arousal modes, and is involuntary and global. It does not yet qualify as a truly empathic response to distress in another, yet it already embodies something of the emotional essence of the later, more mature form.

In the second year of life, advances in self-awareness lead to the ability to more clearly differentiate between self and other. The young toddler may react to another infant's distress by purposeful helping behaviors that are egocentric, such as comforting the other infant with their own favorite toy. In contrast to the toddler, preschoolers become more aware that another's feelings may differ from their own and that these feelings are based on their needs, which may also be different than one's own. In two longitudinal studies, (Radke-Yarrow & Zahn-Waxler, 1984; Zahn-Waxler et al., 1992) researchers asked mothers to record their young child's responses to naturally occurring and simulated distress. Children's prosocial responses including helping, sharing, sympathizing and comforting the person in distress were observed to increase dramatically between 18 and 24 months, as did their empathic concern and active exploration for the cause of the distress. During

the same period, children's vicarious distress decreased. This distinction between vicariously experienced personal distress and sympathetic concern is important for several reasons. Eisenberg, Fabes and colleagues distinguish between personal distress and sympathetic concern on the basis of psychophysiological, facial and vocalic expressions. Personal distress shares some of the characteristics associated with fear, including heart rate acceleration, whereas sympathetic concern is associated with heart rate deceleration. Whether a child reacts to another's misfortune with distress or concern may be important in determining whether the child actually attempts to help someone in distress.

These researchers report that sympathetic concern (which may include sadness) is linked with prosocial behavior, whereas personal distress is not, for preschool and school-age children. At age two, Zahn-Waxler and colleagues (1992) report similar associations indicating that poorly modulated emotional arousal that remains focused on the self may actually interfere with prosocial action. However, the relationship between the child's emotional arousal and prosocial behavior may be quite complex. Eisenberg and Fabes (1992) propose that an optimal level of arousal will most likely lead to sympathetic concern and prosocial behavior. Too little arousal is not expected to provide sufficient motivation, whereas too high arousal may lead the child to experience distress and to avoid its source. Thus, the key to responding helpfully to another's distress is the child's ability to modulate their emotional reaction to enable them to focus their attention on the person in distress rather than on their own distress. This ability to modulate one's level of emotional arousal entails neurophysiological regulation, attentional control, cognitive appraisal, and coping.

**Active Play and Emotion Regulation**

Many benefits of vigorous social play are clearly linked to social and emotional outcomes. Panksepp (1993) has stated that rough-and-tumble play may be beneficial primarily because it serves to generate positive emotional states that mediate social bonding. Other benefits, such as enhanced emotion regulation abilities, especially under conditions of high arousal, remain vital. One of the most important functional hypothesis derived from animal research may be the idea that emotionally arousing play provides a unique context in which the young child can safely practice the expression, control and regulation of highly arousing affective states, both positive and negative.

Naturalistic research that examines the free flow of behavior in young children's play supports the view that unsupervised social play provides a unique context for learning about emotional communication, not only sending and

decoding signals, but also affective perspective taking and emotion management. Like any language, the language of play requires developmentally appropriate experiences for children to speak it fluently. In his clinical research, Stuart Brown (2009) has followed this learning trajectory by taking general play histories of some 6000 individuals. As a result of these extensive interviews, he believes that the absence of relatively unsupervised preschool play results in a deficit in reading play signals that leads to major integrative difficulties as group play becomes more complex in elementary school playground circumstances. Deficits in reading play signals can lead to inappropriate management of aggression, which is manifested by hyper-aggression or withdrawal. In his retrospective clinical analysis of multiple cases Brown (2009) repeatedly finds that the roots of this dysfunction precede elementary school entrance.

Daily observations of children's struggles with emotion management in the sometimes hurly burly chaos of the preschool classroom and playground confirm the view that children who are socially active can learn a great deal; whereas children who are passive and socially withdrawn, or hostile and rejected by their peers may not. The more deeply we study social interaction during children's free play, the more important affective expression and emotional regulation appear. The central role of emotional control and expression is most apparent in the free flow of behavior; that is, in chains of initiations, responses, adjustments, shared delight, protests, apologies, modifications, new directions, and further shared feeling. The place of affect in promoting, guiding, and perpetuating exchanges (or disrupting, disorganizing or terminating them) is obvious to trained observers, but nonetheless very difficult to quantify (Sroufe, Schork, Motti, Lawroski, & LaFreniere, 1984).

In early childhood, quantitative measures of positive affect recorded during free play are strongly correlated with both teacher ratings of social competence and peer popularity because of the central role of affect in initiating and regulating harmonious social interchanges among preschool peers (LaFreniere & Sroufe, 1985). In contrast, preschoolers who expressed chronically high or unusually intense negative emotions were viewed much less favorably by teachers and peers. Some researchers have attempted to go beyond general indices of positive and negative emotion in order to provide a more differentiated view regarding the role of affective expression in children's social interaction. It is particularly important that different types of "negative affect" be discriminated. Observers recording affective expressions during preschooler's free play can reliably distinguish distress, sadness, and anger from one another based on vocal, facial and postural cues (as can the children themselves).

In one observational study of preschoolers' expressions of anger during free play, Fabes and Eisenberg (1992) recorded the causes and consequences of

children's anger and related these observations to measures of social competence and peer popularity. Most of these angry reactions were observed during disputes among the children over objects. Consistent with the research cited above, children who were judged by peers as popular or by teachers as socially competent were less often involved in angry disputes. They were also more likely than less popular or competent children to deal directly and non-aggressively with the provocation, often using their greater social status in the peer group to retaliate by isolating the other child. In addition, children's responses to these provocations differed depending on the age and sex of the child, the cause of the conflict, and the status of the person with whom they were in conflict. These results suggest that preschoolers are beginning to control their emotional expressions to fit the context.

In our experimental work with young children, we decided to specifically examine preschool boys' abilities to regulate disappointment, frustration and anger in order to achieve positively toned cooperation with a peer (LaFreniere, 1996). Our prior naturalistic observations had revealed that the primary proximate cause of aggression in early childhood was the frustration of losing a competition over a desirable resource. Particularly among boys, instrumental aggression around objects in the preschool setting accounted for the vast majority of recorded acts of aggression in the classroom Based on these observations, we decided to induce mild frustration in an experimental situation by controlling the outcome of a competition. Preschool aged boys were instructed that the first one who completed his jigsaw puzzle would be awarded a prize. The boys typically competed enthusiastically. Success in the competition was characterized by broad smiling and triumphant looks at the partner with occasional boasting, while losing the competition was followed by looking down or away, frowning, slumping posture, and occasional whining or complaining.

In the subsequent cooperative play situation, which involved sharing an attractive toy, typically some form of turn taking prevailed, with each child employing the toy for a brief period. However, great variation in the degree of cooperation, conflict and competition was observed. Affective regulation following the competition strongly predicted the subsequent degree of cooperation and conflict in the second task. Boys who were previously assessed by their preschool teachers as socially competent were typically able to regulate the mild negative emotion produced by the unequal outcome to the competition and subsequently were able to engage enthusiastically in play with a peer, with more cooperation and less competition and conflict than children who were less competent. In contrast to socially competent preschoolers, preschoolers with a history of problem behavior showed considerably more tension and less emotion regulation in their interaction with each other. Boys who were previously assessed by their preschool teachers as

angry-aggressive tended to respond to losing the competition with sharp frustration and had great difficulty regulating this emotion. In contrast, anxious-withdrawn children in the same circumstances often responded with passivity, dejection and resignation. In neither case were the boys able to sustain positive cooperation with their partner during the second period of cooperative play.

Collectively, these studies suggest that emotion regulation skills underlie children's abilities to balance cooperative and egoistic concerns in the daily challenges of social life in the peer group, where children sort themselves into leaders and followers, bullies and victims, and popular, isolated and rejected social roles. For boys especially, vigorous social play in early childhood provides a scaffold for learning skills involved in adolescence that are related to social dominance in the peer group. Dominance status, in turn, may eventually relate to acquiring important social and material resources and be a key factor in achieving fitness, as it is in other species of primates. Boys who withdraw and fail to compete successfully, or who become hypercompetitive and aggressive, were not likely to achieve reproductive success in our evolutionary past, and may be similarly handicapped in our present day society.

## Conclusions

Many of the basic research findings regarding play in a wide range of mammalian species also hold true for children, revealing important structural and functional continuities that have endured over several hundred million years. Despite the fact that American children spend most of their waking hours surrounded by recent products of an ever-inventive technological society, when left to their own devices, they often return to these enduring patterns of play because of the joy and pleasure they bring. Nature provides its own reinforcement for the honing of skills that are vital to the organism.

As with most mammals, play in children appears to be a primary affective motivational system. It shows the characteristic inverted U shaped curve with gradual development in infancy, a peak in childhood, and decline in adolescence as children approach the age of sexual maturity. Play deprivation is followed by a rebound, and the frequency and type of play is highly sensitive to contextual and hormonal factors. Evolved patterns of play benefit children in a variety of ways. Different forms of children's play with peers call for regulating physiological arousal, but in different ways. In situations that call for empathy and nurturance, an inability to manage high arousal may lead the child to experience distress and to avoid the person rather than providing help. In the context of rough-and-tumble

play the young child can safely practice the expression and regulation of highly arousing affective states, both positive and negative.

Such vigorous social play enables children to establish friendships and maintain them even when conflicts arise. This type of unsupervised peer interaction provides children an opportunity to hone emotion communication and regulation skills, especially during emotionally arousing situations, as conflicts are sure to arise due to early childhood egocentrism. In this sense, programming out such conflicts, by relentless adult supervision and interference in children's play may actually be a disservice. This was one of Piaget's key insights. He advocated peer interaction, not parent or teacher tutoring, as the principle means by which young children shed their egocentrism and learn the importance of perspective-taking (Piaget, 1932). Finally, for boys especially, rough-and-tumble play in early childhood provides a scaffold for learning emotion regulation skills related to managing anger and aggression in the peer group in the absence of adult control.

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