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## Changes in American children's time – 1997 to 2003

**Sandra L. Hofferth**

Department of Family Science, 1210E Marie Mount Hall, School of Public Health, University of Maryland, College Park 207423

Sandra L. Hofferth: hofferth@umd.edu

### Abstract

Over the six-year period between 1997 and 2003 broad social changes occurred in the United States: welfare rules changed, the nation's school policies were overhauled, America was attacked by terrorists, and American values shifted in a conservative direction. Changes in children's time were consistent with these trends. Discretionary time declined. Studying and reading increased over the period, whereas participation in sports declined, suggesting that the increased emphasis on academics at the school level has altered children's behavior at home as well. Increased participation in religious and youth activities and declines in outdoor activities may reflect changes in parental values and security concerns. The results suggest continuation of the upward trend in reading and studying from the 1980s and early 1990s, but increased religious attendance and youth group participation rather than increased participation in sports characterized this recent period.

### Keywords

Leisure time; children; family; time trends

## 1 Changes in children's time – 1997 to 2003

### 1.1 Introduction

The public is fascinated by trends in children's activities, such as homework, sports, reading, and watching television (Mathews, 2003; Ratnesar, 1999). Although to repeatedly measure and then report these activities may appear insignificant, to the contrary, a comparison of how children spend their time today compared to the past opens a window on changes in values and beliefs over the period that would otherwise be invisible.

Research on changes in values and beliefs has been hampered by its dependence upon individual self-report. What individuals report cannot usually be taken at face value, but must be deconstructed (Daly, 2001). Researchers attempt to look beneath the surface to interpret the meaning of what respondents say, recognizing that actors may be unaware of their motivations. For example, some parents who enroll children in extracurricular activities may want their child to win a college scholarship (Dunn, Kinney and Hofferth, 2003), while others may desire to improve social skills or even to create positive childhood memories (Daly, 2001). Self-reports are particularly insensitive to social change. If the same questions or categories are used, major changes or shifts cannot surface (Alwin, 2001).

However, an alternative to self-report for assessing values and beliefs is the examination of behavior. The experiences, the actions that individuals and families take, are important. Each of us has exactly 24 hours each day, and only those 24 hours; what varies is how we use that

time. Although some actions are reinforced externally, value-based actions are self-reinforcing. Satisfaction or nostalgia occurs after the fact, strengthening the behavior. To the extent that parents make activity decisions based upon anticipation of consequences, symbolic as well as physical, they are expressing their values (Bandura, 1976). Thus, how people spend their time becomes a reliable indicator of their values. And, even more important, how parents and children make decisions regarding their children's time is a reliable indicator of their values regarding childrearing. As parental values or underlying circumstances change, children's activities should change.

This paper, therefore, examines changes in children's time as indicators of changes in family and societal circumstances and values over time. It examines changes in the activities of children 6 to 12 between 1997 and 2003, the latest year in which detailed data on American children's time are available. It explores whether changes occurred in participation or in time spent. Finally, it examines whether changes reflect changes in family structure, family income, family size, maternal education, and maternal employment or whether they reflect broader social changes that occurred between 1997 and 2003.

## 1.2 Background

Previous research has examined social change between 1981 and 1997, focusing on the consequences for children's activities of three major demographic shifts: increased labor force participation of mothers, decline in two-parent families, and increased educational levels of the population (Hofferth and Sandberg, 2001b; Sandberg and Hofferth, 2001; Sayer, Bianchi and Robinson, 2004). Documented were three associated changes in children's time. First, nondiscretionary time, the sum of day care/school, personal care, eating, and sleeping, increased and, therefore, discretionary time declined (Hofferth and Sandberg, 2001b). Second, time in structured activities such as art activities and sports increased and unstructured play, housework, and television viewing declined. Third, time spent in religious attendance declined, but children's study and reading time rose.

The increase in nondiscretionary time resulted from children spending more time in day care because of increased maternal employment. Mothers were attracted into the work force by higher female wages and encouraged to take increasing responsibility in the financial support of their families by family dissolution and stagnating male wages up through the mid 1990s (Levy, 1998). In contrast, declining play, television viewing, and household work, and increased arts, sports participation, reading, and studying occurred among children of nonworking as well as working mothers; therefore, these were not due to changes in maternal employment, but could represent broad value change (Hofferth and Sandberg, 2001b). Many ongoing changes reflect the increased educational levels of the population. Mothers with higher education place more value on reading, studying, and constructively using time (Hofferth, 2006). Previous research has pointed to the value parents place, not just on academic success, but also success in developing their children's physical, social, and creative skills (Dunn, Kinney and Hofferth, 2003). In 1997 children of mothers with some college spent more time reading, participating in youth groups, and studying, and spent less time watching television, compared with children of less educated mothers (Hofferth and Sandberg, 2001b). Between 1981 and 1997 a decline in religious attendance occurred among those children whose mothers had not completed any college.

What changes took place between 1997 and 2003, a six-year period at the end of the 20th century, that justify examining changes in children's time over this relative short period of time? There was little of the change in family structure and family size that characterized previous periods (Federal Interagency Forum on Child and Family Statistics, 2003; U.S. Bureau of the Census, 2005); however, four critical changes occurred. The first was a revival of conservative values during the 1990s linked with both Democratic and Republican

administrations. Second, and associated with this first change, was the passage of welfare reform legislation in 1997 that changed the welfare system to a program of temporary assistance by removing entitlements, setting limits on eligibility, and establishing assisted pathways to independence for low-income mothers. Third, was the passage of legislation in 2001 establishing clear academic benchmarks for primary and secondary students in the U.S. and enforcing testing to evaluate progress on these goals. The fourth was the attack by terrorists on the World Trade Center in New York City on September 11, 2001.

A revival of traditional conservative values occurred in the last decades of the 20th century (Ansell, 2001). According to international commentators, the debates in the 2000 and 2004 elections focused more upon moral issues than foreign policy or internal economic policy (The Scotsman, 2004). Republican control over both houses of Congress and the election of a Republican President in both 2000 and 2004 solidified the conservative ascendancy. Abortion rights and gay marriage continue to be hot-button issues in Supreme Court appointments and state legislative initiatives. Increased conservatism may be reflected in activities such as increased attendance at religious services and children's participation in youth groups, which includes youth activities sponsored by religious institutions.

Increased conservatism was especially evident at the end of the 20th century, with Democratic President Bill Clinton supporting a socially conservative welfare bill in 1997. From the early to the mid 1990s, state legislation tightening welfare eligibility, followed by the passage in 1997 of federal legislation, the Temporary Assistance to Needy Families Act (TANF), increased emphasis on work in welfare programs (Hofferth, Stanhope and Harris, 2002). Subsequently, the employment levels of single mothers increased to those of married mothers (Federal Interagency Forum on Child and Family Statistics, 2003). The proportion of children living in a family with at least one full-time full-year employed parent was at a record high (Federal Interagency Forum on Child and Family Statistics, 2003). In addition, the proportion of children living with two parents employed full-time year round doubled from the early 1990s. This should lead to children spending even more time in school and in day care, with a concomitant decline in discretionary time.

"No Child Left Behind" legislation introduced by Republican President George Bush in 2001 focused upon making schools accountable for continued improvements in the academic progress of their students. This legislation increased emphasis on academic success in school, and raised concern about homework and studying time (Loveless, 2003) at a time when more women were completing four or more years of college (U.S. Bureau of the Census, 2008). National tests show gains in mathematics, particularly for younger students, but since 1992 children's reading test scores have remained about the same (Loveless, 2003). Reading for pleasure is the single most important activity associated with higher children's test scores in previous studies (Hofferth and Sandberg, 2001a), yet little is known about whether the small increases shown in the 1980s and 1990s (Hofferth and Sandberg, 2001b) have continued. Studying has also been found to be associated with higher achievement, particularly for adolescents (Cooper et al., 1998). Increased emphasis on academic success may have led to children spending increased time both studying and reading for pleasure. A related activity that may have been affected is participation in youth groups, which includes academic clubs, social clubs such as scouts, and service clubs such as safety guards. Extracurricular activities have been associated with greater academic success (Mahoney, Harris and Eccles, 2006).

Finally, the attacks by terrorists on the World Trade Center in September of 2001 increased anxiety about safety and security. The heightened concern about children's safety in their own communities (Pebbley and Sastry, 2004) perhaps further reinforced the choice of supervised activities over free play. In addition, it sent many families back to a search for community, including religious and community institutions.

### 1.3 Limits on choice of activities

Of course, not all families have access to the resources to pay for children's extracurricular activities or to live in safe neighborhoods. Access to resources is generally linked with family income, though race/ethnicity may be associated with differential access because residential segregation leads to differential neighborhood and school quality (Phillips and Chin, 2004). Previous research has not shown income to be an important predictor of children's activities (Hofferth and Sandberg, 2001a); children may have access to free or low-cost extracurricular activities through their schools. However, the part played by income compared with other factors needs to be explored using more recent data. The extent to which activities are associated with family income tests whether activities are limited by access and the extent to which they are associated with maternal education tests whether activities are primarily value-based. Race/ethnicity contributes to activity choice through access and through values, as do family structure and maternal employment, and their association with activities helps shed light on the role of resources versus values.

### 1.4 Research questions and hypotheses

This paper describes changes in children's time between 1997 and 2003, whether they are consistent with demographic and policy changes that occurred over the period, and whether they continue or alter trends seen since 1981.

We expect to see a continued decline in discretionary time as a result of continued increases in maternal employment, and continued increases in studying and reading time of children as a result of increased pressure to achieve in school. However, increased academic pressures may have reduced attention paid to sports. Additionally, increased conservatism may have increased attendance at religious services. Declines in children's time spent in outdoor activities such as walking would be consistent with increased security concerns. To test these hypotheses, we regress activities in 1997 and 2003 on maternal education, maternal work status, family size, age and gender of child, number of parents, race/ethnicity, and family income in the appropriate year, controlling for an indicator of whether the year was 2003. A significant sign on the coefficient for the activity in 2003 indicates that there was a change, controlling for all the other factors. Finally, our theoretical hypotheses regarding the importance of values versus access to resources would be supported if maternal education has a stronger association with children's activities than does family income.

## 2 Methods

### 2.1 The 1997 Child Development Supplement to the Panel Study of Income Dynamics

The study sample was drawn from the 1997 Child Development Supplement (CDS) to the Panel Study of Income Dynamics (PSID), a 30-year longitudinal survey of a representative sample of U.S. men, women, children, and the families in which they reside. In 1997, the PSID added a refresher sample of immigrants to the United States so that the sample represents the U.S. population in 1997. When weights are used, the PSID has been found to be representative of U.S. individuals and their families (Fitzgerald, Gottschalk and Moffitt, 1998). With funding from the National Institute of Child Health and Human Development, data were collected in 1997 on up to two randomly selected 0 to 12-year-old children of PSID respondents both from the primary caregivers and from the children themselves. The CDS survey period began in March 1997 and ended in early December 1997 with a break from mid-June through August; thus the study took place only during the spring and fall. Interviews were completed with 2,380 child households containing 3,563 children. The response rate was 88%. Post-stratification weights based upon the 1997 Current Population Survey were used to make the data nationally representative. Sample characteristics reflect the characteristics of the population of children under age 13 in the United States in 1997. The sample used in this study consisted of boys and

girls between 6 and 12 years of age in 1997, from first grade through about grade 6 or 7, and who had a mother in the household. These children were born between 1985 and 1991.

## 2.2 The 2003 Child Development Supplement to the Panel Study of Income Dynamics

In fall 2002 through spring 2003, the participants of the 1997 Child Development Supplement were contacted again and another supplement was administered. Because 5–6 years had passed since they were previously interviewed, few children in the 2003 wave were under age 6. Consequently, to make comparisons of the two cohorts of children, we restricted the sample taken from the 2003 study to those children who were aged 6 to 12 years of age in 2003 and whose families participated in the 2003 Supplement. These children were born between 1990 and 1996. Some of the children from the original 1997 data collection were 13–18 in 2003; however, we did not include them because the 1997 wave did not have a comparable adolescent sample. The total potential number of children eligible to participate was 3,271, of whom 88.9% participated in the 2003 supplement. Weights were calculated to adjust for the original probability of selection and for attrition between 1997 and 2003. Thus the weighted total is representative of children aged 6 to 12 in 1997 or in 2003.<sup>1</sup>

## 2.3 Time diaries

The Child Development Supplements collected complete time diaries for one weekday and one weekend day for 79 percent (2,818) of the 3,563 sample children aged 0 to 12 in 1997 and 82% of the 2,911 children participating in 2003. Comparisons between children who provided a diary and those who did not showed no significant differences on demographic characteristics. The time diary, which was interviewer-administered either to the parent or to the parent and child, asked questions about the child's flow of activities over a 24-hour period beginning at midnight of the randomly designated day. These questions asked the primary activity that was going on at that time, when it began and ended, and whether any other activity was taking place. Children's activities were first assigned to one of 10 general activity categories (e.g., sports and active leisure) and then coded into 3-digit subcategories (e.g., playing soccer). Coding was conducted by professional coders employed by the data collection organization; the level of reliability exceeded 90 percent. Time spent traveling for the purpose of engaging in a specific activity was included in that category.

In the coding process, children's activities were classified into ten general activity categories (paid work, household activities, child care, obtaining goods and services, personal needs and care, education, organizational activities, entertainment/social activities, sports, hobbies, active leisure, passive leisure), and further subdivided into 3-digit subcategories (such as parent reading to a child) that could be recombined in a variety of ways to characterize children's activities. For comparison purposes, the primary activities of children aged 3 to 12 were classified into the 18 major categories used by Timmer and colleagues in the early 1980s (Timmer, Eccles and O'Brien, 1985) and by Hofferth and Sandberg in 2001 (Hofferth and Sandberg, 2001a; Hofferth and Sandberg, 2001b). These categories were expanded to separate shopping from household work and to separate day care from school. Youth groups were also distinguished from the broader "visiting" category. Religious attendance does not include meeting time of youth groups in a religious building but reflects attendance at services. Time

<sup>1</sup>The 1997 sample used in this study differs slightly from the sample used in the analysis of change between 1981 and 1997 (Hofferth and Sandberg, 2001b). The previous analysis was conducted with an early version of the time diary file; slight changes in the file occurred between that time and the current release. Both studies deleted children without two diaries and children who spent the entire week in one activity, and both studies weighted the data using PSID-provided sampling weights. The present 1997 data set includes four fewer children aged 6 to 8 and one fewer child aged 9 to 12 than did the one used for the previous report. We were unable to replicate the file exactly. Because of this sample difference, there are several small and nonsignificant differences between children's weekly time in some activity categories in the two reports. These differences in point estimates of only a few minutes do not influence the conclusions regarding changes over time between 1997 and 2003.



spent traveling for the purposes of engaging in a specific activity was included in that category. Secondary activities are not measured. For example, time spent doing housework with the television on where housework was the primary activity is not counted as time “watching television”.<sup>2</sup> Thus, some activities that are often secondary may be underestimated. Given that many activities are occasional, we would not expect all children to engage in most of these on a daily basis. However, we want to abstract from this to describe the activities of American children in general. Because not all children do every activity each day, the total time children spend in an activity is a function of the proportion who engage in the activity and the time those participating spend in it. An estimate of weekly time is computed by multiplying weekday time (including those who do not participate and have zero time) by 5 and weekend day time by 2, after removing a few children who did not have both a weekend and weekday diary.<sup>3</sup> Selecting children aged 6 to 12 with two diaries and who were not interviewed over the Christmas break (see below), sample sizes were reduced to 1,448 cases in 1997 and 1,343 cases in 2003, a total of 2,791; missing data on some of the demographic variables further reduced the sample to 2,564 for the multivariate analyses.

Robinson and Godbey (1997) distinguished among contracted time (work, school), committed time (household and child care obligations), personal time (eating, sleeping, personal care), and free time (everything else). We generally use this model with some small changes because we are concerned with children, not adults. Because they have to be in school but don’t have to work, we treat school and day care rather than work as children’s “contracted” or nondiscretionary time. Personal care time is time spent eating, sleeping, and caring for their personal needs. Few children have “committed” time; we include household work as part of their free time because children negotiate their participation in household work from family to family. It is not fixed by society, like school, or by physical needs, like sleep and personal care. In comparison to discretionary time, nondiscretionary time varied little between 1981 and 1997 (Hofferth and Sandberg, 2001a). For the purpose of this paper, therefore, free or discretionary time consists of household work, shopping, studying, religious attendance, youth groups, visiting, sports, outdoors activities, hobbies, art activities, play, television viewing, reading, household conversations, and passive leisure (which includes going to movies and sports events as a spectator).

**Limits of comparability across the two years of data—**Because the two data collections were similarly conducted, the results should be comparable. There is one limitation, however, the seasonal difference between the 1997 and 2003 samples. The 1997 study was conducted primarily between March and June, and then again in September through November. In contrast, the 2003 study was conducted in October 2002 through June 2003, with the majority of interviews conducted between November 2002 and March 2003. Therefore, the data collection seasons were almost completely opposite, with the 1997 survey conducted in the late spring and early fall and the majority of the 2003 survey interviews conducted during the winter months. Although one would not expect that seasonality would play a major part in children’s activities, it, in fact, does. The potentially most serious problem was that the 2003 survey was conducted over the Christmas holidays, when children were not attending school and their activities differed dramatically from those during the school year. Consequently, after examining the calendar for 2002 and 2003, all children’s diaries collected from December 20, when schools begin closing for the holidays, through January 5, when most children should have been back in school, were deleted. This removed 157 cases for 2003.

In order to address concerns about whether activity changes resulted from seasonal differences across the survey period with respect to outside temperature at interview, we created a dummy

<sup>2</sup>The specific activities that make up each of the 21 categories are available from the authors.

<sup>3</sup>Two children who, in 1997, had only one activity (traveling or visiting) were also excluded.

variable by coding the geographic location of the child into two types of states – warm-weather states and nonwarm-weather states. This was based upon the heating degree days calculated by the U.S. National Oceanic and Atmospheric Administration for the July 2004 to November 2005 season (U.S. Department of Commerce, 2006). Based upon data that showed a clear degree-day distinction between states in the southern rim of the U.S. and more northern states, states with fewer than 3,000 cumulative degree days were coded as warm states and the rest were nonwarm states.<sup>4</sup> Children in warm weather states should not be affected by seasonality that is weather-related. The results of our analysis indicated, as expected, that outdoors and sports activities were higher and participation in indoor activities lower in warm compared to nonwarm states in both 1997 and 2003 (not shown). However, in both warm and non-warm states, the data showed a decline in sports participation for both age groups between 1997 and 2003. The decline in sports, therefore, is not a result of differences in temperature at the interview dates in 1997 and 2003. It could still result from differences in seasonality that are not temperature-related because there is still substantial seasonality in the sports available to children in their schools and clubs; however, that type of seasonality should be limited to sports and should not in any way affect reading, studying, playing, sleeping, TV watching, or video game playing.

## 2.4 Variables

Besides the overall descriptive analyses by age of child (based upon age in months at the time of the CDS parent interview), we also conducted multivariate analyses using key demographic characteristics of the family as independent variables, including maternal employment (employed versus not employed), maternal education (some college and completed four years of college or more versus no college), family structure (1 versus 2 parents), family size (1 or 2 versus 3 or more children), and gender of the child. Income was measured by the ratio of family income to needs, the annual income of the family for the previous calendar year divided by the poverty line in dollars for that family size and year. We included a dummy variable for whether the state the child was residing in met the previously described definition of warm state or not. All the definitions were consistent across the two waves of data except that of maternal employment. In 1997, maternal employment was defined as ever-employed in the previous year, whereas, in 2003, maternal employment was defined as employed at the time of the survey. The core PSID data wave that collected employment information was conducted in 2001 and not in 2002; employment at the survey date was deemed to be a better indicator than employment more than a year prior to the survey.

## 2.5 Analysis plan

The descriptive analyses show the proportion of children in an activity and then the total time, including those who did not participate. T-tests were used to compare across the years 1997 and 2003 and to compare boys and girls.

The purpose of the multivariate analyses is to examine the extent to which individual and family sociodemographic changes and study design account for changes in children's time between 1997 and 2003. These analyses of amount of time spent in the activity are based upon Tobit regression models that adjust for the fact that not all children engage in each activity, which would otherwise skew the distribution of times (Tobin, 1958), but permit keeping time at the interval level. If ordinary least squares (OLS) were used, the regression slope would be biased by the inclusion of zero values. The Tobit coefficients reflect both the effect of the independent variable on the probability of the activity and on the hours spent in the activity by participants (McDonald and Moffitt, 1980). The higher the proportion of children who participate in the

<sup>4</sup>The warm weather states are Alabama, Arizona, California, Florida, Georgia, Hawaii, Louisiana, Mississippi, New Mexico, South Carolina, and Texas. Hawaii was not represented in our study.

activity, the more the results reflect the hours among participants and thus the more similar the results become to those from OLS regressions just on participants. Therefore, for activities in which all or almost all children participate (e.g., television viewing), OLS is used. All analyses are weighted using population weights provided by the PSID-CDS, which were then normalized so that numbers represent actual sample sizes. Robust standard errors were computed using STATA to adjust for clustering of both children within families and across the two years.

### 3 Results

#### 3.1 Children's participation in activities by age

Between 1997 and 2003, declines in participation of children 6–12 occurred in several activities: visiting, sports, spending time out of doors, engaging in other passive leisure, and conversing with household members (Table 1). The proportion playing declined 4% and the proportion spending time in household work declined 9% for children aged 9 to 12, but not for children aged 6 to 8. Market work declined, but from a very low initial level.

The largest participation declines occurred in sports and outdoor activities, a decline that occurred in warm states as well as other states (not shown). Over all children aged 6 to 12, there was a decline of 21% in participation in sports, from 76% to 60%, a decline that occurred equally for children of both age groups. There was also a 37% decline in participation in outdoor activities, from 16% to 10%. We would expect increases in most of the other activities, because the total still must add to 24 hours. However, we do not see equal increases in other activities. Increases were selective.

The percentage of children reported as spending time studying increased between 1997 and 2003, a continuation of the upward trend from 1981 to 1997. Sixty-six percent of 6–12-year-old children reported studying at all in 2003, compared with 58% in 1997, an increase of 14%. As between 1981 and 1997, the proportion spending any time studying in a survey week increased more for younger children 6 to 8 (21%) than for older children 9 to 12 (10%). By 2003, almost the same proportion of younger (64%) as older children (68%) spent some time studying. This is a major change over just six years.

Similarly, 47% reported reading during the survey week in 2003 compared to 38% in 1997, an increase of 24% over the period. Again, the increase was larger for younger children (29%), than for older children (23%). In contrast to studying, where in 2003 the participation rates were similar, a larger proportion of younger than older children read for pleasure during the study week in both 1997 and 2003.

Several other categories of activities rose by considerable percentages. For all children, religious attendance rose 23%, from 26% to 32%, and participation in youth groups rose 26% (from 27% to 34%) between 1997 and 2003. Participation in art activities rose 13% for the entire group, with a 35% increase for children aged 6 to 8 (from 26% to 35%), and no increase for children aged 9 to 12.

Numerous categories showed no change. The proportion participating in personal care, eating, hobbies, sleeping, and school and day care did not change. Except for a 3% increase for children aged 9 to 12, the proportion watching television remained high and stable. Almost all watched television.

#### 3.2 Time spent in activities by age

The total weekly time in each activity over all children, with nonparticipants (those spending zero time in an activity) included, is shown in Table 2. We first examined discretionary and



nondiscretionary time. To obtain discretionary time we summed personal care, eating, sleeping, school and day care and subtracted the total from 168, the total number of hours available in a week. We found a decline in discretionary time between 1997 and 2003 that continued the decline previously found between 1981 and 1997. In 1981 children aged 6 to 12 enjoyed about 57 discretionary hours per week. In 1997, children aged 6 to 12 enjoyed about 50 discretionary hours per week. By 2003, discretionary time had declined two hours to about 48 hours. This is a decline of only 4%, small relative to the 12% decline from 1981 to 1997, but still significant because it occurred over only a 6-year period. The reason for the decline in discretionary time between 1997 and 2003 is the increased amount of time spent sleeping and in school, nondiscretionary activities. Personal care and day care remained constant and eating time declined slightly. In the following we focus only on discretionary time.

A comparison of Tables 1 and 2 tests whether changes in discretionary time result from changed participation or from changed time spent among those who participate. For example, the total time spent studying rose both because more children studied and because those who studied spent more time doing it. Including those who did not study at all, on average, children spent 2 hours and 55 minutes studying in 1997 and 3 hours 36 minutes per week studying in 2003, an increase of 23%. The percentage increase in time (23%) was greater than the percentage increase in participation (14%), indicating that time spent studying increased among those who studied (by 8%, not shown). The time spent studying showed a slightly larger rise for children aged 6 to 8 (32%, from 1:58 to 2:36) than for children aged 9–12 (20%, from 3:36 to 4:20).

Reading time for the entire age group of 6 to 12-year-olds increased 34% – from 1:11 to 1:35 – with the increase equal for older and young children. Similar to studying, the overall increase in reading time (34%) exceeded the percent increase in participation (24%), indicating increased time in reading among those who read (6%, not shown).<sup>5</sup> We checked to see whether increased studying and reading was linked to season of interview. Study time increased in both warm and in nonwarm states, suggesting that it was a real change, whereas reading time increased only in nonwarm states, perhaps reflecting seasonality (not shown).

Declines occurred in several activities. Consistent with decreased participation, time in other passive leisure declined 17% and time spent in household work declined 12%. These declines were primarily due to a decline in participation rather than to a decline in time spent among participants. The 31% decline in time spent in outdoor activities also reflected a decline in participation rather than time spent among participants. In contrast, the 37% decline in time spent in sports reflected both a decline in participation and a decline in time spent among participants. These declines in physical activities occurred in both warm and nonwarm states (not shown). Time spent visiting declined 13%, again due to decline in both participation and time spent.

Because of the declines in several major categories of activities, we expected increases in other activities. We found an increase of 6% in television viewing time, for example. Television viewing time remained constant for 6–8 year olds but increased for 9–12 year olds. Time spent in art activities remained at a low level. Although participation in art activities rose 35% for children aged 6 to 8, there was no overall increase in time spent in art activities for either age group or all children. Time in art activities among those participating remained constant. Sleep time rose by about 2% for all children 6 to 12 years of age.

There were several categories of activities that rose by large percentages. Between 1981 and 1997 the time in religious attendance had been declining (Hofferth and Sandberg, 2001b). Although the overall time spent in attendance at religious services was still low – 1 hour and

<sup>5</sup>To calculate the weekly time for only those participating, divide the time in hours by the percent participating.

44 minutes in 2003 – the time spent rose 25% between 1997 and 2003, reflecting a 23% increase in participation and a 2% increase in time spent among participants. Youth groups also showed an increase. The total time spent in youth groups rose from 44 minutes to about an hour a week between 1997 and 2003. The increase of 36% over the period reflected a 26% increase in participation and a 7% increase in time spent among those participating (not shown). The increased time in religious activities was almost entirely a result of increased participation rather than increased time, whereas increased time in youth groups resulted from both increased participation and increased time spent in it.

### 3.3 Gender differences in activities

Table 3 shows gender differences in time spent in these activities, again including nonparticipants. In 2003, girls spent more time in household work, shopping, personal care, outdoor, and art activities than did boys. Boys spent more time in sports, hobbies, and play. Boys spent more time studying than girls in 1997, but that differential disappeared completely by 2003. Most of the 1997–2003 trends in activity time were similar for both boys and girls. The one exception was sports. The decline in sports was much larger for boys than for girls. Finally, only girls' play time declined from 1997 to 2003; boys' play time stayed the same.

### 3.4 Multivariate analyses of change, 1997 to 2003

This analysis focuses on reading, studying, sports, outdoor time, religious attendance, youth groups, household work, other passive leisure, visiting, outdoor activities, and television viewing. On these variables the descriptive analysis (Tables 1 and 2) suggested that changes in time occurred between 1997 and 2003.<sup>6</sup> The means for all the variables are shown in Table 4. Seventy-two percent of the sample was white, 16% Black, and 13% Hispanic. Forty-three percent of mothers completed at least some college, and 57% completed high school or less. Three-quarters of children lived with two parents and two-thirds had an employed mother. Forty-three percent of children lived in families with 3 or more children. Average family income was 3.4 times the poverty line, about \$47,600 for a family of three in 2003. One-third lived in a so-called “warm” state. The time data are comparable to Table 2, but the hours are in hours and fractions of an hour rather than hours and minutes. The sample size is reduced because of missing data on the independent variables.

**3.4.1 Did real changes in time occur?**—The first question is whether, after controlling for socioeconomic characteristics, state, and season of interview, real changes in children's time between 1997 and 2003 occurred. Examining the variable “year is 2003” in Table 5, we see that time attending religious services and time spent participating in youth organizations were significantly higher in 2003 than in 1997; thus, time in these activities increased over the period. Participation in sports and outdoor activities was significantly lower in 2003 than 1997; participation in these activities declined. Differences between 1997 and 2003 in background variables such as maternal education, family income, type of state and season produced some of the apparent changes we saw previously in the time spent reading, studying, watching television, household work, passive leisure, and visiting. After controlling for background variables, there was no longer a significant difference in time spent in these activities between 1997 and 2003. For example, in this analysis the time spent reading was larger in 2003 than in 1997 by about .65 hours (39 minutes) per week, but the coefficient was not statistically significant.

**3.4.2 Linking children's activities to resources**—Access to resources is measured here by the ratio of family income to poverty and by race/ethnicity. In spite of the common belief

<sup>6</sup>A reduction in time in market work was significant; however, few children 6–12 engaged in market work.

that access to resources affects children's activities, the results show that greater family income to needs levels were directly associated only with the amount of reading time, household work, passive leisure, and television viewing. Children in higher income families were more likely to read for pleasure and spent more time reading than children from lower income families. In addition, children from higher income families spent fewer hours watching television. Finally, children in higher income families did marginally less household work and engaged in marginally more passive leisure. Presumably, financially advantaged children have access to many more valued types of activities that are alternatives to television and the family may pay for help with household work. No link between the ratio of income to needs and sports participation was found. Because reading and television viewing do not require the monetary resources that sports require, the associations between income and reading or television viewing may also reflect attitudes and values linked to economic success. That family income is not strongly predictive of many of children's activities net of education does not mean that income does not influence children's academic success; reading is a key developmental activity.

Race/ethnic differences are linked to resources and to values. Being Black or Hispanic was associated with fewer hours spent playing sports and engaging in outdoor activities. Black children spent significantly more time – about 2 hours per week – watching television than White children. Differences in sports and television viewing could be partially due to differences in resources, and lower time spent in outdoor activities may result from living in more dangerous neighborhoods. Finally, compared to White children, Black children spent about 2 more hours attending religious services, and Black and Hispanic children spent more time studying but less time reading for pleasure. These latter differences are likely to be linked to values rather than to resources.

**3.4.3 Linking activity choices to values—**The amount of education the mother has completed is the factor consistently associated with children's activities net of a variety of controls, corroborating previous work and our theory that time reflects attitudes and values more than access to resources. Greater maternal education, in particular, completing four or more years of college, was associated with children spending more time attending religious services, participating in youth organizations, reading and studying, and engaging in sports and outdoor activities (Table 5). It was also associated with children spending more time in passive leisure activities, being more likely to visit, and helping more around the house. This is possible because they spend less time watching television.

**3.4.4 Other factors related to activity choices—**Living with two parents was related to children's activity time. Children living with two parents spent more time in religious attendance and in youth organizations, and were more likely to read, but they spent less time in sports and outdoor activities than those with one parent. Children of employed mothers spent less time reading and watching television than did children of nonemployed mothers. This makes sense. Such children are more likely to be in day care (not shown); reading and watching television are activities more commonly engaged in at home than out of the home. Younger children spent less time in youth organizations, watching television, studying, in sports, and in outdoor activities than older children. They were more likely to read for pleasure, however. Children in larger families spent more time in household work and were less likely to visit or be in day care.

## 4 Discussion

Over the six-year period between 1997 and 2003 broad social changes occurred in the United States: welfare rules changed, the nation's school policies were overhauled, America was

attacked by terrorists, and American values shifted in a conservative direction. Changes in children's time were consistent with these trends.

Consistent with changed welfare rules that made it necessary for low-income mothers to seek employment, children spent more time in school and day care than they had in 1997. As a result, children experienced a small decline in their discretionary time over the period.

Consistent with the passage of "No Child Left Behind" legislation and the federal government's focus over the period on improving children's academic test scores was the increased time children spent studying. An increase in study time that was stronger for younger (6–8-year old) than older (9–12-year old) children is consistent with increased math test scores for 4th graders but not 8th graders that were documented in the NAEP. However, this trend was not significant after background factors were controlled, suggesting that increased maternal education and other factors such as season of interview explained the increase in studying.

Also consistent with the increased emphasis on reading skills, increases in time spent reading occurred for all children. These increases were, as for studying, larger for younger than for older children. Research shows that reading for pleasure is clearly the best preparation for standardized tests. Therefore, increased reading for pleasure at young ages is a good omen for children's later academic achievement. Again, increased reading was explained by changes in family characteristics; after maternal education, employment, income, and other factors were controlled, reading levels were similar in 1997 and 2003.

Increased conservatism in the United States and a terrorist attack on September 11, 2001 were major changes in the latter part of the 20th and beginning of the 21st century, respectively. A major shift in children's activities over this 6 year period is represented by increased religious attendance and time spent in religious activities. Reversing a previous decline between 1981 and 1997, this change likely reflected the increased threat to American national security, a return to basic values, and a search for meaning. Substantial increases in participation in and time spent in youth groups may reflect parents' desires that their children contribute to the community through volunteer and helping activities (Dunn, Kinney and Hofferth, 2003).

As some activities increased, others declined. Probably the most unexpected was the decline in participation in sports and outdoor activities in 2003 compared with 1997, even after controls for seasonality of interview and climate of state of residence were introduced. The decline in sports may be linked to the increased focus on academics, parental concern about overscheduling as a major topic for concern in the first part of the 21th century (Mahoney, Harris and Eccles, 2006). The decline in outdoor activities may be linked to safety and security concerns. A decline in time spent walking to school has been well-documented (Ham, Martin and Kohl, 2007). Both are relevant to concerns about reduced childhood physical activity and increased overweight over the past decade.

What is the relative importance of family values versus family resources in influencing children's time? Family income per se was less important to children's time than was maternal education. Greater family income to needs was linked to more time spent reading and less time spent watching television, with a marginal increase in passive leisure and a reduction in household work. Maternal education was much more important to children's time, influencing all the activities considered. This does not imply a lack of importance of income to children's outcomes, but does suggest that many of children's activities are not directly dependent upon financial resources. They are dependent upon family values and objectives for their children.

These changes reflect important value shifts at the beginning of the 21st century consistent with events and circumstances in the preceding decade. Changes in study and reading habits,

in sports and outdoor activities, and in participation in religious observance and youth group activities reflect important behavioral and value shifts that will affect lives for years to come.

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Table 1

Percentage of children 6–12 participating in 21 weekly activities, 1997 and 2003, by age

Activities	Age 6–8			Age 9–12			All Ages		
	1997	2003		1997	2003		1997	2003	
N	598	573		850	770		1448	1343	
Market work	2%	0%	**	3%	0%	***	3%	0%	***
Household work	66%	69%		79%	72%	**	73%	71%	
Shopping	49%	47%		46%	46%		47%	46%	
Personal care	100%	100%		100%	100%		100%	100%	
Eating	100%	100%		100%	99%		100%	100%	
Sleeping	100%	100%		100%	100%		100%	100%	
School	90%	93%		91%	90%		91%	91%	
Studying	53%	64%	***	62%	68%	**	58%	66%	***
Religious attendance	26%	34%	**	26%	31%	*	26%	32%	***
Youth groups	26%	33%	**	27%	34%	**	27%	34%	***
Visiting	47%	46%		56%	49%	**	53%	48%	*
Sports	74%	57%	***	77%	62%	***	76%	60%	***
Outdoors	15%	13%		16%	8%	***	16%	10%	***
Hobbies	2%	2%		4%	4%		3%	3%	
Art activities	26%	35%	***	22%	21%		24%	27%	*
Playing	93%	94%		88%	84%	*	90%	88%	
Television	96%	97%		94%	97%	*	95%	97%	*
Reading	42%	54%	***	35%	43%	***	38%	47%	***
Household conversations	32%	27%	*	28%	25%		30%	26%	*
Other passive leisure	46%	38%	**	52%	44%	**	49%	42%	***
Daycare	12%	11%		5%	7%	*	8%	9%	

Note:

\*\*\* statistically significant at the 0.001 level,

\*\*\*  
at the 0.01 level, and

\*  
at the 0.05 level.

Source: Own calculations from the Panel Study of Income Dynamics.

Table 2

Weekly time children 6–12 spent in 21 activities, 1997 and 2003, by age

Activities	Age 6–8			Age 9–12			All Ages		
	1997	2003		1997	2003		1997	2003	
N	598	573		850	770		1448	1343	
Market work	00:05	00:00 **		00:17	00:01 **		00:11	00:00 ***	
Household work	02:25	02:27		03:44	03:05 **		03:11	02:49 *	
Shopping	02:31	02:09		02:15	02:22		02:22	02:17	
Personal care	07:59	08:02		07:51	07:42		07:55	07:50	
Eating	08:18	07:50 *		07:23	07:15		07:46	07:30 *	
Sleeping	70:58	72:49 ***		67:38	69:16 ***		69:03	70:45 ***	
School	31:39	33:05 *		33:35	33:22		32:46	33:15	
Studying	01:58	02:36 ***		03:36	04:20 **		02:55	03:36 ***	
Religious attendance	01:23	01:43		01:23	01:44 *		01:23	01:44 **	
Youth groups	00:37	00:50		00:49	01:09 *		00:44	01:01 **	
Visiting	02:47	02:15		02:40	02:21		02:43	02:19 *	
Sports	05:03	02:46 ***		06:31	04:31 ***		05:54	03:47 ***	
Outdoors	00:31	00:34		00:39	00:18 *		00:36	00:25 *	
Hobbies	00:04	00:02		00:09	00:05		00:07	00:03	
Art activities	00:51	01:05		00:56	00:56		00:54	01:00	
Playing	12:09	11:36		09:00	08:43		10:20	09:56	
Television	12:40	12:36		13:32	14:54 **		13:10	13:56 *	
Reading	01:09	01:31 **		01:13	01:38 **		01:11	01:35 ***	
Household conversations	00:29	00:29		00:26	00:30		00:27	00:30	
Other passive leisure	01:35	01:18		02:18	01:57		02:00	01:40 *	
Daycare	01:35	01:22		00:32	00:44		00:59	01:00	
Not ascertained	01:02	00:44		01:22	00:56 *		01:14	00:51 **	
% of time accounted for	99%	100%		99%	99%		99%	100%	

Note:

\*\*\* statistically significant at the 0.001 level,  
\*\* at the 0.01 level, and  
\* at the 0.05 level.

Source: Own calculations from the Panel Study of Income Dynamics.



**Table 3**  
Weekly time children 6–12 spent in 21 weekly activities, 1997 and 2003, by gender

	Time spent in 1997			Time spent in 2003			Trend in time spent, change 1997–2003		
	Boys	Girls	Gender diff.	Boys	Girls	Gender diff.	Boys	Girls	
N	731	717		688	655				
Market work	00:11	00:12		00:00	00:01		*	**	
Household work	02:44	03:38	***	02:28	03:09	***		*	
Shopping	01:57	02:47	***	02:04	02:28	*			
Personal care	07:17	08:32	***	06:59	08:39	***			
Eating	08:00	07:33	**	07:37	07:23		*		
Sleeping	68:54	69:12		70:37	70:53		***	***	
School	33:05	32:27		33:15	33:15				
Studying	03:08	02:41	*	03:35	03:38		*	***	
Religious attendance	01:24	01:22		01:43	01:44			*	
Youth groups	00:47	00:41		00:54	01:07			**	
Visiting	02:22	02:19	*	03:04	02:19			**	
Sports	07:21	04:25	***	04:29	03:07	***	***	***	
Outdoors	00:30	00:41		00:15	00:34	***	**		
Hobbies	00:04	00:09		00:05	00:02	*		*	
Art activities	00:29	01:20	***	00:45	01:14	***	**		
Playing	11:12	09:27	***	11:33	08:23	***		*	
Television	13:06	13:14		14:13	13:41		*		
Reading	01:04	01:18		01:27	01:43		**	**	
Household conversations	00:27	00:27		00:26	00:33				
Other passive leisure	01:53	02:07		01:36	01:44		**	*	
Daycare	00:54	01:04		00:54	01:06				
Not Ascertained (NA)	01:01	00:35	*	01:27	01:07	*	**		
% of time accounted for	99%	99%		100%	99%				

Note:

\*\*\* statistically significant at the 0.001 level,

\*\* at the 0.01 level, and

\*  
at the 0.05 level.

Source: Own calculations from the Panel Study of Income Dynamics.

**Table 4**

Means and standard deviations of variables

Variable	Pooled sample Total 1997 & 2003	
	Mean	SD
<b>Background:</b>		
White and other	0.72	0.45
Black	0.15	0.36
Hispanic	0.13	0.33
Male	0.49	0.50
Age is 6–8 or actual age	0.41	0.49
Mother completed high school or less	0.56	0.50
Mother completed some college	0.22	0.42
Mother completed college or more	0.22	0.41
Mother is employed	0.67	0.47
Two parents (vs. one parent)	0.77	0.42
Three or more children	0.42	0.49
Family income to poverty ratio	3.40	3.82
Lives in warm state	0.31	0.46
Interview conducted in fall	0.27	0.44
Interview conducted in winter	0.32	0.47
Interview conducted in spring	0.41	0.49
Year is 2003	0.47	0.50
<b>Weekly time (fractions of an hour):</b>		
Reading	1.36	2.46
Studying	3.31	4.27
Sports	4.93	6.53
Religious attendance	1.55	3.19
Youth organizations	0.89	2.64
TV hours	13.50	9.98
Household work	3.06	4.11
Passive leisure	1.88	3.47
Eating	7.67	3.32
Visiting	2.57	5.01
Outdoor hours	0.54	2.55
Day care	1.06	4.30
N	2,564	

Note: All data are weighted.

Source: Own calculations from the Panel Study of Income Dynamics.

Table 5

Regression coefficients for effects of background on whether participated and weekly hours in selected activities

Variable	Reading		Studying		Sports		Religious attendance		Youth Organization		Household work		Passive Leisure		Visiting		Outdoors		Television	
	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours
Background:																				
Black	-0,73 ***	-1,58 ***	0,44 *	1,17 *	-0,70 ***	-2,54 ***	0,35 +	1,91 *	0,17	0,30	-0,38 *	-1,54 ***	-0,53 **	-1,51 **	-0,24	0,13	-0,70 ***	-2,54 ***	1,89 *	
Hispanic	-0,63 *	-1,51 *	0,54 **	1,78 **	-0,60 *	-2,28 *	-0,07	-1,26	-0,03	-0,09	-0,21	-0,31	-0,20	-0,73	-0,29	-0,34	-0,60 *	-2,28 *	1,40	
Male	-0,21 +	-0,56 *	0,15	0,42	0,31 *	2,58 ***	0,00	0,20	-0,02	-0,02	-0,35 **	-1,21 ***	-0,13	-0,35	-0,18 +	-0,89 +	0,31 *	2,58 ***	0,10	
Age is 6 to 8	0,42 ***	0,29	-0,36 ***	-2,40 ***	-0,18	-1,90 ***	0,07	0,20	-0,06	-0,62 +	-0,46 ***	-1,39 ***	-0,25 *	-1,22 ***	-0,29 **	-0,54	-0,18	-1,90 ***	-1,45 **	
Mother completed some college	0,13	0,29	0,24	0,62	0,13	0,61	0,44 *	1,73 *	0,47 **	1,76 **	0,30 +	0,73 +	0,21	0,61	0,18	0,84	0,13	0,61	-2,96 ***	
Mother completed college or more	0,62 ***	1,46 ***	0,37 *	1,16 *	0,29	1,77 **	0,48 **	1,81 *	0,57 ***	2,21 ***	0,40 *	0,16	0,36 *	1,84 ***	0,41 *	1,13 +	0,29	1,77 **	-3,37 ***	
Mother is employed	-0,37 **	-0,79 **	0,18	0,60	0,18	0,54	-0,20	-0,79	-0,20	-0,51	-0,04	-0,31	0,06	0,15	-0,17	-0,54	0,18	0,54	-1,15 +	
Two parents (vs. one parent)	0,34 *	0,58	-0,16	-0,41	-0,35 +	-1,23 +	0,74 ***	3,05 ***	0,63 **	1,46 *	0,25	-0,12	0,02	0,23	0,08	0,24	-0,35 +	-1,23 +	-0,26	
Three or more children	0,11	0,15	-0,06	-0,32	-0,01	-0,07	0,11	0,59	0,14	0,00	0,05	0,66 *	0,02	0,20	-0,24 *	-0,87	-0,01	-0,07	-0,67	
Family income to poverty ratio	0,03 *	0,07 *	0,01	0,06	0,04	0,07	-0,01	-0,05	0,00	-0,02	-0,02 +	-0,05 +	0,03	0,09 +		0,05	0,04	0,07	-0,16 **	
Lives in warm state	-0,11	-0,23	0,01	0,36	0,35 *	1,52 *	-0,14	0,18	-0,21	-0,37	-0,36 *	-0,97 **	-0,26 +	0,36	-0,21	-0,58	0,35 *	1,52 *	-0,39	
Interview conducted in fall	0,09	0,11	0,03	0,02	-0,11	0,24	0,26	1,46 +	0,27	1,04 +	0,15	0,37	0,32 +	0,71	0,29 +	1,30 +	-0,11	0,24	-1,74 *	
Interview conducted in spring	0,00	-0,10	-0,53 *	-2,08 **	0,41 +	2,83 *	0,13	1,06	0,23	0,87	0,12	0,61	0,40 *	0,93	0,19	1,42 +	0,41 +	2,83 *	-0,14	
Year is 2003	0,28	0,65	0,05	0,01	-0,49 *	-1,09	0,40 +	2,05 *	0,53 **	1,81 **	-0,08	-0,2	-0,05	-0,33	-0,1	-0,13	-0,49 *	-1,09	0,43	

Variable	Reading		Studying		Sports		Religious attendance		Youth Organization		Household work		Passive Leisure		Visiting		Outdoors		Television	
	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours	Logit Whether	Tobit Hours
Constant	-0,40 +	-0,66	0,53 *	2,16 ***	0,36	0,82	-1,50 ***	-7,15 ***	-1,31	-4,40 ***	1,18 ***	3,39 ***	-0,37 +	-1,77 *	0,15	-1,02	0,36	0,82	17,66 ***	***

Note:

\*\*\* statistically significant at the 0.001 level,

\*\* at the 0.01 level,

\* at the 0.05 level, and

+ at the 0.1 level.

Source: Own calculations from the Panel Study of Income Dynamics.



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### Original Article

# Children's Risky Play from an Evolutionary Perspective: The Anti-Phobic Effects of Thrilling Experiences

Ellen Beate Hansen Sandseter, Department of Physical Education, Queen Maud University College of Early Childhood Education (DMMH), Trondheim, Norway. E-mail: [ebs@dmmh.no](mailto:ebs@dmmh.no) (Corresponding author).<sup>1</sup>

Leif Edward Ottesen Kennair, Department of Psychology, Norwegian University of Science and Technology (NTNU), Trondheim, Norway.

**Abstract:** This theoretical article views children's risky play from an evolutionary perspective, addressing specific evolutionary functions and especially the anti-phobic effects of risky play. According to the non-associative theory, a contemporary approach to the etiology of anxiety, children develop fears of certain stimuli (e.g., heights and strangers) that protect them from situations they are not mature enough to cope with, naturally through infancy. Risky play is a set of motivated behaviors that both provide the child with an exhilarating positive emotion and expose the child to the stimuli they previously have feared. As the child's coping skills improve, these situations and stimuli may be mastered and no longer be feared. Thus fear caused by maturational and age relevant natural inhibition is reduced as the child experiences a motivating thrilling activation, while learning to master age adequate challenges. It is concluded that risky play may have evolved due to this anti-phobic effect in normal child development, and it is suggested that we may observe an increased neuroticism or psychopathology in society if children are hindered from partaking in age adequate risky play.

**Keywords:** anxiety, fear, development, risky play, etiology

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## Introduction

The purpose of this article is to explore and understand the functions of risky play from a modular evolutionary psychology perspective (Buss, 2004; Cosmides and Tooby, 1987, 1994; Kennair, 2002; Pinker, 1997). This modular perspective anticipates that

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<sup>1</sup> Note: The authors contributed equally to this article.

different types of risky play might be due to specific adaptations or evolved mental mechanisms – and thereby have specific evolutionary functions. Individual differences in risk-taking among children (see, e.g., Morrongiello and Lasenby-Lessard, 2006; Morrongiello and Matheis, 2004, 2007; Morrongiello and Sedore, 2005) are not the issue of this article. Rather, this article focuses on human universals in children's way of exploring challenges in their play environment. Risky play will therefore be considered as part of children's normal development. This suggests that disturbances in the species' anticipated stimulation (i.e., the lack of risky play) may be part of the etiology of psychopathology. Specifically, fear of real dangers as an evolutionary adapted non-associative process (Poulton and Menzies, 2002b) will be suggested as part of normal development. Risky play, we will argue, is a part of the normal process that adapts the child to its current environment through first developing normal adaptive fear to initially protect the child against ecological risk factors, and thereafter risky play as a fear reducing behavior where the child naturally performs exposure behavior (Allen and Rapee, 2005). This may be framed more cognitively: The child is motivated to conduct behavioral experiments investigating their environment – with a reduction of safety behavior (Wells, 1997). Both of these formulations mirror effective modern anxiety treatment (Allen and Rapee, 2005; Wells, 1997). We will also address the evolutionary psychopathology perspective of mismatch (Nesse and Williams, 1995); i.e., where the modern environment does not adequately stimulate evolved mental mechanisms (e.g., Kennair, 2003, 2007, 2011). If the child does not receive the adequate stimulation by the environment through risky play, the fear will continue despite no longer being relevant (due to features of the ecology no longer constituting a risk, and the child's improved competencies due to physical and psychological maturation) and may turn into an anxiety disorder: fear responses toward imagined or exaggerated threats and dangers that reduce the individual's ability to function despite the individual having developed the abilities to handle these situations. This article dovetails with recent contributions to the field by Pellegrini, Dupuis and Smith (2007). While they consider safe skill acquisition while in an immature state in general, we consider specifically how anxiety demotivates children from partaking in too risky behaviors, while at the same time through thrilling play experiences motivates children to continuously challenge themselves and develop age relevant skill sets as they mature.

### **Children's Risky Play, Injuries and Hazards**

Risky play is thrilling and exciting forms of play that involve a risk of physical injury. Risky play primarily takes place outdoors, often as challenging and adventurous physical activities, children attempting something they have never done before, skirting the borderline of the feeling of being out of control (often because of height or speed) and overcoming fear (Sandseter, 2009; Stephenson, 2003). Rather than the avoidance inducing emotion of fear, a more thrilling emotion is experienced. Most of the time risky play occurs in children's free play as opposed to play organized by adults (Sandseter, 2007a,c).

In modern western society there is a growing focus on the safety of children in all areas, including situations involving playing. An exaggerated safety focus of children's play is problematic because while on the one hand children should avoid injuries, on the

other hand they might need challenges and varied stimulation to develop normally, both physically and mentally (Ball, 1995, 2002, 2004; Chalmers, 2003; Freeman, 1995; Heseltine, 1995; Little, 2006; Satomi and Morris, 1996; Sawyers, 1994; Smith, 1998; Stephenson, 2003; Stutz, 1995). Children test possibilities and boundaries for action within their environment through play, most often without being aware that this is what they are doing. Apter (2007) outlines the importance in which this may aid survival when, later in life, watchful adults are no longer present. The rehearsal of handling real-life risky situations through risky play is thus an important issue. Paradoxically, we posit that our fear of children being harmed by mostly harmless injuries may result in more fearful children and increased levels of psychopathology.

Statistics of playground accidents from several countries show that most of the injuries related to children's play are species normal and less severe – injuries that children throughout evolutionary history have experienced without suffering any permanent harm, such as bruises, contusions, concussions and fractures – as results from falls or hits from swings, slides, climbing frames or other equipment (Ball, 2002; Bienefeld, Pickett, and Carr, 1996; Illingworth, Brennan, Jay, Al-Ravi, and Collick, 1975; Mack, Hudson, and Thompson, 1997; Phelan, Khoury, Kalkwarf, and Lamphear, 2001; Sawyers, 1994; Swartz, 1992), while the fatal playground injuries that result in death or severe invalidity are very rare (Ball, 2002; Bienefeld et al., 1996; Chalmers, 2003; Chalmers et al., 1996; Phelan et al., 2001). Thus the injuries themselves rarely constitute trauma that might influence normal development. While such may occur, and some children are more prone to such serious accidents and it is important to identify and prevent these children from harming themselves our focus in this article is, as mentioned, on normal children and development.

Further reviews on children's accidents on playgrounds have found that the most common risk factors are not the characteristics of the equipment, but rather the children's behavior and normal rashness, such as walking or turning summersaults on top of a climbing frame, standing (or even standing on the shoulder of others) on the swing, or pushing others off a slide or a swing (Ball, 2002; Coppens and Gentry, 1991; Illingworth et al., 1975; Ordoñana, Caspi, and Moffitt, 2008; Rosen and Peterson, 1990). No matter how safe the equipment, the children's need for excitement seems to make them use it dangerously.

Research has indicated a relationship between a child's willingness to take risks and their injury proneness (Matheny, 1987; Morrongiello, Ondejko, and Littlejohn, 2004; Potts, Martinez, and Dedmon, 1995). Studies identify a certain group of children who are high risk takers (e.g., high on Extraversion and low on Inhibitory Control) and tend to overestimate their physical ability (Miller and Byrnes, 1997; Plumert, 1995; Plumert and Schwebel, 1997; Schwebel and Plumert, 1999), although the relationship between such overestimation and injury is somewhat inconsistent between studies (Plumert, 1995; Schwebel and Plumert, 1999). Studies have further found that a relatively small proportion of children tend to account for a large proportion of injuries, and that externalizing behavioral problems such as aggression, over-/hyperactivity (ADHD) and opposition towards parents seem to be important predictors for injuries in this group (Cataldo, Finney, Richman, and Riley, 1992; Jaquess and Finney, 1994; Jokela, Power, and Kivimaki, 2009; Ordoñana, Caspi, and Moffitt, 2008; Spinks, Nagle, Macpherson, Bain, and McClure,

2008; Wazana, 1997).

Research showing that overestimation of one's own ability is higher among 6 year olds than among 8 year olds who seem to have developed a better ability to make accurate judgments about risk situations. This suggests that children learn to judge risks through experience with risky situations and by developing the cognitive skills necessary to make more accurate judgments (Plumert, 1995; Plumert and Schwebel, 1997). Also, greater amounts of direct experience with a risky situation itself is found to be associated with lower risk appraisals in the situation (DiLillo, Potts, and Himes, 1998), probably partly because experience leads to the ability to manage the risk (Adams, 2001) and develop a more sound sense of the actual risk in the situation (Ball, 2002; Plumert, 1995). Other studies have found that younger children (2<sup>nd</sup> graders) anticipated greater injury severity and more fear than older children (4<sup>th</sup> graders and 6<sup>th</sup> graders) in open-ended high-risk situations (Peterson, Gillies, Cook, Schick, and Little, 1994). Similar results were found among 6-10 year old children (Hillier and Morrongiello, 1998). Peterson et al. (1994) suggest that this may be explained by children becoming desensitized to the possibility of injuries by repeatedly experiencing near injury or minor injuries, while another explanation may be that they become better at both assessing and managing the risk (Adams, 2001; Ball, 2002; Plumert, 1995) – and, we claim, reduce their fear of these situations simultaneously. Investigating risk taking along the continuum from young child to adolescence, Boyers' (2006) extensive review of research on the development of risk taking showed that risk taking is likely to increase with age because of both child characteristics (e.g., cognitive development, emotional regulation and psychobiological development) and social characteristics (e.g., parents, peers, environment).

With age, play will change in quality – e.g., roughhousing turns more into real fights where the thrill of playing often will be replaced with more aggression and the activity seems to be more focused on establishing more adult-like hierarchies (Pellegrini and Long, 2003; Smith, 2005). Further, for adolescent and young adult males the Young Male Syndrome (Wilson and Daly, 1985) kicks in – and one assumes that, due to sexual selection (both intra-sexual selection, competing with other males, and inter-sexual selection, attempting to catch the attention of females), males of these ages take hazardous risks, resulting in hypophobia (Kennair, 2007; Marks and Nesse, 1994) and increased mortality (Kruger and Nesse, 2004).

Research on children's risk perception and injury proneness overall show that this is a complex issue where several factors (e.g., developmental, personality, emotional, social, environmental, parental) contribute to explain why childhood injuries occur (Cataldo et al., 1992; Dal Santo, Goodman, Glik, and Jackson, 2004; DiLillo et al., 1998; Morrongiello et al., 2004; Ordoñana et al., 2008; van Aken, Junger, Verhoeven, van Aken, and Deković, 2006; Wazana, 1997). It seems that both child characteristics and environmental characteristics must be considered when studying child injuries, and that one also has to take into consideration the child's age in terms of differences in parenting characteristics as the child grows older (e.g., child characteristics becoming more influential as the parents supervision eases off) (Matheny, 1987; Ordoñana et al., 2008; van Aken et al., 2006).

Still, most of the studies mentioned do not distinguish between minor and severe injuries but rather treat all injuries, mostly reported through parents' self-report measures,

as one. The most common way to distinguish minor and severe injuries in these studies (in the few cases this is done) is to categorize injuries that need medical treatment as severe/serious injuries, while home-treated injuries are minor injuries. Due to this a lot of non-severe injuries (even medically treated) that will heal well and have no further impact on the child's life are counted as severe. In this article, a starting point of our approach is that minor injuries are a natural part of children's activity and development and should therefore not be regulated out of children's everyday lives (Wyver et al., 2010). We believe that it is the severe and lethal accidents that should be avoided.

This leads to the important issue of distinguishing between risks and hazards when discussing risks that children can face through their activities (Little, 2010). The term risk-taking is usually interpreted negatively, seeing risk and hazard as synonymous (Lupton and Tulloch, 2002). For instance, within the developmental psychology literature, risk-taking is usually defined as the engagement in behaviors that are associated with some probability of negative outcomes (Boyer, 2006). However, most people meet situations that involve some element of risk throughout their everyday lives. We need, through experience and learning, to be prepared to meet these risks and to manage them. In this view, risk can be defined not necessarily as just negative, but as situations in which we are required to make choices among alternate courses of action where the outcome is unknown (Little, 2010). This means that risk is not necessarily a danger that needs to be avoided but rather something that needs to be managed (Ball, Gill, and Spiegel, 2008). Greenfield (2003) argues that a distinction should be drawn between hazard being something the child does not see, and risk being uncertainty of outcome and requiring a child's choice whether to take the risk or not. Adults should therefore try to eliminate hazards that children cannot see or manage without removing all risks, so that children are able to meet challenges and choose to take risks in relatively safe play settings. This means finding the balance between those risks that foster learning and the hazards that can result in serious injury (Little, 2010).

In this article the focus is, as mentioned, on normal children, and not on injury prone children or children with pathological proneness to injuries, nor the extremely shy and introverted children who actively avoid all risks, negative emotions, social situations and challenges. We also take a positive approach to risk, distinguishing between hazards as negative and risks as positive and thrilling challenges (Little, 2010) that will improve children's risk management and risk perception (Adams, 2001; Ball, 2002; Sandseter, 2010).

It seems that a large proportion of normal children have an urge to explore their environment and to engage in risky forms of play where they can rehearse fighting skills, and test their physical strength and courage, even though it involves the possibility of getting hurt for real (Ball, 2002; Buss, 1997; Pellegrini and Smith, 1998; Smith, 1998; Stephenson, 2003). Could this be due to our evolved psychology? And in that case what is the adaptive effect of seeking risky situations (albeit as noted, these situations are more thrilling than really dangerous)?

## **The Etiology of Anxiety and Phobias**

Until recently, most have believed that anxiety disorders were acquired due to



negative experiences with different stimuli (e.g., Rachman, 1977), i.e., combinations of classical and operant conditioning (as in Mowrer's two-factor theory) and social cognitive learning theory. This has been challenged by different studies by Poulton and colleagues. Poulton and Menzies (2002a, 2002b) suggest that anxiety appears as a normal part of the child's maturation, and that anxiety vanishes again due to a natural interaction with the anxious stimulus as part of normal development. They argue for a non-associative theory of phobias and fear acquisition, suggesting that liability to fears and phobias are innate and evolutionarily arisen, as opposed to the conditioning perspective of phobias being elicited by experience and learning. This theory has strong support in research of several fears and phobias (e.g., heights, water, separation; Poulton, Davies, Menzies, Langley, and Silva, 1998; Poulton, Menzies, Craske, Langley, and Silva, 1999; Poulton, Milne, Craske, and Menzies, 2001; Poulton, Waldie, Craske, Menzies, and McGee, 2000; Poulton, Waldie, Menzies, Craske, and Silva, 2001). Kendler, Myers and Prescott (2002) similarly found no support for the stress-diathesis model for phobias in a sample of twins. Rather, Kendler et al. interpret their findings as strong support of the non-associative theory of phobias and fear acquisition. Thus a contemporary approach to the etiology of anxiety disorders considers that they are due in large part to an interplay between genes and environment, and that they appear at a developmentally relevant age. Normal interaction with the relevant environment may thereafter reduce anxiety. We suggest that normal interaction to a large degree consists of risky play – which combines positive and activating emotions (e.g., thrilling sensations) with both a motivation to seek exposure and safety behavior reduction. Similarly, exposure therapy of anxiety patients attempts to create clinical settings that simulate this natural anti-phobic behavior in order to habituate, but more importantly provide the patient with a sense of coping. This also highlights what may be the result of not having the opportunity to engage in risky play: The child may not experience that he or she naturally can cope with the fear-inducing situations. And despite having matured mentally and physically enough to master the previously dangerous situations, one may continue to be anxious. Continued anxiety hijacks the adaptive function of fear and causes non-adaptive avoidance of situations that *were* but no longer *are* dangerous for the individual due to maturation and increased skills.

### **Children's Play in an Evolutionary Context**

According to Pinker (1995) one of human children's evolved mental mechanisms is the module to face danger, "including the emotions of fear and caution, phobias for stimuli such as heights, confinement, risky social encounters, and venomous and predatory animals, and a motive to learn the circumstances in which each is harmless" (p. 420).

While evolutionists in general have been accused of being biased, from a developmental perspective, to focus on sexually reproductively mature adults – due to the ultimate importance of reproduction to the process of evolution – evolutionary developmental psychologists need to consider the age and context-specific evolutionary mechanisms behind development (Bjorklund and Ellis, 2005; Bjorklund and Pellegrini, 2000; Blasi and Bjorklund, 2003). Children need to survive in order to reproduce. They also have to develop to be able to reproduce. In order to do this they need to solve age

specific adaptive tasks. There are therefore predictable mental adaptations associated with childhood. These adaptations will increase the likelihood of solving survival tasks and tasks involving getting the necessary developmental stimulation, such as the sucking reflex in mammals (Bjorklund and Pellegrini, 2000), imitations and facial gestures by the infant as facilitating mother – infant social interaction and communication (Bjorklund, 1987; Bjorklund and Pellegrini, 2000), infants typical high pitched crying combined with gasping as an evolved mechanism to receive attention and care from their parents (Thompson, Dessureau, and Olson, 1998; Thompson, Olson, and Dessureau, 1996) and evolved psychological mechanisms that enable children to learn language (easier than in older age) in order to communicate effectively (Pinker, 1995).

Bekoff and Byers (1981) state that play in general would have been eliminated, or never would have evolved, unless it had beneficial results (functions) that outweighed its disadvantages (costs). The ontogenetic adaptive function of play is that children may learn skills that are important for adulthood (Bjorklund and Pellegrini, 2000, 2002; Pellegrini and Bjorklund, 2004; Pellegrini and Smith, 1998). Still, some of the presumably adaptive characteristics of infancy and childhood are not adaptations for later adulthood, but rather have been selected to adapt individuals to their current environment. Play might therefore be a specific adaptation relevant primarily to childhood (Pellegrini and Bjorklund, 2004; Pellegrini and Smith, 1998) with both deferred and immediate benefits (Bekoff and Byers, 1981; Pellegrini and Bjorklund, 2004; Pellegrini and Smith, 1998). According to Bjorklund and Pellegrini (2000), this view is consistent with the perspective that the functional pressure of natural selection also exists during childhood.

According to Bruner (1976), play provides a less risky situation than “real life,” thus minimizing the consequences of one’s actions. Aldis (1975) and Smith (2005) argue that play for practice initially evolved from immature agonistic behavior such as play fighting and pursuit-and-flight behavior, which had selective advantages for survival because individuals engaging in this play were more trained in survival behavior than were those without such practice. Similarly, Sutton-Smith (1997) discusses that play in an evolutionary selective model creates uncertainties and risks that children rehearse when managing both fictive and real play situations.

## **Risky Play and Hypophobia**

Two opposing approaches to explaining risky play behavior would be a general immaturity in considering dangers, or that the risk-taking behavior itself is sought out especially and the risk is compensated by the stimulation it provides. The low level of actual harm – both in rough and tumble play and general risky play – suggests that the immaturity explanation is not convincing. Rather, risky play seems to involve a certain degree of *hypophobia* (Marks and Nesse, 1994) or a suspended fear of being hurt in potentially harmful situations. Many phenomena in the modern ecology are real hazards – the large amounts of sugar, fat and salt, driving, unprotected intercourse, guns, medication, razorblades, etc. are dangerous items that do not naturally elicit fear reactions; few people consider the risk of driving along the highway. On the other hand, the very common phobias include fear of heights, water, the dark, and animals such as spiders, snakes,

rodents and birds. This suggests that hypophobia may be due to a *mismatch* between our species' ancestral environment (i.e., the environment our species evolved to be adapted to) and the modern environment (Nesse and Williams, 1995). If one calculated the risk of the modern phenomena versus the more evolutionary relevant stimuli one will soon see that we are hypophobic of real risks, and hyperphobic of non-hazardous risks. Most cases of risky behavior would elicit fear, which would reduce risky behavior. Therefore, the lack of adaptive fear in risky play warrants an explanation – preferably an evolutionary explanation, as risky play provides an evolutionary paradox. Both the evolution and the development of fear and anxiety (Kennair, 2007; Marks and Nesse, 1994) may therefore be relevant to an understanding of risky play.

Mental development might also influence the assessment of risk. Parenthood, or just being in a caretaker or caregiver role, may increase adaptive worry in order to keep children safe. Findings that, e.g., children are more at risk from injury through accidents when fathers rather than mothers are involved in taking care of them suggests that maybe mothers have specific care giving mechanisms involving adaptive worry (Schwebel and Brezaussek, 2004). Regarding risk perception, it is also of interest to consider how more impulsive children with ADHD seem to be more hypophobic of dangerous situations than children in general (Barkley, 2001; DiScala, Lescossier, Barthel, and Li, 1998; Gayton, Bailey, Wagner, and Hardesty, 1986; Swensen et al., 2004), as well as the findings that children with a highly active and risk taking temperament engage in more risk taking behavior and thus experience more unintentional injuries (Matheny, 1987; Plumert and Schwebel, 1997; Potts, Martinez, and Dedmon, 1995; Schwebel, Brezaussek, and Belsky, 2006; Schwebel and Plumert, 1999). However, one needs to differentiate between disturbed risk taking behavior and normal risky play.

It is therefore important to understand that our evolved psychology perceives risk differently than an objective assessment of statistical risk. What is perceived as risky might not necessarily be risky, while what actually is risky might not be perceived as risky. In normal, evolutionarily relevant situations one may expect that the real risk is relatively accurately calculated. Despite parents or younger children being anxious, the maturing child may alter their perception of the risk of specific stimuli. Thus the fact that children seem less fearful of typically fear-eliciting stimuli when engaged in risky play, and that the risk seems to be manageable for them (i.e., injuries are rarely serious), suggests that a fear modulating mechanism may be activated in this specific context. We believe this modulating mechanism provides the child with emotions that motivate approach and investigation, i.e., the thrilling emotions involved in risky play (rather than fear that motivates avoidance and safety behavior).

### **Possible Functions of Six Categories of Risky Play**

Our hypothesis in this article is that the child, through play, reduces anxiety of situations that used to be dangerous when the child was younger.

A study aiming to categorize risky play through observations and interviews of children and staff in preschool suggested six categories of risky play (Sandseter, 2007a) that were recently confirmed by additional video observations and interviews (Sandseter,

2007b). The emerging categories are described in Table 1.

**Table 1.** Categories and subcategories of risky play (revised from Sandseter, 2007a, 2007b)

Categories	Risk	Sub-categories
Great heights	Danger of injury from falling	Climbing Jumping from still or flexible surfaces Balancing on high objects Hanging/swinging at great heights
High speed	Uncontrolled speed and pace that can lead to collision with something (or someone)	Swinging at high speed Sliding and sledging at high speed Running uncontrollably at high speed Bicycling at high speed Skating and skiing at high speed
Dangerous tools	Can lead to injuries and wounds	Cutting tools: Knives, saws, axes Strangling tools: Ropes, etc.
Dangerous elements	Where children can fall into or from something	Cliffs Deep water or icy water Fire pits
Rough-and-tumble	Where the children can harm each other	Wrestling Fencing with sticks, etc. Play fighting
Disappear/get lost	Where the children can disappear from the supervision of adults, get lost alone	Go exploring alone Playing alone in unfamiliar environments

These categories support previous research on children's play in general and risk-taking play in particular (Aldis, 1975; Blurton Jones, 1976; Humphreys and Smith, 1984; Kaarby, 2004; Smith, 1998; Stephenson, 2003).

Using a modular perspective based on Sandseter's (2007a, 2007b) six categories, each type of risky play will be considered separately. Sandseter's (2007a) interviews revealed that some of the categories were perceived risky by both children and staff (great heights, high speed and rough-and-tumble play), while others were unanimously perceived risky only by the staff (dangerous tools and dangerous elements), and still others were perceived risky only by the children (danger of disappearing/getting lost). This is in accord with the concepts of mismatch (Nesse and Williams, 1995) and hypophobia (Marks and Nesse, 1994) as previously mentioned. The relative stability of our evolved psychology and the rapid progress of socio-cultural development have led to the fact that not all dangerous items or situations elicit fear or anxiety reactions (Kennair, 2007). In addition the perception of what is risky or not may be due to individual genetic differences and environments (Kendler et al., 2002) as well as experience and habituation (Poulton and Menzies, 2002a, 2002b). In the following, the categories of risky play perceived as risky and thrilling by the children will be addressed first, followed by the categories perceived as

risky only by the staff (in this sense, caregivers). Each of the categories will be discussed in relation to *possible functions* and *anti-phobic effects*.

### *Play with great heights*

The most frequent form of risky play in great heights is climbing. Children climb on all climbable features, such as trees, playground climbers, big rocks, steep slopes, hillsides, etc. Jumping down from high places, incidents of hanging or dangling from heights and balancing close to drops are also common kinds of play with great heights (Sandseter, 2007a, 2007b).

*Possible functions.* Benefits of this kind of play may be to get to know ones ecology, exploring the environment (Bjorklund and Pellegrini, 2002) and practicing and enhancing different motor/physical skills for developing muscle strength, endurance, skeletal quality, etc. (Bekoff and Byers, 1981; Bjorklund and Pellegrini, 2000; Byers and Walker, 1995; Humphreys and Smith, 1987; Pellegrini and Smith, 1998). All physical practice and training might be relevant for the developing child. Play in great heights also involves training on perceptual competencies such as depth-, form-, shape-, size-, and movement perception (Rakison, 2005), and general spatial-orientation abilities (Bjorklund and Pellegrini, 2002). These are important skills both for survival in childhood (i.e., immediate benefits) and for handling important adaptive tasks in adulthood (i.e., deferred benefits).

Although not describing in detail the behavior patterns of the play, many ethnographic studies provide evidence for locomotor play such as chasing, running, climbing, jumping down, sliding, swinging and different forms of acrobatics in a wide range of hunting-and-gathering and agricultural village cultures throughout the world (see, e.g., Gosso, Ota, Morais, Ribeiro, and Bussab, 2005; Power, 2000; Smith, 1982, 2005). Further strengthening the evolutionary explanation, locomotor play similar to human locomotor play is also found among non-human mammals (e.g., primates, carnivores) and some kinds of birds (Aldis, 1975; Power, 2000; Smith, 1982). Aldis (1975) also shows that an important aspect of this kind of play in both animal and human groups is seeking out thrills and slightly fearful situations related to height, speed, daring movements and unpredictable outcomes of the play.

*Anti-phobic effect.* According to Poulton and Menzies (2002a, 2002b) one might expect the fear of heights to develop naturally. Contrary to earlier theories claiming that fear of heights was due to serious accidents, Poulton et al. (1998) found that children sustaining injury due to falls both before age 5 and between ages 5 and 9 did not have a greater frequency of fear of heights at age 11 and height fear and phobia at age 18. Interestingly, injurious falls from heights between ages 5 and 9 were associated with the absence of height fear at age 18, thus indicating an opposite direction than that predicted by conditioning, and providing strong support of a non-associative theory of fear acquisition in the development of a fear of heights (Poulton et al., 1998). Those who have fear of heights at low age usually avoid heights, while those who have a low level of fear of heights are more likely to engage in risky behavior near heights, thus experiencing more serious falls. Risky play with great heights will provide a desensitizing or habituating experience and maturationally adequate mastery providing cognitive restructuring. This will result in less

fear of heights later in life.

*Play with high speed*

Swinging with high speed, riding a bike at high speed, running at high and uncontrolled speed, or sliding down slides, hills, cliffs, etc. are common forms of this category of risky play. Sandseter (2007a, 2007b) discovered that children often increased the risk of swinging by standing on the swing, swinging several children together or in other challenging ways, or in sliding down snowy slopes by throwing themselves on their stomachs head first, backwards, or several children in a row, etc.

*Possible functions.* The most obvious evolutionary function of play in high speed is the enhancement of perception – particularly depth – and movement perception, but also the perception of size and shape (Rakison, 2005). Another obvious benefit of high speed activities such as swinging and sliding is training on spatial-orientation abilities (Bjorklund and Pellegrini, 2002). Also, the more general physical and motor stimulation of play where children move around running, bicycling, walking up and sliding down hills or slides, enhances their physical fitness and motor competence (Bekoff and Byers, 1981; Bjorklund and Pellegrini, 2000; Byers and Walker, 1995; Pellegrini and Smith, 1998).

The aforementioned documentation on locomotive play such as chasing, running, sliding and swinging found both in different human cultures across the world as well as in non-human mammals (see, e.g., Gosso et al., 2005; Power, 2000; Smith, 1982; Smith, 2005) applies to the evolutionary argument of the function of play with high speed.

*Anti-phobic effect.* This kind of play might be motivated by mechanisms that were necessary for our tree-dwelling ancestors to be motivated to swing from tree to tree. The result of this behavior may be a greater chance of falling and hurting oneself, but at the same time the behavior will decrease the chance of developing anxiety of heights and also fear of emotional activation in general.

High speed was not a typical part of our hominin ancestors' ecology. There are therefore no obvious hominin adaptations for high speed. Thus it seems more likely to be more archaic or due to by-products of perceptual systems. Still, the anti-phobic effects of feeling the thrill and excitement, as well as associating physiological activation with positive experiences and emotions, ought to be assessed in further research.

*Rough-and-tumble play*

Typical activities in this category of risky play are fighting, fencing with sticks/branches, play wrestling and chasing (Blurton Jones, 1976; Humphreys and Smith, 1984; Sandseter, 2007a, 2007b; Smith, 2005).

*Possible functions.* Rough-and-tumble play is the most common form of play in non-human mammals (Aldis, 1975; Bekoff and Byers, 1981; Fry, 2005; Power, 2000; Smith, 1982), and it is also found, not only in Western industrialized cultures, but in a wide range of other cultures such as hunting-and-gathering and agricultural village cultures all over the world (see, e.g., Fry, 2005; Gosso et al., 2005; Power, 2000; Smith, 2005). Research on rough-and-tumble play in both animals (e.g., primates, carnivores) and humans have also found that males engage more in play-fighting than females (Aldis, 1975; Bjorklund and Pellegrini, 2002; Power, 2000; Smith, 1982; Smith, 2005) and that the

roughness in the play seems to increase with age (Power, 2000). The findings that rough-and-tumble play such as play-fighting is common across cultures and animals similar to humans support the suggestion that this kind of play is a result of an evolutionary adaptive process.

Rough-and-tumble play involves great physical and motor stimulation, and the functions, both deferred and immediate, of physical training through play activities is addressed above. Another possible immediate function of rough-and-tumble play is to enhance complex social competences such as affiliation with peers, social signaling, good managing and dominance skills within the peer group, bargaining, manipulating and redefining situations (Flinn and Ward, 2005; Humphreys and Smith, 1987; Pellegrini and Smith, 1998; Smith, 1982). According to Bjorklund and Pellegrini (2000), rough-and-tumble play also serves deferred benefits by enhancing survival and reproduction, particularly for boys – who most often engage in this kind of play, of gaining competence in aggression, fighting, social competition and experience in dominant and subordinate roles. These are social competencies that are useful for adult life and evolved strategies for enhancing survival, as males have had to face competition, dangers and physical challenges as hunters (Jarvis, 2006). For kindergarten children there rarely is an aim to hurt the other and both parts partake in this as a playful activity (Humphreys and Smith, 1987). Still, research suggests that rough-and-tumble play in preschool- and primary school-aged children provides practice and hones skills for regulating aggressive behavior (Dodge, Coie, Pettit, and Price, 1990). Studies of peer perception found that non-aggressive cooperative children were liked by peers and that bullies were disliked by peers (Boulton and Smith, 1994, 1996; Dodge et al., 1990), and that physical aggressive behavior among boys may continue into adolescence (Broidy et al., 2003; Scholte, Engels, Overbeek, Kemp, and Haselager, 2007). Not being able to regulate aggression and real hostile behavior in rough play situations is therefore disadvantageous for the social development of a child.

It is worth noting that dominance in rough-and-tumble play becomes even more obvious as one enters adolescence (Humphreys and Smith, 1987; Smith, 1997). As the boys, as is most often the case, move toward puberty the roughhousing becomes more competitive and the weaker fighter will be dominated by the stronger fighter. The roughhousing thus changes character and function and becomes more a hierarchy building activity.

Rough-and-tumble play thus seems to have important functions, both immediate and deferred, for motor practice, social skills practice, aggression regulation and physical health.

*Anti-phobic effect.* The anti-phobic effect of rough-and-tumble play is not very evident, and there is a lack of research looking into this issue. It might be that this is not a relevant function of this kind of play. Still, a couple of researchers have outlined the possibility that rough-and-tumble play, particularly the kinds where the participants aim to scare each other by taking the role as monsters or other scary creatures, the kinds where war-play is the essential focus, and the kinds including unpredictable and sudden movements and high sounds, can be a form of play-fear reinforcement that can reduce anxiety by habituation in a pretend situation (Aldis, 1975; Power, 2000). One might

speculate that social phobia and other forms of anxiety involving social hierarchy, physical closeness and social evaluation (i.e., fear of people) might be reduced due to a normalization of the intimacy and self-assertion involved in normal rough-and-tumble play. Organized rough and tumble play, such as Judo practice, has been researched and some findings suggest that children become less aggressive, less emotionally disturbed and less anxious through such practice (Gleser and Lison, 1992; Lamarre and Nosanchuck, 1999).

*Play where the children can “disappear” / get lost*

Both Sandseter (2007a) and Davidsson (2006) have found that children love to walk off alone and go exploring away from the eyes of adults. Children experience a feeling of risk and danger of getting lost on occasions where they are given the opportunity to “cruise” on their own exploring unknown areas; still, they have an urge to do it (Sandseter, 2007a).

*Possible functions.* The urge to walk off alone in new and undiscovered environments without supervision from adults is children's way of exploring their world and becoming at home in it (Bjorklund and Pellegrini, 2002; Smith, 1998). Research has shown that exploration is an important part of children's play (Davidsson, 2006; Kaarby, 2004; Sandseter, 2007a). According to Bjorklund and Pellegrini (2002), the fact that boys engage more than girls in exploration, and also explore larger areas than girls, is related to what Bowlby called the environment of evolutionary adaptedness (EEA) where males were hunters and had to be able to safely move around in diverse and large areas away from home. This is in accordance with the research of Silove, Manicavasagar, O'Connell and Morris-Yates (1995) arguing that a lower level of separation anxiety among boys than girls is due to the adaptive pressure for boys to learn hunting skills and the courage to venture far from the home, and opposite for girls to learn skills for nurturing and creating safe environments for child-rearing. Enhancing perceptual competencies such as depth-, form-, shape-, size-, and movement perception is also a natural function of children's exploration of their environment (Rakison, 2005).

Studying animal and human play, Aldis (1975) makes a distinction between serious exploration where the human/animal learns about their environment, and play which is just playful activity. Aldis describes serious exploration with the example of a young rhesus monkey that first independently leaves its mother to explore the immediate proximity, and at the first sign of danger will flee back to her. Then, over a period of time, the young rhesus monkey will gradually fan out from “home base” to explore more distant areas.

Aldis argues that through serious exploration, rather than play, animals learn what features of the environment lead to food, which lead to danger, and so on. Still, Aldis admits that it is difficult to differentiate between serious exploration and play, and that often a new and unknown environment or object is approached by serious exploration in the beginning and then gradually explored further through play. In our opinion exploration performed in a play “atmosphere,” such as pretend play, is a kind of exploratory play, teaching the players about their environment through play situations.

*Anti-phobic effect.* The fear of separation from caretakers is common in humans (Buss, 2004) – particularly for the female part of the human population (Silove et al., 1995). The urge among children for going exploring on their own is puzzling in this view.



In our hominin ancestors' past, getting lost probably was a real danger, highlighting the adaptive function of initial separation anxiety in young children. Are these children less anxious than would have been adaptive for them in the past? In most western societies children sleep alone, which is both culturally and evolutionarily a novel situation. One might speculate that this may create a larger degree of individuality and also a hypophobia of being alone. In any case, as the child matures, independence and investigation of the surroundings is necessary – also in order to find food to feed themselves.

Is separation anxiety an evolved non-associative fear that can benefit from desensitization/habituating behavior? A study by Poulton et al. (2001) revealed that separation anxiety was largely independent of associative factors, strongly supporting a non-associative explanation. Interestingly the results showed that the amount of separation experiences before age nine correlated negatively with the separation anxiety symptoms at age 18, suggesting an “inoculation” effect of early separation events. The results also indicated that planned separations can help children to learn not to fear separations. These results support the assumption of children's voluntary separation from caretakers, by wandering off alone, as a mode of anti-phobic behavior. As in the case of anti-phobic effects of play in great heights (Poulton et al., 1998), one could expect that children with less fear of separation would be more willing to expose themselves to separation events than children with a high fear of separation. Even so, when having the opportunity to voluntarily plan and carry out a separation from their caretakers by exploring new and unknown areas, experiencing the thrill of the risk of being lost, children seem to “inoculate” themselves from the anxiety of separation.

#### *Play with dangerous tools*

Play with tools that are potentially dangerous included behaviors such as using a knife for whittling, a saw for cutting down branches, a hammer and nails for carpentering, and an axe for chopping wood (Sandseter, 2007a, 2007b). This is one of the categories that are risky from an adult point of view, while the children are more disposed to feel this is only an exciting activity (Sandseter, 2007a). It is also worth noting that this behavior was much more typical among children, and not considered risky by adults only one or two generations ago.

*Possible functions.* Play with dangerous tools can be regarded as a kind of object play. The central point of object play is manipulation of objects in different ways, such as hitting and throwing them (Bjorklund and Pellegrini, 2002; Pellegrini and Bjorklund, 2004). Pellegrini and Bjorklund (2004) argue that the large amount of time children spend in play and manipulation of objects is an indication of the importance and adaptive relevance this has for competencies both in childhood and later in life. Also supporting the adaptive function, play with objects has been described in a wide variety of human cultures throughout the world (Gosso et al., 2005; Smith, 2005). Object play is also observed in non-human mammals and great apes (Bruner, 1976; Pellegrini and Bjorklund, 2004; Power, 2000; Ramsey and McGrew, 2005; Smith, 1982). Aldis (1975) observed object play among some kinds of carnivores and to some extent among primates, although primates tend to be more engaged in serious exploration and manipulation of objects. Still, Aldis' results show that the serious exploration of objects often turned into play with objects when the primates

were more familiar with the new object.

Play with objects is beneficial for individuals to learn properties of objects and their functions, and seems to be valuable in emergent tool use (Bjorklund and Pellegrini, 2002). The fact that boys are more likely than girls to engage in object oriented play, and they do object play more vigorously and physically while girls seem to engage in more solitary manipulation of objects, suggests that this provides deferred benefits of important skill acquisition for the adult human where males would have to prepare for hunting and women for gathering (Bjorklund and Pellegrini, 2002; Pellegrini and Bjorklund, 2004).

*Anti-phobic effect.* Some forms of hypophobia (Marks and Nesse, 1994) will be due to a mismatch between our ancestors' environment that we are adapted to (Nesse and Williams, 1995; Tooby and Cosmides, 1990) and the current environment. Many dangerous tools never existed in the past and we did not evolve natural fears of them. Even though tools such as knives and axes existed in earlier phases of human evolution (although less sharp), object play (including playing with dangerous tools) more likely is motivated by an interest in tools and acquisition of tool handling skills than by anti-phobic effects. Future research into the differences between play involving modern tools and role-playing adult skill behavior might shed light into the different motivational mechanisms.

#### *Play near dangerous elements*

Play near dangerous elements in Sandseter's (2007a, 2007b) study included play on top of high and steep cliffs, play near deep water by the seaside and tumultuous play near a burning fire pit. Like in the case of play with dangerous tools, this is a category that primarily is regarded risky from an adult point of view, while some of the children thought this was scary and others did not (Sandseter, 2007a).

*Possible functions.* Similar to some of the other categories of risky play, one can assume that this kind of play serves a function of exploring the environment and becoming familiar with its possibilities and constraints. Still, research shows that some of the children are not very attentive to the fact that they are playing near a dangerous element, but rather are preoccupied in their activity, such as role play, play chasing and the like (Sandseter, 2007b). The potential hazard is thus not always perceived by the children (Sandseter, 2007a). The function of playing near dangerous elements may therefore be an indirect function, the dangerous element not being the essential part of the play itself, still having an effect on how children learn to handle different environmental features and elements such as water, steep and high cliffs, and fire. Children have been playing close to dangerous ecological features throughout our species' evolutionary history – so one would assume that there has been selection to improve children's ability to be aware of real risks.

*Anti-phobic effect.* If one assumes that fear of potentially dangerous elements, similar to fear of height (Poulton et al., 1998), are non-associative evolutionarily-relevant fears that arise naturally in young humans, the hypothesis of habituation through exposure to the stimuli and the falsification of exaggerated belief of hazards through behavioral experiments would be reasonable also for fear of high and steep cliffs, water and fire. It is possible that the children who were not afraid of dangerous elements in Sandseter's (2007a, 2007b) studies have had more anxiety reducing experiences than the ones that thought that playing near dangerous elements was scary. We addressed the anti-phobic effect of

experiencing injurious falls through exposing oneself to great heights above (Poulton et al., 1998). A study carried through by Poulton et al. (1999) found similar results on fear of water. This study concluded that there was no relationship between water confidence and experiencing water trauma before age nine and the symptoms of water fear at age 18. The authors conclude (see also Poulton and Menzies, 2002a; Poulton and Menzies, 2002b) that their studies support a non-associative perspective arguing that the fear of water arises due to innate reasons. Thus, anxiety is due to maturation, rather than associative learning of anxiety (Rachman, 1977). Further, Poulton et al. (1999) conclude that anxiety is reduced over time with repeated exposure to the stimuli. Thus, play behavior near dangerous elements such as high cliffs, water and fire may be natural, anti-phobic behavior, while preventing this behavior may increase the risk of phobias and a lack of normal coping behavior in heights, water or close to fire.

### **Survival Tasks, Functions and Sex-Differences**

One would assume that all children would gain from enhancing physical, social and perceptual skills and being familiar and comfortable in their surrounding environment, as well as acquiring good risk management skills and anti-phobic effects of stimulation. Still, research concludes on boys being far more represented than girls in the willingness to take risks and engage in risky play (Cairns and Cairns, 1994; Ginsburg and Miller, 1982; MacDonald, 1995; Morrongiello and Rennie, 1998; Smith, 1998), intense challenging physical play and rough-and-tumble play (Blurton Jones, 1976; DiPietro, 1981; Eaton and Enns, 1986; Eaton and Yu, 1989; Humphreys and Smith, 1984, 1987; MacDonald, 1998; Pellegrini and Smith, 1998; Power, 2000; Smith, 1997, 2005). Research findings also indicate that boys have a higher injury liability than girls (Boles, Roberts, Brown, and Mayes, 2005; Coppens and Gentry, 1991; Matheny, 1987; Morrongiello and Rennie, 1998; Ordoñana et al., 2008; Rosen and Peterson, 1990; Schwebel, Brezaussek, and Belsky, 2006). Can this sex-difference be accounted for in an evolutionary perspective? Several authors (see, e.g., Bjorklund and Pellegrini, 2000, 2002; Ellis and Bjorklund, 2005; Jarvis, 2006; Pellegrini and Bjorklund, 2004; Smith, 1982) state that the documented sex-differences in play styles is consistent with the adaptive problems males and females have had to encounter. Men have had to prove themselves as a strong, safe, protective and worthy partner for the females with whom he wanted to produce offspring (Ellis, 1992). This would, in the past, imply the willingness to take great risks (Kruger and Nesse, 2004; Wilson and Daly, 1985). This includes both travelling away from the home base for hunting and fighting wild animals, and protecting the partner and offspring from enemies and other "hostile forces of nature." Women, on the other hand, would have to be more cautious to survive and secure reproductive success, and then serve as the primary caregivers for their children staying at the home base performing gathering tasks. Sex-differences in the urge for risky play could possibly be viewed as an adaptation to enhance competencies important for survival in the history of evolution. Differences in fearfulness or anxiety, and the need to reduce both fear and anxiety more in males, may be part of this (Kruger and Nesse, 2004; Wilson and Daly, 1985).

## **General Discussion**

Anxiety etiology has been based on, e.g., Mowrer's two-factor theory – including both classical and operant conditioning (see also Rachman, 1977, for a conditioning approach). This is no longer considered a likely explanation. At least the associative pathways might need to be expanded with non-associative models (Poulton and Menzies, 2002a). The isomorphic principle of how pathogenesis and cure need to be similar processes has been typical within much psychotherapeutic theory – since the effective treatment of anxiety has been learning theory-based, many have expected conditioning to be the etiology of anxiety. At the same time researchers such as Poulton and Menzies (2002a, 2002b), and Kendler, Myers and Prescott (2002) provide strong evidence that suggests that anxiety appears through largely maturational or dispositional mechanisms. On the other hand, anxiety reduction seems to be due to coping and interaction with the naturally fear-generating stimulus. The naturally developed fear seems to be alleviated through normal habituation or coping experiences, somehow. We suggest that risky play provides the exact conditions that will be most curative of any anxiety, the exaggerated fear reactions to stimulus or situations that the child in reality is able to master. These are: the motivation to seek out the stimulus (exposure/experience) and to learn how to master the stimuli while being motivated by a positive (thrilling) rather than aversive emotion resulting in coping/mastery experiences. Note that thrill reduction occurs after a period of careful but thrill motivated negotiation of the threatening condition and the learning and mastery of the necessary skills involved. In other words, the child starts off with a natural inhibition toward situations that the child developmentally is not mature enough to cope with, but this fear is reduced as the child develops mental and physical skills and exposes itself to the stimulus motivated by thrilling emotions, while learning how to master these challenges.

Children do not consciously consider the immediate or deferred benefits of their play while playing or while deciding what to play. Enjoyment or thrill of play is basically the motivational basis for play among children (Smith, 1982), and children engage in risky play because they enjoy doing it (Sandseter, 2007c, 2009). Sutton-Smith (1997) states that there is no contradiction between assuming that a child's personal reason for play is an intrinsic motivation to experience positive emotional states such as arousal, excitement, fun, merriment, joy, ecstatic feelings, mastery and competence, and assuming that the effects of such play are useful for other kinds of adaptations such as enhancing survival and the child's fitness. This corresponds to hominins procreating through history, not primarily due to the conscious desire to have offspring, but due to sexual drives and the pleasures of sex.

Still, several important questions remain unanswered: It is important not to prematurely conclude that risky play is due to specific adaptations or plays an adaptive role in normal development. Other explanations are possible: Are the motivational and perceptual mental systems that make children experience this form of stimulation activating and thrilling by-products (Gould and Lewontin, 1979; see also Buss, Haselton, Shackelford, Bleske, and Wakefield, 1998; Kennair, 2002) of our mental mechanisms? Or might they be remnants of systems that, e.g., made our tree dwelling ancestors feel

motivated to climb and jump from branch to branch? Would this have consequences? And is it still a system that needs stimulating in order to ensure normal development?

Few deprivation studies have been conducted to try to reveal the developmental importance of different kinds of play. This has been more common in animal play literature (Bjorklund and Pellegrini, 2002). Still, some studies of the effects of depriving children of locomotor play have occurred. The results from these studies were consistent in showing that deprivation led to increased levels of locomotor play when the opportunities for this kind of play were re-established (Byers and Walker, 1995; Pellegrini and Davis, 1993; Pellegrini, Huberty, and Jones, 1995). Further research would be necessary to consider the effects of preventing risky play. If this indeed resulted in an increased tendency toward fearfulness or neuroticism this would provide further evidence of the fear reducing effect of risky play.

We have been informed by a modular approach, and posited specific mechanisms for specific types of risky play. One might object that a more domain general approach might also be possible to explain such behavior. We do believe that heights, speed and play near dangerous elements probably use many of the same mechanisms, and although there probably are different mechanisms involved in rough and tumble play, probably there also are common processes such as the thrilling emotion. We do posit at that level that this process is rather general. Also there may be evolved individual differences (see Buss and Hawley, 2011) that regulate this process at a general level, such as poor self-regulation and inhibitory abilities that both reflect general universal development of the prefrontal cortex as well as individual differences, as well as meta-cognitive processes involved in the overestimation of abilities to manage risky situations.

## **Conclusions**

This article suggests that one of the most important aspects of risky play may be the anti-phobic effect of exposure to typical fear eliciting stimuli and contexts, in the combination of positive emotion and relative safety and with autonomous coping behavior. As such risky play mirrors effective cognitive behavioral therapy of anxiety (Allen and Rapee, 2005). Current research on the etiology of anxiety suggests that anxieties develop due to both genetic and environmental factors (Allen and Rapee, 2005). The specific genes have not been identified, but neither are we aware of what environmental factors cause anxiety disorders (e.g. Kendler et al., 2002). It seems that the genetic factors cause individual differences, and apart from the phobias most anxiety disorders do not seem functional from an evolutionary perspective (Kennair, 2007). The evidence that phobias seem to develop rather independently of learning experiences (these have at least been difficult to document to date), does not mean that learning may not be a way of reducing or even curing anxiety. Actually graded exposure and learning to think less negative and more mastery oriented thoughts about the anxiety producing stimuli have shown to be the most effective treatment of child anxieties (Allen and Rapee, 2005). It is possible that risky play is a natural way of reducing many phobic reactions that are functional when the child has a low level of mastery of the fear provoking conditions. Thus adaptive *fear*, necessary to keep the child safe and alert and careful when learning to cope with potentially dangerous

situations for young children, is countered by the positive emotions that are typical of the adaptively thrilling experience involved in moving the boundaries of what is safe and what is dangerous. Research has shown that anxious children may elicit overprotective behavior from others, such as parents and caretakers, and that this reinforces the child's perception of threat and decreases their perception of controlling the danger (Allen and Rapee, 2005). Overprotection might thus result in exaggerated levels of anxiety. Overprotection through governmental control of playgrounds and exaggerated fear of playground accidents might thus result in an increase of anxiety in society. We might need to provide more stimulating environments for children, rather than hamper their development.

This means that some forms of risky play may be developmentally adequate species-specific and universal anti-phobic processes. For other types of risky play, the motivational systems may be more archaic systems or they may be due to by-products of our perceptual systems that provide a mixed activation that the children perceive as thrilling and hedonic. The different analyses of function give different testable hypotheses of the psychological mechanisms and motivational systems involved in the different types of play. From a modular approach one would not expect to find the same mechanisms involved in all different types of behavior.

If these ideas are correct, this might not only be about prevention or increasing anxiety at the population level, but also relevant for the improvement of treatment of young children with anxiety. Treatment might profit from having more than merely a habituation perspective; relaxation (e.g., Öst, 1987) may counter anxiety, but it may be more important – at least for many young patients – to experience more thrilling and coping emotions. A treatment program for young patients that uses thrilling emotions to cure anxiety and compares it to current best practice cognitive behavioral treatment protocols would test this directly.

Further research into risky play is necessary. Risky behavior is a potential health hazard. At the same time, an understanding of why and when children will engage in risky behavior is important – not least if such behavior in the long run is beneficial to their normal development. It seems that risky behavior is maintained despite adults' attempts at making children's environments safer. From both a safety perspective as well as from a normal psychological developmental perspective an understanding of the function of risky play and the different psychological mechanisms and motivational systems involved are important to understand. This will be essential in the world wide discussion on demands for children's play safety, by a growing number of researchers regarded as drawing near overprotection, and the balance between such safety requirements and children's needs for opportunities to play freely in challenging, stimulating and developing environments. Even though highly active and risk taking children experience more (albeit minor) injuries, this article suggests that these children will benefit psychologically from natural adaptive fear alleviation and the anti-phobic effect of risky play.

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*Research article*

## **Early childhood educator perceptions of risky play in an outdoor loose parts intervention**

**Rebecca A Spencer<sup>1,\*</sup>, Nila Joshi<sup>1</sup>, Karina Branje<sup>1</sup>, Naomi Murray<sup>1</sup>, Sara FL Kirk<sup>1,2</sup>, Michelle R Stone<sup>1,2</sup>**

<sup>1</sup> School of Health & Human Performance, Dalhousie University, 6230 South St, PO BOX 15000, Halifax, NS, Canada

<sup>2</sup> Healthy Populations Institute, Dalhousie University, 1318 Robie St, PO BOX 15000, Halifax, NS, Canada

\* **Correspondence:** Email: [Becky.spencer@dal.ca](mailto:Becky.spencer@dal.ca); Tel: (902) 494-1171.

**Abstract:** Free play is important in early childhood and offers physical and mental health benefits. Outdoor play offers opportunity for children to use natural elements and promotes physical activity, among other health benefits, including exploring their environment and taking risks. Risky outdoor play may involve challenges, heights, speed, and the potential for injury, but has been associated with increased physical activity levels, decreased sedentary behaviour, improved mental health, and social benefits. The integration of loose parts, or open-ended, unstructured materials, into play environments, has been associated with positive social behaviours, creativity, and improved problem-solving, confidence, and resilience. As opportunities for risky play in early childhood are determined by adults, including early childhood educators, it is important to understand their perspectives on these types of play. The purpose of this study was to explore early childhood educators' perspectives of risky play, in the context of the Physical Literacy in the Early Years (PLEY) intervention. PLEY was a mixed methods study that aimed to evaluate a loose parts intervention in early childcare settings. This paper used Qualitative Description to explore educators' perspectives. Data were collected from 15 focus groups with early childhood educators. Four themes were identified through thematic analysis. The first explains how risky play with loose parts contributes to evolution in educator perceptions; the second describes how educators' perceptions of risk are connected to institutions and systems; the third illustrates how educators developed strategies to facilitate risky play with loose parts; and the fourth



demonstrates how educators perceive risky play as beneficial for children's healthy development. This project highlights societal shifts in play and how loose parts and risky play fit into the ongoing evolution in play, from the perspectives of early childhood educators.

**Keywords:** early childhood; education; loose parts; risky play; educator perspectives

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## 1. Introduction

Unstructured, self-directed, free play dominates early childhood and affords children numerous physical, cognitive, and mental health benefits [1]. The outdoor environment offers particular play opportunities and health benefits for children that cannot be replicated indoors [2]. When children play outdoors, they are able to move freely, explore new movements, and exert more energy; they have fewer restrictions in space and more opportunity to use natural elements [1,3,4]. Children are happier, experience lower levels of anxiety, and have more energy when they play outdoors [5,6]; physical activity levels are also higher, and sedentary behaviour lower, when children are outside compared to inside [4]. Importantly, when children are given the opportunity to play outdoors, they are able to explore their environment and take risks [5,7] which is critical for healthy child development [6].

Risky play is described as thrilling and exciting play, that may involve challenges, heights, speed, tools, rough and tumble play, and testing limits, with the possibility of physical injury [6,8,9]. Children have an evolutionary need to engage in free, unstructured, exploratory play outdoors [10]. Increasingly, research is showcasing the benefits and importance of risky outdoor play [1,4,6,11]. A review by Brussoni et al. (2015) determined that risky outdoor play has many positive effects on health, including increased physical activity and decreased sedentary behaviour, as well as improved learning, mental and physical health, and increased play time, social interaction and creativity [6]. Through risky play, children have opportunity to be physically active [12], become more independent, confident, and resilient [5], and learn important self-regulation skills [1]. Researchers have recently suggested that engagement in risky play can offer opportunity for children to navigate uncertainty and coping, leading to decreased anxiety over time [13].

While the health, social, and developmental benefits of risky play are becoming understood, there has been historical focus on its potential dangers as well. While risky play is inherently, of course, risky [14], a recent systematic review indicates that although there has been a focus on danger, the vast majority of risky play incidents are minor [6]. Belief in benefits of risk taking need not lead to complacency in safety, but requires distinguishing between appropriate well-managed risk and danger or hazards [15]. While restrictive risk-reduction strategies might ensure momentary child safety, they may also impede their healthy development [11,14]. Children learn from experience, even of injury, and are often able to assess their own risk [14]. Risky play allows children to engage in risk assessment, negotiate risk, and understand their limits [11]. Historically, however, risk has been narrowly defined, with negative connotations, which has contributed to risk-averse practices and a decline in opportunities for children to engage with risk [1,11,16].

The Canadian Position Statement on Active, Outdoor Play states, “access to active play in nature and outdoors - with its risks - is essential for healthy child development”, highlighting both the importance of risky play, and the outdoor context as space for facilitating risky play [1]. Outdoor play lends itself to more risky and adventurous play [13]. Children today spend less time outdoors than their parents did, and more time in institutions and structured activities [1,17]. Concerns about safety have limited children’s access to risky outdoor play and independent mobility [18,19]. Further, children’s access to outdoor spaces, with their risks, may be limited by beliefs that children lack the competence to engage with the world alone and are in danger when outside [20]. As a result, it is becoming increasingly difficult for children to have the opportunity to engage in unstructured, risky, outdoor play.

Risk-taking opportunities in early childhood are also largely influenced by adults, including educators [12,13,16]. Due to increased emphasis on both safety and school readiness, many early years programs are focusing more on structured activities, and educators are acknowledging ideas around risky play are shifting and evolving [11,21]. While early learning environments have been identified as particularly important contexts for children to be able to learn about and engage with risk, navigating risky play in these environments is a complex and multi-faceted issue [11,12,14,17,22,23]. Research exploring educators’ perceptions of risky play suggests that early childhood educators recognize the importance of, but identify barriers, including their understanding of safety, regulations, accountability, and potential litigation, with educators in identified less-litigious contexts being more open to risky play [12,15,16,22–26]. Research has begun to identify strategies employed by educators in negotiating risky play, including supervision and observation [6,11,14,15,22,27], though further investigation is warranted to support early childhood educators in navigating this complex issue.

There is overlap between risky play, outdoor play, physical activity, and learning environments [13]. Features of the early learning environment influence the extent of available risky play opportunities [28]. Previous research highlights the importance of environments that support children to explore, experiment, accept challenges, and take risks [6,11,15,22]. The integration of loose parts into children’s outdoor play environments may facilitate opportunities for risky play. Loose parts are open-ended, manufactured or natural play materials that are moveable and without a dictated purpose, which may include anything from recycled tires and stumps, to car parts or pinecones [29,30]. Literature exploring the impact of loose parts play suggests it may promote play participation and engagement, social negotiation, creativity, imagination, problem-solving, and improved physical activity [31–37]. Research has also suggested benefits of loose parts play include confidence, leadership, determination, resilience, and enabled risk-taking [38]. Loose parts offer the opportunity for adventurous, risky play, facilitate exploration and creativity, and allow children to direct their environments and play [34,39–41]. Loose parts have been associated with risky play as they offer opportunity for climbing, swinging, and balancing, and encourage children to test their abilities, and negotiate and assess risk [34,39,41]. With evidence suggesting outdoor play and learning spaces rarely afford the opportunity for risky play [15], introducing loose parts may provide that opportunity.

Ecological approaches, or those that situate health across the context of complex, multi-level environments, from the micro to the macro level, are often employed in health promotion research, particularly in relation to physical activity [42–46]. Van Rooijen and Newstead (2017), drew upon ecological approaches to explore factors influencing professional attitudes toward risk-taking in childhood play [17]. They developed a model represented by concentric circles, with the practitioner

centered, surrounded by increasingly larger levels of influence [17]. Their model includes how children are constructed (for example, as vulnerable and in need of protection); professionals' attitudes, beliefs, and values regarding risk; relationships with parents (requiring collaboration, trust, and communication); regulatory factors like playground restrictions, accountability, and liability; and finally broader cultural factors, including social, political, and environmental concerns [17]. They assert the complex interaction and interdependence of these factors results in significant ongoing conflict, negotiation, and contradictions experienced by childhood practitioners, and suggest future research is warranted to further explore their perspectives [17].

Expanding on existing literature, we explored the perspectives of early childhood educators who took part in the Physical Literacy in the Early Years (PLEY) project, an outdoor loose parts play intervention [47]. The purpose of this study was to explore early childhood educators' perspectives of risky play, and more specifically, risky play in the context of this outdoor loose parts play intervention, in alignment with the model proposed by van Rooijen and Newstead (2017) [17].

## **2. Materials and methods**

### *2.1. Study design*

This paper qualitatively describes educator perceptions of preschooler's risky outdoor play collected as part of a mixed methods intervention study, the Physical Literacy in the Early Years (PLEY) project (registered ID# ISRCTN14058106). The purpose of the PLEY project was to evaluate a loose parts intervention in regulated early childcare settings, including its impact on physical activity and outdoor play, and educator and parent perceptions. The PLEY intervention involved integrating loose parts (such as rope, milk crates, wood, tires, and buckets) into the outdoor play spaces of 11 childcare centres across Nova Scotia for periods between six and eight months. The project used a socioecological approach and the RE-AIM framework to explore multiple levels of influence and understand the impact of the intervention [46,48]. Further details regarding the PLEY project intervention protocol are presented elsewhere [47].

Qualitative data were collected using Qualitative Description methodology. Qualitative Description is an exploratory methodology which, while less interpretive than other qualitative methodologies, is focused on describing the lived experiences of participants, from their perspectives [49,50]. The emphasis on rich description, participant voice, and a tendency to remain close to the data, made Qualitative Description an ideal methodology for this study [49,50].

### *2.2. Data collection and analysis*

Early childhood educators from childcare centres involved in the PLEY intervention were invited to take part in focus groups. Fifteen focus groups took place, nine of which occurred three months following the intervention, and six of which occurred six months following the intervention. Each intervention site was represented in the focus groups and included early childhood educators from a variety of sites, with between three to five educators taking part in each focus group. Focus groups each lasted approximately 45–60 minutes and included questions regarding the intervention, active

outdoor play, loose parts, and risk-taking. All focus groups were audio recorded and facilitated by a member of the research team and a notetaker.

Audio data from focus groups were transcribed verbatim, organized using Microsoft Word (version 16.16.3) and imported into QSR NVivo 11 for analysis. Thematic analysis was guided by the methods of Miles and Huberman [51] and Braun and Clarke [52]. Analysis was conducted by research staff and guided by senior members of the research team. Analysis began with research staff reviewing transcripts and identifying codes using open inductive coding. Frequent research team meetings facilitated the collaborative and iterative development of a codebook. Two coders coded each transcript early in analysis in order to facilitate consistency, and once consistent coding was established, remaining transcripts were coded by one member of the research team. Once transcripts were coded, a collaborative process was used to explore relationships between codes and identify trends across the data, in order to generate themes [51,52]. Quality and rigour, including dependability, authenticity, and credibility, were facilitated using this collaborative and iterative process, in addition to using peer review, field notes, and memo-ing [53,54]. Themes were then examined in consideration of ecological approaches and the model proposed by van Rooijen and Newstead (2017) [17].

### 3. Results

Four themes were identified through Qualitative Description and thematic analysis. The first theme describes how risky play with loose parts uncovers evolution in educator experience, perceptions, and practice; the second theme presents how educators' perceptions of risk are connected to institutions, systems, and discourses of safety; the third theme demonstrates how educators developed strategies to facilitate risky play with loose parts; and the final theme explores how educators perceive risky play as beneficial for children's healthy development.

#### 3.1. *Theme 1: Risky play with loose parts uncovers evolution in educator experience, perceptions, and practice*

The first theme highlights how risky play and the loose parts intervention brought to light how educators' background, experience, and history contributed to their perceptions. As part of this theme, educators reflected on the historical and societal shifts that have occurred in the way children play. Participants reflected on their own experiences, including where and how they were raised, and played, and how their own experiences contributed to their feelings about risky play. One educator said, for example, "*we knew every inch of the woods all through our neighborhood and parents weren't with us, I'm not sure if that happens as much anymore*". They related these perspectives of risky play to their work as early childhood educators, with one saying, "*when you've been in the business for so long you're ingrained of just keep them safe, make sure they're safe, the times are changing where risk is part of their play now*", suggesting that attitudes around risky play have changed. One participant noted the loose parts intervention helped reveal this evolution in perspectives regarding risky play, saying "*perhaps before there wasn't enough risk taking, [...] I started to say to myself, I think we better stop saying, 'be careful, be careful' all the time*" noting the loose parts intervention as helpful in facilitating reflection on risky play.

Educators also reflected upon how they each have their own individual comfort level with risky play. Many participants described how they were more comfortable with risky play outside than inside. One said they were *“more free with the risk-taking outside”*, while another said, *“when they’re outside they have the space to explore, they have the room to just run and jump”*. Another common perspective was that educators were mindful of the responsibility associated with caring for other people’s children. One said, *“it’s someone else’s child and you want them to be in one piece at the end of the day”*. Several participants noted they were more comfortable with risky play with their own children, with one saying, *“I don’t want other people’s kids to get hurt, but like, I let my own kid do something and they get hurt I’d be like well you know that’s my kid”*. Some participants reflected on how their own upbringing impacted their perspective on risky play, with one saying, *“as a child I did everything so I’m able to let them”*. Similarly, another participant said, *“we had strict rules of what happened in our house and it wasn’t the risk play”*, and one considered, *“I wonder if my opinions would change if I was more of a risk taker as a child”*.

Educators also noted that they were progressively becoming more comfortable with risky play, and that this was facilitated by their participation in the outdoor loose parts play intervention. Educators relayed that systemic, environmental, and cultural shifts were happening regarding risky play, in association with the intervention. One said, for example, *“I think there’s a change, there’s an awareness that wasn’t there before”*, while another said, *“we’re seeing a shift within our own organization”*. Connecting to the earlier theme of confidence, a participant said, about children’s risk-taking with loose parts, *“it’s building the children’s skills and confidence and then as that’s happening, yours is also being built which means that there’s this beautiful sort of mutual respect”*. Similarly, a participant said, *“the more educated you get about it [...] you feel more confident in yourself to let your children take the risks”*. Others discussed how their participation in the outdoor loose parts play intervention changed *“our mindset”* or *“changed my whole perception of risk”*. To sum, one educator said, *“we see the benefits of it now, not the scariness of it”*. Finally, some participants noted the impact of the intervention more broadly, saying, for example, *“I feel like being a part of this has allowed the company to loosen up a little bit”*, indicating that the outdoor loose parts play intervention contributed to changing perceptions of risky play institutionally. Educators recognized shifts in how risky play was perceived over time, that were contributed to by their own history, education, and experiences. The outdoor loose parts play intervention offered an opportunity for further learning and experiences, contributed to shifts in educator perceptions of risky play, and increased comfort in risky play.

### 3.2. Theme 2: Educator perceptions of risky play are tied to institutions and systems

Educators in this project also connected their perceptions of risky play to institutions and systems, and broad discourses around responsibility and safety. As part of this theme, educators articulated their fear of children getting hurt and being responsible for that injury. All participants discussed situations and experiences where they had experienced fear, worry, and anxiety associated with risky play. One said, *“as a teacher you just tend to feel responsible”*, a sentiment that was common among the educators in this project. Connecting to the above subtheme around individual comfort with risk, one participant said risky play had taken them *“out of my comfort zone for risk because I think of the worst scenario, not the best scenario”*. Others connected this to the above subthemes of perceptions of risky

play changing over time, with one saying, *“I’ve been in the field for a long time [...] years ago it was ‘no you can’t do that’ [...] it’s a hard thing to let go of [...] nobody wants to see children be hurt but the more you let them do things you realize that yah it’s risky but it’s not usually that bad”*. One participant said that their role is about *“keeping everybody safe [...] I want to support the risky play, but at the same time we have to be careful”*, which was aligned with many participants who noted that there is a balance to be found between encouraging risk and ensuring safety.

Closely connected to the fears and worries that come with risky play, educators discussed their perceptions of rules, regulations, reporting, and responsibility. A common perception was that *“with the risk taking comes a lot of paperwork too”*. Many participants discussed the protocols and requirements associated with an injury. One said, *“you’re writing the accident report in your head”* in regard to watching risky play take place, while another said, *“I mean every child’s going to have a fall, every child is going at some point [...] you need a band-aid [...] but apparently now it’s like any mark [...] it needs to be written up”*, noting a bit of fatigue with reporting, but also acknowledging that injuries may happen in risky play. Others acknowledged the obligations around risk to be important, with one saying, *“the policy is about accountability [...] our actions reflect on the centre”*. Other participants reflected on the importance of communication, saying, *“that’s the way that administration would look at it, ‘how are you going to do this safely? Tell me why you want to do it’”*, highlighting the connection between their perception of risk and that of the administration.

### 3.3. Theme 3: Educators developed strategies to facilitate risky play with loose parts

Through this project, educators also reflected on the strategies they developed to support risky play and the use of loose parts. Observation was a key strategy noted by many of the participants in facilitating risky play. Educators discussed the importance of stepping back, staying close without interrupting, and letting children lead. One participant said, *“for me it was just the teaching strategy of letting her take the risk and letting her come to her own conclusions”*. Another said, *“If you’re scared they’re going to be scared, so just, you know, be nearby and let them try”*. Educators also often discussed how they speak to children engaging in risky play. One noted the importance of being *“more mindful of what I’m saying to them in those moments and if I need to say anything at all”* and the value of *“being supportive and not restrictive”*. Many discussed the strategy of asking questions, with one saying, *“I’ve been trying to steer away from ‘be careful’ and kind of phrase, like, more open-ended questions, like ‘what would happen if you step your foot there?’”*. Others discussed the importance of providing encouragement, with one saying, *“I wanted to let her be independent, let her be creative and definitely gave her words of encouragement, like ‘this is awesome [...] look at how you’re balancing’”*. Finally, some participants discussed switching out with one another as educators, with one saying, *“maybe I’m going to step back because I know you’re a little more comfortable and you can facilitate this”*, acknowledging again that individual educators will have varying comfort with risk.

Relatedly, educators mentioned the importance of communication in facilitating risky play and outdoor loose parts play. As mentioned, educators have individual experience, background, and comfort levels with risky play, and communicate with one another to ensure educators feel comfortable supervising each activity. Others discussed how risky play warranted communication when there were staff changes, with one saying, *“we’ve just recently had new staff that have come in so we kind of had*

to go through the whole process all over again explaining it and expectations but also like comfort levels and kind of where we're at with risk taking". Additionally, many participants discussed the importance of talking to parents about risky play. One said, *"we have lots of parent nights dedicated to it [...] we do try to really open up that as a talking point with our families so they're comfortable with things that we're doing with their children"*, while another said, *"talking it through with our parents and our families is really important because I don't want them to just walk in and think it's like [...] we're not being careful or thoughtful, that we're not being intentional, because we know the benefits"*. Others connected this more directly to the loose parts intervention, noting that *"it created a dialogue"* and *"gave us more tools to go and say this is why we're doing this [...] And how we're going to do this effectively"*, demonstrating the importance of clear communication with families regarding risky play and loose parts.

### 3.4. Theme 4: Educators perceive risky play with loose parts as beneficial for children's healthy development

The final theme describes how educators perceived risky play as beneficial for children's healthy development. Participants discussed their perceptions that children should take risks and want to take risks, and frequently discussed how risks come with rewards. One said, for example, *"they're up so high and they could fall down and hurt themselves, but there's so much more that they learn from it"*. Some described risky play as a natural and important part of healthy development, saying, *"it's part of growing up"*. Others noted how children wanted to engage in this type of play, with one saying, *"I think it was just, it was something they craved, like they kind of needed to explore it, they needed to see if they could"*. In addition, educators noted that risky play was perceived as *"thrilling to them"* and that it made *"outside time more exciting"*. Participants discussed the importance of boundary-pushing and thrill-seeking associated with risky play. One educator said, for example, *"they're pushing the boundaries to see how far they can go"*. Another participant said, *"it's also the forbidden fruit, my mother doesn't let me do that, but I can do that at the daycare"*, describing their perception of how children enjoyed risk-taking opportunities.

Educators also described their perception that risky play promoted problem-solving, social skills, and confidence. One participant noted that, *"the big improvement I think has been the children, you know who are really now taking more risks, and using a lot more problem solving"*. Participants also discussed how the children self-assessed risks and developed risk-management skills. One said, for example, *"the class independently decided that's too high, we should not jump from here"*, while another said, *"I think they know like where their limits are"*. Many educators discussed their perception that risky play promoted confidence. One said, for example, *"you really saw the child sort of push themselves out of their comfort zone"*, while another said, *"I think the more risk they take, the more confidence they have"*. This confidence was also associated with pride and was perceived to have long-term health benefits: *"it's a sense of pride, it's a sense of accomplishment and that's huge cause [...] that's what they see in the future and them taking risks in adulthood"*.

Participants also mentioned the value of risky play for supporting children's physical health and well-being. One participant noted that risk taking during outdoor loose parts play allowed children to *"really push themselves physically"*, and how, *"over time they're just taking bigger risks, using more*

*muscles you know, using different muscles*". By taking risks, children were developing critical fundamental movement skills, such as coordination and balance, and improving muscular strength and endurance: *"you can really see that their coordination is improving, their balance is improving"; "his muscle development was not quite there [...] and his parents had mentioned that he had come a long way [...] and he was enjoying the experience.*

Finally, there seemed to be consensus among participants that the loose parts intervention provided more opportunity for risky play. One educator said, *"I notice a lot more of that with the loose parts, like the risk-taking opportunities are awesome"*. Another added, about the loose parts intervention, *"it really added to our play and to their risks"*. Others discussed how children were more ready and prepared to take risks, with one saying, *"they were more eager to take risks [...] like after using these materials in different ways, they were more eager"*, and another agreeing, *"they're taking more risks than they would have, or higher risks than they would have"*. Regarding the loose parts, another participant said, *"it gives them the opportunity to scale their risk, depending on what they're comfortable with"*.

#### **4. Discussion and conclusions**

Through Qualitative Description, we identified four themes that can be analyzed using an ecological lens, specifically, the model developed by van Rooijen and Newstead (2017) to explore professional attitudes toward risky play [17]. The first theme highlights how risky play with loose parts contributes to an evolution in educator perceptions. This theme, emphasizing educators' perspectives regarding risky play, is well-aligned with van Rooijen and Newstead's (2017) assertion of the importance of professional attitudes toward risk [17]. The second theme, demonstrating how educator perceptions relate to systems and institutions supports van Rooijen and Newstead's (2017) suggestion of a layer of influence related to regulatory factors [17]. Our third theme, illustrating how educators developed strategies to facilitate risky play intersects with van Rooijen and Newstead's (2017) identification of the importance of relationships with parents, in that our work highlights the importance of communication [17]. Our fourth and final theme, regarding how educators perceive risky play as important for healthy child development aligns with multiple layers of van Rooijen and Newstead's (2017) model, including professional attitude toward risk, constructions of the child, and cultural factors [17]. Interestingly, each of our themes is further intertwined with both the inner layer, focused on the constructions of the child, and the outer layer, focused on cultural factors, of van Rooijen and Newstead's (2017) model, highlighting the interrelatedness of these levels. In each of our themes, it is evident that children are constructed both as in need of protection, but also as having agency, developing skills, and learning to negotiate risk. Cultural factors are emphasized throughout each theme as well, with our participants noting broad cultural shifts and evolution in play over time and discussing wide social and political discourse around safety and regulation. This study expands upon previous research by including the perceptions of educators on risky play within the context of a childcare-based outdoor loose parts play intervention.

Through this project, educators reflected on personal and professional development in association with risky play. Educators noted differences between themselves and their colleagues regarding risk taking, acknowledging the influence of their own upbringing and personal experiences. This is



important, as educators' perceptions of outdoor play, specifically their beliefs and personal experiences, can influence their teaching and practice, as highlighted in van Rooijen and Newstead's (2017) model which devotes a layer of influence related to professionals' attitudes toward risk [17,55]. Relatedly, educators identified a societal shift over time toward focusing on structured activities and increased supervision, resulting in decreased opportunity for risky play. This is aligned with other research that indicates children's participation in physical activity is shifting from unsupervised and unstructured outdoor and risky play to more structured and supervised activities [1,4,17,56,57]. This is further aligned with van Rooijen and Newstead's (2017) model which suggests the importance of both regulatory and cultural factors [17]. This finding suggests childcare settings have a unique opportunity to provide children with an environment that allows them to explore and challenge themselves through risky play. Importantly, the fact that educators recognize this shift suggests that they understand their role in supporting quality play experiences.

Educators also reflected on how their participation in the outdoor loose parts play intervention improved their comfort with risky play. Through this intervention, educators had the opportunity to develop strategies that facilitated their engagement in risky play. Educators noted observation as a key strategy in supporting risky play. They also discussed the importance of communication regarding risky play and being mindful of how risk is framed. This aligns with strategies suggested when assessing risk taking during outdoor play, including considering both the child's and educators' comfort and abilities [58]. This is also aligned with how van Rooijen and Newstead's (2017) model suggests the importance of professionals' relationships with parents, which requires clear communication, collaboration, and trust [17]. Similarly, educators have emphasized the importance of understanding their own limits when it comes to assessing risk-taking during outdoor play and how this may sometimes limit children's participation in risky play [17,58]. Together, these strategies highlight how educators have to negotiate risk taking in the childcare setting.

Through this project, educators also discussed how supporting risky play in the childcare setting comes with challenges and responsibilities. Although educators recognized the importance of risky play, they reflected on the need to balance risk and safety. Educators did express fear and anxiety associated with children injuring themselves through this type of play in the childcare setting. A growing culture of child safety with risk mitigation strategies and childcare centre regulations have impacted the way early childhood educators practice and support risky play; Educators voicing these concerns, and the fears of being perceived as irresponsible, is consistent with previous literature [15,23]. This is closely connected to van Rooijen and Newstead's (2017) model's highlighting of regulatory factors as influential in how professionals negotiate risky play [17]. Although participating educators discussed their comfort with their own children engaging in risky play, they voiced how this level of comfort changes with other children due to centre policies and associated responsibilities. This finding suggests regulatory factors can hinder the way they support risk taking in the childcare environment. Educators also discussed the importance of communication with families about risky play, highlighting the need for additional strategies to support this type of communication. This finding is emphasized in the literature where communication with parents, and the need for training to support this dialogue, is critical in order for educators to practice in a way that is meaningful and beneficial for children [59–61], and again echoed in the layer of van Rooijen and Newstead's (2017) model emphasizing professional relationships with parents [17].

In this study, educators discussed how risk-taking in outdoor play is perceived as fun and thrilling, and how they believed this type of play was rewarding and important. This finding suggests that risky play is generally perceived positively and was encouraged in the participating child-care settings. This is an important finding, as educators' attitudes toward risky influences their practice [17,23]. Likewise, educators discussed how risky play benefits important aspects of child development such as enhanced fundamental movement skills, improved problem-solving, social skills, and confidence, and enhanced self-assessment. These findings are consistent with the literature and suggest that risky play not only benefits children's development, but participating educators are able to connect risky play to pedagogy [1,4,6]. This implies that although perceptions of risky play may differ among educators, the idea of risky play is generally perceived positively by educators and is seen as a mechanism for developing various physical, cognitive, and socio-emotional benefits.

Educators also discussed how they perceived the loose parts intervention to have a positive impact on the way children engaged in risky play. Educators described how the intervention facilitated children's physical activity and physical literacy and contributed to the development of fundamental movement skills such as balance and coordination, while also improving confidence. This finding is aligned with literature that suggests loose parts diversify the play experience and afford more opportunity to engage in risky play, through physical activities like climbing and balancing, as well as through controlling their environments, and allowing children to explore [15,34,39–41].

Important connections can be drawn between the themes identified in this project and across the levels of the model developed by van Rooijen and Newstead (2017) [17]. Across the themes, educators reflected on their own background, upbringing, and experiences. These reflections offer valuable insight into how educators construct their perceptions regarding risk. Educator beliefs significantly influence how they practice in the early childcare setting, with research indicating the belief systems of educators are informed by their own personal experiences and serve as a mechanism for how they make teaching-related decisions [62]. In fact, research has found educators' beliefs and personality type to influence teaching practice more than factors such as centre resources [63]. Across themes, educators also discussed societal shifts around play, and their perceptions that over time and generationally, we have become more risk averse regarding play. In this project, educators noted that the loose parts intervention served as a facilitator for an alternative shift that supported the adoption of risky play. These cross-theme findings also cross the levels of van Rooijen and Newstead's (2017) model, highlighting the importance of the construction of children, professional attitudes toward risk, and cultural factors. Future research should continue to explore societal shifts in play, how perceptions of risk relate to those shifts, and how loose parts may contribute to these perceptions.

Through this project we were able to explore educators' perceptions of risky play in the context of an outdoor loose parts intervention. Educators seem to recognize and appreciate the value of healthy risk taking during outdoor play for child development, and how loose parts materials provide a mechanism for children to explore and challenge themselves. Educators discussed how they negotiate risky play, and shared strategies they use to ease. Future studies are needed to further explore, evaluate, and assess the strategies used by educators here, to determine their efficacy in facilitating risky play, and to identify additional strategies. Future research should also further explore how risky play is communicated in childcare settings: with and between educators and administration, with parents and families, and with children.

This project has several strengths and limitations. A strength of this project is its contribution to the literature by adding a qualitative exploration of early childhood educators' perceptions of outdoor risky play in the context of a loose parts intervention. An additional strength is its use of an ecological framework and the recently developed model of van Rooijen and Newstead (2017) [17]. A further strength is that the work was conducted by a diverse interdisciplinary team with expertise in the use of loose parts in childcare settings. An important limitation of this work is the limited diversity represented in the childcare centres. While childcares from across Nova Scotia were included, they are only representative of regulated childcare centres, and therefore do not include the perspectives of other forms of childcare, limiting the diversity of perspectives that might be included, especially those which may serve historically under-represented groups. Additionally, while educator perceptions make a valuable contribution to the literature, this study is limited by exclusively including educator perspectives, and not including the child perspective as well. Future research should explore child perspectives of risky play and the use of loose parts.

Through this study, we found that risky play with loose parts contributes to an ongoing evolution in educator perceptions, and that those educator perceptions are intertwined with institutional, systemic, and cultural influences. We also found that educators facilitate risky play with loose parts by learning and developing new strategies, and that they perceive risky play to be an important part of healthy child development. Sharing these insights with other early years stakeholders may provide a better understanding on the benefits of risky play and the associated contribution offered by loose parts materials.

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## Conflict of interest

All authors declare no conflicts of interest in this paper.

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# Evolutionary Functions of Social Play

## Life Histories, Sex Differences, and Emotion Regulation



PETER LAFRENIERE

Many research findings about animal play apply to children's play, revealing structural and functional similarities with mammals in general and primates in particular. After an introduction to life-history theory, and before turning to humans, the author reviews research about the two mammals in which play has been studied the most extensively: laboratory rats and monkeys. He looks at the development of play, deprivation studies, gender segregation, and the functions of gender-differentiated forms of play. The gender segregation and sex differences in play parenting and rough-and-tumble play observed in many primates are also evident in children. Vigorous social-play benefits all children physically by developing strong bones and muscles, by promoting cardiovascular fitness, and by encouraging exercise habits that help prevent obesity. Unsupervised play also helps hone the skills of communication, perspective taking, and emotion regulation. For boys especially, rough-and-tumble play in early childhood provides a scaffold for learning emotion-regulation skills related to managing anger and aggression. **Key words:** emotion regulation; life-history theory; play deprivation; play of mammals; play of primates; play parenting; rough-and-tumble play; social play

**T**HIS ARTICLE EXPLORES the adaptive functions of the forms of play that have been shaped by natural selection to insure the organism's survival and reproduction. Contemporary evolutionary biologists think evolved patterns of play help children develop strong bones and fit bodies, acquire and practice a culture's skills and values, learn to establish friendships and get along with peers, and control impulses and emotions. The positive emotions play invokes encourage children to explore the environment, to try out new behaviors, and to learn with more flexibility—all of which helps prepare them for the unexpected (Panksepp 1993; Spinka, Newberry, and Beckoff 2001). However, in the United States and in much of the rest of the developed world, we have witnessed a dramatic decline in the opportunities for children to engage in vigorous social play away from adult control (Gray 2011). Thus, questions about possible functions



of free social play with respect to the physical and emotional health of children seem especially urgent.

In this article, I examine the possible benefits derived from vigorous social play—running, jumping, chasing, and wrestling. Mothers and teachers often frown on all of these, especially when played indoors. I begin with an introduction to life-history theory because each species has its own unique social ecology and historical development. We need an understanding of the challenges and opportunities a particular species faces to understand why play evolved in the particular form it did in that species. Because similar patterns of vigorous social play appear in many species, we can use comparative analyses to explore its adaptive functions in relation to species differences in social ecology and life history, as well as in age and gender within species. I precede my discussion of play in children with an overview of the mammals for which play has been studied most extensively: rats and monkeys. I review the development of play and experimental deprivation studies in which the potential benefits of play are inferred from animals deprived of it, for which there is no close parallel in human research. I also examine gender segregation and sex differences in play in relation to the specific functions that gender-differentiated forms of play serve in monkeys. I then describe developmental and cross-cultural patterns of play in children with particular attention to gender segregation and sex differences. Finally, I review evidence for adaptive functions of play in children and conclude with a discussion of the specific function of emotion regulation.

### **An Evolutionary Perspective**

From evolutionary biology, we know that the impulse to play in certain ways and at certain points in the life cycle is common to a variety of mammals. Because play is so ubiquitous in young mammals and combines the expenditure of great energy with apparently pointless risk, its evolutionary origins and functions have long intrigued evolutionary biologists. Evolutionary biologists specializing in the study of animal behavior (hereafter, ethologists) generally regard play as having been shaped in our species by natural selection to provide delayed benefits to the individual. In other words, through play a child develops and practices skills critical to survival and reproduction as an adult (Smith 2010). However, play may also confer immediate benefits to a child, and contemporary ethologists recognize that natural selection acts upon all periods of the life cycle, a view now called life-history theory.

Life-history theory proposes an analytical framework widely used in biology and evolutionary psychology since the 1970s. It postulates that species-typical characteristics have evolved to guide somatic and reproductive efforts over the course of life. The basic insight of life-history theory is that, with respect to its evolution, it is best to consider an organism as an ever-changing life cycle, not as a static adult. Because individuals have a finite amount of time, energy, and resources, they must make basic decisions regarding behavioral priorities and the allocation of resources with respect to developmental periods and life goals appropriate to those periods (Bogin 1999; Levins 1968). Despite its obvious costs, play takes priority during the early-juvenile period in all social primates, and social play occupies much of the time not spent eating and sleeping. Ethnologists consider this fact important as the primary basis for inferring an adaptive function of play, because natural selection favors only behaviors whose benefits clearly outweigh associated costs. The basic cost of such play is the time and energy devoted to it, since playing necessarily diminishes the time, effort, and energy spent on other activities. Under benign circumstance, the costs of play are greatly reduced, but playing can be costly under less favorable circumstances involving uncertainty, danger, or resource shortage, and other environmental risks. For example, it is well known that food shortages diminish juvenile play. This makes sense given the expenditure of high energy associated with play, which can increase food requirements in at least some species by as much as 10 percent over a metabolism at rest (Martin 1984; Siviy and Atrens 1992). Animals play less in very hot climates, when they fall ill, and when they fear predators. For example, cat odors and other predator odors have been shown to decrease play in rats (Siviy, Harrison, et al. 2006). All this makes sense, too, because the additional costs of play involve the possible neglect of predator danger, as well as the heightened risk of injury, especially in play fighting and other risky behaviors (Smith 2010).

Despite such costs and strategic trade offs, the natural propensity of young 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 “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” (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. I take this principle as the starting point for my analysis.

### **Laboratory Rats at Play**

Researchers have studied rat pups extensively to determine what functions play serves in their development, both socially and at the neural level. Classified as rough-and-tumble, the play of rat pups, includes charging, pinning, chasing, rolling, wrestling, and inhibited biting as well as surprise attacks. This behavior appears to be largely instinctive because it requires no evident learning on the part of the animal and appears early in life, even in socially isolated animals (Panksepp 1993). The developmental course of play behavior in rats follows the typical inverted U curve seen in other species, increasing rapidly from eighteen days of age and peaking at between thirty-two and forty days then declining as rats approach sexual maturity (approximately eighty to ninety days). Play fighting also becomes rougher and more complex during this period with an increase in asymmetry associated with dominance struggles. Such play fighting differs from the more serious fighting of somewhat older rats by its lesser severity and the reduced risk of its causing injury (Pellis and Pellis 1987). Panksepp (1980, 1993) insists that rat pups do not become aggressive when playing in this manner and never progress beyond a playful state. They initiate play bouts by pouncing on each other followed by chasing and pinning. After a period of playing, the animals stop and engage in grooming. The surprise attack often comes during this grooming phase. Usually, one animal suddenly pounces onto the seemingly unaware playmate, and the playing again commences.

### **Social Deprivation Experiments with Rats**

Researchers have found that the play of rat pups increases considerably after the animals are deprived of social interaction. The short-term effects of social deprivation, as well as more specific play deprivation (animals housed with nonplayful adult rats), clearly reveal a rebound effect. Of greater interest to developmental psychologists are findings regarding the long-term effects of play deprivation.

Research has demonstrated that depriving juvenile rats of play opportunities during their normative play period with peers (twenty to fifty days old) appears to have serious consequences for their adult behavior. In adulthood, these play-deprived rats show disturbances in their social behavior (Hol, Van Den Berg, Van Ree, and Spruijt 1999; Van den Berg, Hol, Van Ree, Spruijt, Everts, and Koolhaas 1999), their agonistic behavior (Lore and Flannelly 1977), and their sexual behavior (Gerall, Ward, and Gerall 1967). Rats deprived of play fighting are less tolerant of social approaches and may respond to social initiatives by behaving either more aggressively or more timidly than normal. These effects do not appear in rats provided one hour of peer play per day (Einon and Potegal 1991; Potegal and Einon 1988). We shall return to questions regarding the long-term effects of social deprivation at the end of the next section dealing with the play of monkeys.

### **Monkeys at Play**

Because of the diversity of primate social ecologies, any discussion of the different forms and functions of social play must consider the species-specific context in which the play occurs. For example, one would expect little social play in orangutans because they live primarily in solitude. Mother orangutans spend most of their lives isolated from other adult orangutans and give birth about once every five years. The only playmate for a juvenile orangutan, therefore, is its own mother, who is not particularly playful (Biben and Suomi 1993). Thus, the development of play behavior in orangutans does not offer much insight regarding the development of play in children.

In contrast, squirrel monkeys and rhesus macaques are typically born into troops that provide a great deal of social play with age-mates. They are also the two species of monkeys that have received the greatest research attention and provide us a more comprehensive view of play behavior over the life course than other nonhuman primate species. Monkey infants begin to engage in peer social play at about five weeks (Biben and Suomi 1993) and show the typical inverted U curve seen in other species, increasing rapidly in the early months, peaking at about six months, then declining rapidly by the end of the second year as the monkeys approach sexual maturity. At about the time they begin to play, infant monkeys of both sexes also begin to prefer the company of same-sex peers; and among juveniles, sex segregation becomes the rule (Rosenblum, Coe, and

Bromley 1975). This pattern of sex differences in social play generally appears in all primates. More importantly for our purposes, gender-specific forms of play provide important clues to the evolved functions of social play. As with humans, sex differences among rhesus and squirrel monkeys are typically relative rather than absolute—some overlap occurs 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 often than males do (Geary 1998; Pryce 1995). The functional significance of this type of play is apparent in primates—research in five species show that the chances of survival of the monkey's firstborn is two to four times higher for mothers with previous experience in caring for infants (Pryce 1993). Finally, mothers socialize their daughters differently than they do their sons. For example, female rhesus monkeys hold their daughters closer than they hold their sons and show more concern when their daughters wander.

On the other hand, rhesus mothers direct displays of anger more often at male than at female offspring, and mothers wean males earlier. Young male squirrel monkeys and male rhesus monkeys spend more time with peers, often without their mothers close by; they engage in high-energy games of chasing and play fighting; and they leave their natal troop at sexual maturity (Biben and Suomi 1993; Drickamer and Vessey 1973). The social ecology and life history of squirrel monkeys and rhesus monkeys resemble each other in important ways. In each species, as is true of primates in general, the developmental course of males and females differs 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 and more variable ones for males (Biben and Suomi 1993). Females, by staying in their natal group, inherit their status from their mother, and their affiliative relationships with their mother, aunts, and sisters generally remain stable throughout their lives. In contrast, males—who leave their natal group just before adulthood—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 reaches as high as 50 percent in some wild-monkey populations (Dittus 1979). Thus, from an evolutionary standpoint, rough-and-tumble play with peers provides critical practice for males relevant to their eventual dominance status in a new troop. Although the

males' longer and more-intense play-fighting bouts are costly during the early juvenile period—involving, as they do, more energy and the risk of injury—the bouts are not as costly as failing to join a new troop successfully. Thus, natural selection builds 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 for reproductive success in male and female monkeys. As a result of this asymmetry, adult male rhesus and squirrel monkeys are more aggressive than females, who generally avoid aggression and direct competition (de Waal 1996).

Experimental research also shows that many factors influence rough-and-tumble play in monkeys. For example, the amount of play in young squirrel monkeys varies from two or three hours per day to less than a half an hour depending on the availability of food (Baldwin and Baldwin 1974, 1976). Experimental studies creating food scarcities artificially reduce play rates to 1 percent of the time spent on play when food is abundant. When food supplies are renewed, play rates rebound strongly. Play rates are also subject to hormonal influences. Experimental research 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 leads to increased physical competition and high-energy physical play in female monkeys, regardless of social and contextual factors (Wallen 1996; Geary 1998).

In contrast to play fighting, play chasing does not appear to be gender differentiated, and females engage in this form of play nearly as often as males engage in it. While play chasing 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 helps monkeys learn to flee from predators and other dangers. Juvenile primates, like most young mammals, engage in a great variety of locomotor play, which occurs 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 the physical coordination necessary for rapid escapes in arboreal

environments. I have more to say about locomotor play in the discussion of children's play.

### **Social-Deprivation Experiments with Monkeys**

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 at the Wisconsin Regional Primate Center in the 1960s and 1970s. 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, stereotypical 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 responded with either excessive fear or excessive aggression when normally reared age-mates tried to engage them in play. The dysregulated bursts of reactive fear and aggression elicited retaliation from their normally raised peers. Later studies demonstrated that successful rehabilitation of the isolates depended on their pairing with nonthreatening, younger, female juveniles. At six months of age, isolate 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 them other nonthreatening forms of social stimulation. As both monkeys developed, aspects of normal social functioning gradually built up, although the isolates remained highly reactive to stress and conflict.

In reviewing this extensive literature, it is important to note that the social isolation in the early studies from the Harlow lab involved much more than mere "play deprivation." However, their subsequent research of comparing peer-reared monkeys with mother-reared monkeys does approximate play deprivation in the latter group. In these studies, mother-reared monkeys were deprived of all contact with age-mates in the first six months of life, 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, 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, the exploratory behavior of 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 mother-reared male monkeys in peer play, a difference that became more pronounced as they approached puberty. This elevated rate of aggression in males continued 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. When deprived of normal maternal care giving, monkeys exposed only to peers do not develop normally even in those domains specific to peer socialization. Thus peer play gets compromised in peer-reared monkeys because they never learn the earlier lessons in emotional regulation normally acquired during the attachment phase from a competent mother.

Suomi interprets his isolation experiments as a demonstration of 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 could not deal with the emotional arousal engendered by such stimulation, and they responded by mixing expressions of fear and threat, alternating between withdrawal and hyperaggressiveness. Mason (1965) hypothesized that these inability 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 the isolates could not communicate effective emotional cues.



Not only did they fail to send clear emotional signals, they also proved unable to decode clear signals. This lack of competence in nonverbal communication of emotion in isolate monkeys directly contributed to their maladaptive social relations with peers. The role of facial expressions in regulating harmonious social interaction in rhesus monkeys finds further support in experiments conducted by Izard (1990). He discovered 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 1960s and 1970s have had an enormous impact on the field of child development and have served to inspire naturalistic research in children a decade later, including my own observational studies of peer interaction in early childhood.

### **Children at Play**

The research literature on various types of children's play has a long history in both developmental psychology and ethology, which fortunately has been reviewed recently in two separate books by noteworthy contributors to these research traditions (Pellegrini 2009; Smith 2010). In my brief comments here, I intend to address both the similarities of research findings on children's play with the findings I have just reviewed on mammalian and primate play and the differences between children's play and animal play.

As with the analysis of monkeys at play, an analysis of the types and functions of children's play should be grounded in the unique features of human life history and social ecology. Many of the characteristic trends in primate social ecology and life history are evident in exaggerated form in humans. Although we share almost 99 percent of our genes with chimpanzees, our brains are more than triple the size of theirs. Among other differences, our brain size necessitates a relatively short gestation period because of the constraints of pelvic size on the birth of such a large-brained infant. This "premature" birth for humans necessitates a much longer period of dependency in infancy and an even longer juvenile period than those of other primates. In comparison with chimpanzees and gorillas, for whom physical growth is complete at about age eleven, physical

growth in humans continues to about age twenty (Smith 2010). Moreover, life-history patterns are gender-differentiated in humans; humans are distinguished by the two-year gap between females and males in puberty onset, growth spurts, and adult sexual maturity (LaFreniere 2010).

Many of the more basic and pervasive research findings on animal play also prove true for the play of human 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—gradual development in infancy, a peak in childhood, and decline in adolescence as children approach sexual maturity. Naturalistic studies of play deprivation in children also demonstrate a rebound effect, and the frequency of play appears highly sensitive to contextual factors. In addition, gender segregation also appears in young play groups, and the two types of play in which sex differences are widely observed in primates, play parenting and rough-and-tumble play, are also evident in children's play (Fagen 1981, 1995; Smith 2010).

### **Sex Differences**

Many developmental psychologists believe that, in addition to our shared biology with primates, socialization is another source for some differences in play behavior between girls and boys. The details of the behavioral ecologies of boys and girls are important to understand because of the role that peers play with respect to gender identity and sex roles.

Universally, children begin to sort themselves into sex-segregated enclaves beginning at about three years of age, which also marks the emergence of gender identity (a child's knowledge of his or her own gender and identification with others of the gender). Prior to their establishing gender-segregated play groups and before they establish a stable gender identity, toddlers begin to develop sex differences in toy preferences. In fact, children manifest such preferences even before they can accurately label toys as "boy things" or "girl things" (Fagot, Leinbach, and Hagan 1986). As early as fourteen months of age, girls begin selecting dolls and soft toys while boys choose trucks and cars (Smith and Daglish 1977). Toddlers' early tendencies to associate more with same-sex peers than with opposite-sex peers may derive from the sex differences in toy and activity preferences.

One study that addressed the origin of same-sex preferences found that by two years of age, girls already prefer same-sex peers while boys do not show a similar preference until age three (LaFreniere, Strayer, and Gauthier 1984). These data, derived from extensive observations of peer play in fifteen different children's groups, may actually reflect girls' avoidance of boys, rather than preference for girl playmates. This reasoning receives further support in experimental findings and in sociometric studies showing negative evaluations of boys by girls. As same-sex play becomes increasingly prominent, a number of behavioral differences between the sexes become more evident as well.

According to such developmental psychologists as Hartup (1989) 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 their peers than girls do. 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 demonstrate these behaviors away from adult supervision than are girls. In contrast, girls engage in more dyadic play than boys and more often prefer the company of their (mostly) female preschool teachers than do boys. The picture from a combination of naturalistic and experimental studies emerges as 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 appear in the behavior of girls and boys in mixed-sex groups and in the behavior of groups of girls with groups of boys. See LaFreniere (2010) for an extensive review.

If early sex-segregated play reflects girls' avoidance of boys, by the end of the preschool years, preference for same-sex peers transforms into clear avoidance of crossing the gender divide for both boys and girls. Segregation between the sexes increases throughout early childhood. By age four, 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, boys' rough play begins to lose the innocent quality it had in early childhood.

In an ethological study of same-sex groups of twelve- to sixteen-year-old girls and boys at a summer camp, Ritch Savin-Williams (1987) found gender-

distinct play and gender-distinct social interaction styles. Whereas boys ordered, teased, argued, and dominated through physical play, girls gossiped, ostracized, and provided unsolicited advice. Typically, boys established highly stable status hierarchies on the day of their arrival at the cabin using very direct and overt strategies of physical dominance and verbal ridicule. In contrast, girls used physical assertion much less often and were more indirectly manipulative in their verbal directives and ridicule. One of the girls who gradually took control of a cabin did so by ostracizing a high-status peer and undermining her through gossip, directing middle-status peers with “suggestions,” and subtly ridiculing a low-status peer with “assistance.” In some cabins, girls resolved conflicts by giving someone the “silent treatment,” which lasted for days.

Dominance in boys’ cabins was anything but subtle, and boys engaged in exuberant rough play that occasionally escalated into real fighting. When this happened, strained relations were quickly patched up with assertions that it was all “in fun.” Almost 90 percent of the sixteen hundred recorded instances of dominance behavior in one cabin of boys were overt rather than indirect. Quantitative analyses of all eight cabins revealed that the most overt female cabin (57 percent) was less overt than the least overt male cabin (67 percent). Dominance behavior was not only more overt among boys, it also occurred more frequently, sixteen times per hour, compared to six times per hour in the female cabins (Savin-Williams 1987).

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 prenatal development shape sex differences in both brain structures and social behavior, particularly in play. These steroids help direct the organization and wiring of the brain during development, and they influence the structure and neuronal density of various regions. Several researchers have reported sex differences in a variety of brain structures, including the amygdala and hypothalamus, both of which are involved in play behavior (Lewis and Barton 2006). These two parts of the brain appear to be implicated in gender-differentiated patterns of rough-and-tumble play. In the comparative study of nonhuman primates, their relative sizes were found to correlate positively with the frequency of social play.

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. Prenatal exposure to higher levels of androgen in girls relates to decreased interest in infants and doll play and increased preferences for the toys 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).

### **Cross-Cultural Research**

It follows directly from such biological evidence that gender differences in play would be universal rather than culturally specific. The results in both preindustrial and industrial societies generally demonstrate 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, and wrestling, four to five 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 among boys and girls (Smith 2010). For this reason, researchers need to distinguish chasing from play fighting, instead of lumping them together, as they sometimes do. 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 these diverse cultures share two sex differences: girls exhibited more nurturing than boys, and boys engage in more dominance behavior than girls. More recently, a multinational study involving ten countries (Austria, Brazil, Canada, China, France, Italy, Japan, Russia, Spain, and the United States) using teacher ratings confirmed these findings, documenting sex differences in empathy and social competence favoring girls and physical aggression and dominance favoring boys in all ten countries (LaFreniere et al. 2002).

In her cross-cultural analysis of children's social behavior in ninety-three societies, Bobbi Low (1989) found that sex-differentiated patterns of child rearing were systematically related to various dimensions of the social ecology in

ways predictable from evolutionary theory. In polygynous, nonstratified societies in which men elevate their social status and achieve higher reproductive success by taking multiple wives, boys were socialized to be industrious, competitive, and aggressive. In these societies, the larger the maximum number of wives, the more boys were socialized to be competitive. These results were not found in monogamous, stratified societies in which men's social status and reproductive success could not be advanced by competitive and aggressive behaviors, although socialization for industriousness was still evident.

Similarly, socialization for girls tended to emphasize more aggressive behavior and achievement in societies where women inherited wealth and held political office than in societies where men had near total control of economic and political power (Low 1989). In summary, cross-cultural research demonstrates that parenting styles can influence childhood behavior in ways that align such behavior with the demands of a particular social ecology. At the same time, cross-cultural research consistently demonstrates universals in sex roles. In general, biological and cultural factors collaborate to produce adaptive behavior within any particular ecology.

### **Adaptive Functions**

Questions regarding the adaptive functions of social play in children are central to both human ethology and developmental psychology, and the answers have clear social-policy implications with respect to early childhood. Unfortunately, definitive answers to functional hypotheses are scarce, though opinions abound. All functional hypotheses need to be specific to the type of play and formulated with immediate or deferred benefits in mind. With respect to the two types of social play previously discussed for nonhuman primates—play parenting and rough-and-tumble play—functional hypotheses should also be gender specific.

A review of the literature on rough-and-tumble play reveals a number of competing functional hypotheses. Sex differences in the amygdala and hypothalamus, both of which are implicated in gender-differentiated patterns of play (Hines and Shipley 1984; Lewis and Barton 2006) strongly suggest different benefits for boys and girls who engage in rough-and-tumble play. In modern Western cultures, some of these benefits may be largely vestigial, such as deferred benefits leading to enhanced hunting or fighting skills. Other benefits, related to

achieving dominance status and acquiring valuable resources, may remain significant in modern cultures. Additional benefits may also still operate, including benefits derived from play chasing. In games involving chasing, children seem to prefer the fleeing position (e.g. in the game of tag and in all games modeled after tag, the preferred position is to be chased), which suggests that such play has more to do with our legacy as prey than our legacy as hunters. Consistent with this, girls do not engage much in play fighting, but they frequently engage in play chasing, perhaps almost as much as boys. Chasing very clearly serves to build cardiovascular strength and may also play a role in learning to flee from predators, enemies, and other dangers. Such abilities may still be adaptive because running away and hiding can still save lives.

Typical playground forms of locomotor- and physical-exercise play, including tag, hopscotch, jump rope, and climbing on monkey bars, benefit children in a variety of ways. These physically challenging and vigorous forms of play certainly provide short-term benefits with respect to cardiovascular health and muscular development. Combined with proper dietary habits, long-term habits of healthy exercise may help prevent obesity, which had reached epidemic proportions in the United States by the twenty-first century. Currently, two out of three American adults are overweight or obese, and the number climbs annually. Minority and low-socioeconomic groups are disproportionately affected at all ages (Wang and Beydoun 2007). According to Cynthia Ogden and her colleagues in the *Journal of the American Medical Association* (2010), childhood obesity has more than tripled in the past thirty years. The prevalence of obesity in children aged six to eleven years increased from 6.5 percent in 1980 to 19.6 percent in 2008. Among adolescents aged twelve to nineteen years, it increased from 5.0 percent to 18.1 percent (Ogden et al. 2010). Because exercise and eating habits, once established, tend to remain stable over time, overweight adolescents have a 70 percent chance of becoming overweight or obese adults (USDHHS 2008). Besides burning calories and helping to prevent obesity, different forms of playground play may also provide other long-term benefits. For example, sustained jumping—as in jump rope—increases bone density in childhood (Pellegrini 2009).

Children may also benefit cognitively in terms of sustained and focused attention from regular exercise. Younger children, especially boys, seem to need opportunities for vigorous play more than older children. Studies have shown that young children become increasingly restless in the classroom after long periods of sedentary activity and they play more vigorously when released from

their desks (Smith and Hagan 1980). This behavior appears to be quite similar to the “rebound effect” in the play deprivation studies of animals. When children are deprived of exercise indoors then given an opportunity for outdoor play, the intensity and duration of exercise increases (Pellegrini, Huberty, and Jones 1995). These effects for American five- to nine-year olds appear greater for boys than for girls.

Vigorous social play also clearly benefits social behavior and emotions. 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, especially under conditions of high arousal, may remain as important today as ever. Animal research suggests 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.

### **Managing Emotions**

Research that examines the free flow of behavior in young children’s play suggests that unsupervised social play provides an opportunity for learning about emotional communication, not only by sending and decoding signals but also by 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 six thousand individuals. As a result of these extensive interviews, he believes that the absence of unsupervised preschool play results in a deficit in reading play signals that leads to major integrative difficulties as group play becomes more complex on elementary-school playgrounds. Deficits in reading play signals can lead to the inappropriate management of aggression, manifested by hyperaggression or withdrawal. In his retrospective clinical analysis of many cases, Brown repeatedly finds that the roots of this dysfunction precede elementary school.

Daily observations of children’s struggles with emotion management in the sometimes chaotic preschool classroom and playground confirm that socially active children learn a great deal, whereas children who are passive and socially withdrawn or hostile and rejected by their peers do not learn. The more deeply we study social interaction during children’s free play, the more important affec-



tive expression and emotional regulation appear. The central role of emotional control and expression becomes 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, and terminating them) is obvious to trained observers, but very difficult to quantify (Sroufe et al. 1984).

In early childhood, quantitative measures of positive affect recorded during free play strongly correlate with both teacher ratings of social competence and peer popularity because a child's affect plays the central role in initiating and regulating harmonious social interchanges among preschool peers (LaFreniere and Charleworth 1983; LaFreniere and Sroufe 1985). In contrast, teachers and peers viewed much less favorably preschoolers who expressed chronically high or unusually intense negative emotions. Some researchers have attempted to go beyond general indices of positive and negative emotions in order to provide a more differentiated view regarding the role of affective expression in children's social interaction. It is particularly important that we discriminate between different types of negative affect. Observers recording affective expressions during preschoolers' free play can reliably distinguish (as can the children themselves) distress, sadness, and anger from each other based on vocal, facial, and postural cues.

In one observational study of the expressions of anger during free play of preschoolers, 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 occurred during disputes among the children over objects. Consistent with previous research, 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 nonaggressively with the provocation, often using their greater social status in the peer group to retaliate by isolating the angry 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 children of preschool age begin to control their emotional expressions to fit the context.

In our experimental work with young children, we decided to examine male preschoolers' abilities to regulate disappointment, frustration, and anger in order to achieve positively toned cooperation with a peer (LaFreniere 1996). Our

prior 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 about objects in the preschool setting accounted for the vast majority of recorded acts of aggression in the classroom (LaFreniere and Charleworth 1983). Based on these observations, we designed an experiment to induce mild frustration by controlling the outcome of a competition. Preschool boys were instructed that the first one who completed his jigsaw puzzle would receive a prize. The boys typically competed enthusiastically. When they won the competition, they broadcasted smiling and triumphant looks at their partners and occasionally boasted of their success. When they lost, they looked down or away, frowned, slumped, and occasionally whined or complained.

In a subsequent cooperative play situation involving the sharing of an attractive toy, typically some form of taking turns prevailed, where each child played with the toy for a brief period. However, we observed a great variation in the degree of cooperation, conflict, and competition. Affective regulation following the puzzle 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 successfully regulated the mild negative emotion produced by the unequal outcome to the puzzle competition and subsequently played enthusiastically 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 interactions. Boys who were previously assessed by their preschool teachers as angry and aggressive tended to respond to losing the puzzle competition with frustration and difficulty in regulating this emotion. In contrast, anxious and 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 cooperative play session.

Collectively, these studies suggest that emotion-regulation skills underlie children's abilities to balance cooperative and egoistical concerns in the daily challenges of social life among peers, where children sort themselves into leaders and followers, bullies and victims, and adopt popular, isolated, or rejected social roles. For boys especially, vigorous social play in early childhood provides a scaffold for learning skills needed in adolescence 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 own 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. I have reviewed research on locomotor and rough-and-tumble play in juvenile laboratory rats, monkeys, and humans to show how the adaptive functions of play for each species are related to their specific social ecology and life history. These comparisons reveal the inventive hand of natural selection as a tinkerer, taking components out of complex systems that have worked in the past and embedding them into new designs and new contexts. 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 honing skills that are vital to the organism.

As with most mammals, play in children appears to be a primary affective and 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 of play is highly sensitive to contextual factors. In addition, the early gender segregation and sex differences in play parenting and rough-and-tumble play that occur in primates also appear in children's play of different cultures.

Evolved patterns of vigorous social play benefit children in a variety of ways. First, and certainly important in today's sedentary society, are the physical benefits. Vigorous play helps children develop strong bones, muscles, and cardiovascular fitness and encourages exercise habits that, if maintained, can help prevent obesity and lead to a lifetime of physical fitness. Second, 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 emotion-regulation skills, especially during emotion-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 Jean 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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## CLINICAL REPORT

# The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bond: Focus on Children in Poverty

## abstract

FREE

Play is essential to the social, emotional, cognitive, and physical well-being of children beginning in early childhood. It is a natural tool for children to develop resiliency as they learn to cooperate, overcome challenges, and negotiate with others. Play also allows children to be creative. It provides time for parents to be fully engaged with their children, to bond with their children, and to see the world from the perspective of their child. However, children who live in poverty often face socioeconomic obstacles that impede their rights to have playtime, thus affecting their healthy social-emotional development. For children who are underresourced to reach their highest potential, it is essential that parents, educators, and pediatricians recognize the importance of lifelong benefits that children gain from play. *Pediatrics* 2012;129:e204–e213

More than 15 million children in the United States younger than 18 years live in poverty.<sup>1</sup> These children experience disparities in education, health care, and socioeconomic resources.<sup>2–6</sup> Children living in poverty may also be deprived of the benefits of safe and creative playtime and access to age-appropriate extracurricular activities. The implications of play deprivation may be substantial, because play is essential to the social, emotional, cognitive, and physical well-being of children beginning in early childhood.<sup>7</sup> In addition, play offers an opportunity for parents to view the world from their child's perspective as they engage fully with their children during playtime; all families deserve ready access to this bonding opportunity. Even before the United Nations High Commission for Human Rights cited play as a right of every child, philosophers and psychologists, such as Plato, Piaget, and Friedrich Froebel, recognized the importance of play in healthy child development.<sup>8–10</sup>

This report addresses issues that may deprive children who live in poverty from gaining the maximum benefit from play. Because it follows an earlier report that focused on factors reducing free playtime for children whose families have resources, this report addresses issues specific to children from lower-income families.<sup>7</sup> Although some of the factors covered in the previous report may also apply to children from lower-income and poor families, 3 issues disproportionately affect these children and merit special attention. First, access to recess and other in-school creative and physical

Regina M. Milteer, MD, Kenneth R. Ginsburg, MD, MSEd, and the COUNCIL ON COMMUNICATIONS AND MEDIA and COMMITTEE ON PSYCHOSOCIAL ASPECTS OF CHILD AND FAMILY HEALTH

**KEY WORDS**

children, development, parents, pediatrician, play, poverty

**ABBREVIATIONS**

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outlets (eg, physical education, art, music), as well as after-school youth development programs are reduced. Second, out-of-school opportunities for play may be compromised by a lack of safe play areas, because parks and playgrounds are less abundant in lower-income areas and, in some cases, may be unsafe because of drug dealing, violence, and vandalism.<sup>11,12</sup> Finally, because lower-income parents have to deal with additional social, emotional, and economic stressors of daily living, they may have less time, energy, and resources available to provide active and creative playtime at the park, playground, or even in the home.

All children deserve the opportunity to reach their highest potential. The optimal developmental milieu for children includes academic enrichment, as well as opportunities for physical, cognitive, social, and emotional growth offered in school, home, and community settings. There are different forms of play—free unstructured play, which uses unlimited creativity, and semistructured play, which is guided play with joint attention by parent and child. It is beyond the scope of this report to define and divide, but poverty may prevent challenges to both unstructured and guided play.

Free unstructured play, as well as creative and physical outlets, contribute to social and emotional growth. This report offers guidance on how pediatricians can advocate for children by helping families, school systems, and communities consider how best to ensure play is protected and promoted as the optimal developmental milieu for positive child and youth development is explored.

## THE BENEFITS OF PLAY

It could be argued that active play is so central to child development that it should be included in the very definition of childhood. Play offers more than

cherished memories of growing up, it allows children to develop creativity and imagination while developing physical, cognitive, and emotional strengths. A previous manuscript described the benefits of play in fuller detail.<sup>7</sup>

Play enhances physical health by building active, healthy bodies. Physical activity beginning in early childhood prevents obesity.<sup>13</sup> In fact, play may be an exceptional way to increase physical activity levels in children and, therefore, may be included as an important strategy in addressing the obesity epidemic.<sup>14,15</sup>

Play contributes to healthy brain development.<sup>16–18</sup> Children engage and interact with the world around them through play from a very early age. Even in the academic environment, play helps children adjust to the school setting, thereby fostering school engagement, and enhances children's learning readiness, learning behaviors, and problem-solving skills.<sup>19–31</sup> In addition, play and recess may increase children's capacity to store new information, as their cognitive capacity is enhanced when they are offered a drastic change in activity.<sup>19,20</sup>

Play is essential to developing social and emotional ties. First, play helps to build bonds within the family. Children's healthy development is mediated by appropriate nurturing relationships with consistent caregivers.<sup>16</sup> Play allows for a different quality of interaction between parent\* and child, one that allows parents to “listen” in a very different, but productive, way. When parents observe their children playing or join them in child-driven play, they can view the world through their child's eyes and, therefore, may learn to communicate or offer guidance more effectively. Less-verbal children may be able to express themselves,

including their frustrations, through play, allowing their parents an opportunity to better understand their needs. Above all, the intensive engagement and relaxed interactions that occur while playing tell children that their parents are fully paying attention to them and, thereby, contribute to a strong connection.<sup>17,32,33</sup> Play also helps forge connections between children. It allows them to learn how to share, to negotiate and resolve conflicts, and to learn self-advocacy skills when necessary.<sup>34,35</sup> It teaches them leadership as well as group skills that may be useful in adult life.

Play should be an integral component of school engagement. School engagement is best realized when the educational setting attends to the social and emotional development of children as well as their cognitive development. The challenge is to make each child feel competent in a school setting, because the experience of success forms positive associations with school attendance.<sup>9</sup> Although we hope for each child to demonstrate academic strengths, opportunities to exhibit social, physical, and creative strengths optimizes the chances that children will realize their areas of strength. Play, recess time, and classes that foster creative aptitude and physical fitness allow for peer interactions that contribute both to school engagement and social-emotional learning. Social-emotional learning should not be thought of as distinct from academic learning, because it can creatively be integrated with academic learning and has been shown to enhance children's ability to learn.<sup>36–38</sup>

Play is a natural tool that children can and should use to build their resilience. At its core, the development of resilience is about learning to overcome challenges and adversity. As mentioned, children learn to deal with

\*The word “parent” is used in this report to represent the wide range of adult caregivers who raise children.

social challenges and navigate peer relationships on the playground. In addition, even small children use imaginative play and fantasy to take on their fears and create or explore a world they can master. Play allows them to create fantasy heroes that conquer their deepest fears. It allows them to practice adult roles, sometimes while playing with other children and sometimes while play-acting with adults.<sup>34</sup>

<sup>39–41</sup> Sensitive adults can observe this play and recognize the fears and fantasies that need to be addressed; however, in many cases, play itself helps children meet their own needs. As they experience mastery of the world they create, children develop new competencies that lead to enhanced confidence and the resilience they need to address future challenges.<sup>34,42</sup>

## **FACTORS THAT REDUCE PLAY FOR CHILDREN IN POVERTY AND THE POTENTIAL IMPLICATIONS**

### **Reduced Access to Play in Schools**

There has been a national trend over the past decade of reducing playtime as an integral part of the school day. This trend is most easily observed in the reduction and, in some cases, elimination of recess; however, there are more subtle changes throughout the school day that reduce children's opportunity to play. First, the approach to early education that naturally incorporated play into the school day is shifting toward a more academically oriented instructional approach as new standards for reading readiness have changed for even kindergarten students.<sup>9</sup> Second, in many districts, there is less school time allocated to the creative arts and physical education.<sup>9,43,44</sup> These subjects contribute to a well-rounded education for a variety of reasons but share some of the benefits of play. They allow for

a break from the standard academic subjects, foster creative and physical expression, and teach relaxation and stress-reduction skills that will last a lifetime.<sup>9,13</sup> Finally, even after-school activities have shifted away from play and physical activity and toward being an extension of academics and a space for homework completion.<sup>43</sup> This report focuses on reduced recess for illustrative purposes.

Many of these trends are disproportionately affecting underresourced school districts because of targeted efforts to reduce significant academic disparities. It is a national imperative that all children are given the opportunity to reach their academic potential, and efforts to reduce disparities between children with varying levels of resources are urgently needed. It remains important, however, that what is known about child development, including social and emotional learning, remains at the forefront of consideration as policies to raise academic standards and performance for children are created and implemented. Play, in all its forms, needs to be considered as the ideal educational and developmental milieu for children is created. Because poorer children are most dramatically affected by these policies, stakeholders must remain vigilant in ensuring that children do not inadvertently suffer from the diminution of play in their lives while exploring potential solutions to benefit them academically.

A report by the National Center for Education Statistics revealed that children who attend schools with high minority and high poverty rates in urban settings are more likely to have reduced recess time as compared with their peers in more affluent suburban areas.<sup>44–46</sup> Twenty-eight percent of schools with students who have the highest poverty rates had no recess at all.

The No Child Left Behind Act of 2001, designed to decrease the achievement gap of disadvantaged students, allocated additional educational resources and enrichment programs while decreasing recess time to allow more formal educational encounters.<sup>47</sup> At its inception, child development experts, including educators and pediatricians, voiced caution about the demise of playtime for young children with the proposed increased curriculum time of the program.<sup>9</sup> The experts supported the Alliance for Childhood recommendations that children from low-income families be afforded time to learn how to play and time to play.<sup>9</sup> Perhaps in recognition of the importance of the social and emotional development, as well as academic success of children who live at or below the poverty line, the US Department of Education in 2009 announced the Race to the Top Program, an education initiative that financially rewards school districts that support improving social, cognitive, physical, and emotional school readiness of disadvantaged students. In bids to receive the rewards, school districts must demonstrate focused programs that prepare students in the core academic subjects and other subjects that contribute to the development of well-rounded students, such as physical education and the arts.<sup>48</sup> Thus, children who might otherwise not be afforded opportunities for physical activity and enrichment programs outside of the school day have designated time to enhance their total development.

The disparity between access to recess between middle-income and lower-income districts may be explained by factors other than recess time being transferred to reading and math instruction. It has been suggested that reduced recess in poorer areas is reflective of adult concerns that it is not safe for poorer children to have

unstructured time; yet, it has not been proven that recess is unsafe. A time to play is different from the environment in which play occurs. When children have toys and equipment with which to play and attention is paid to helping the children transition back to class, the benefits of recess in terms of expressivity, exercise, and socialization suggest its vital role in the child's school day and overall well-being. Some experts believe the real danger is that the misunderstanding has led to the removal of playtime.<sup>49</sup> The reduction of recess and other in-school opportunities to play affect all children but may have a particularly detrimental effect on poorer children, because they are likely to have fewer opportunities to play outside of school.<sup>11,12</sup> In addition, because school is often the first true socialization environment for vulnerable children, the opportunity for social and emotional learning must not be compromised.

Poor children enter the educational system at a lower level of readiness, averaging 2 years behind their middle- and upper-class peers.<sup>50</sup> This may be explained in part by their increased exposure to social stressors (higher rates of single mothers who lack social supports and financial resources, absent fathers, limited access to early childhood education, unsafe neighborhoods, lack of preventive health care). They mainly enter schools in poor communities that lack financial resources to enhance the educational process.<sup>51</sup> Schools, under pressure to increase academic performance and to decrease the achievement gap of students, have increased direct educational time, including after-school enrichment and tutorial programs. Although it is important to decrease academic disparities, enhanced non-academic interactions are also essential to prepare children for future

success. If the overall goal is to decrease school failure, which could ultimately lead to depression, entry into the juvenile justice system, and continued economic deprivation, a response to the problem has to include efforts to promote school engagement.<sup>49</sup> As previously discussed, opportunities for play and social and emotional learning enhance school engagement. Quite simply, school engagement occurs when children succeed academically, have other non-academic opportunities for success (creative arts, physical education), and consider school a place in which they feel safe and enjoy spending time.

Play in the school day offers benefits to academic as well as social and emotional learning. A recent report by Barros and others stated that a break during the school day of  $\geq 15$  minutes was associated with better teachers' ratings of classroom behavior scores.<sup>19</sup> Good behavior in the classroom is associated with a more productive learning environment secondary to increased attentiveness.<sup>19,20</sup> In addition, children's ability to store new information is increased, because their cognitive capacity is enhanced by a drastic change in activity.<sup>51–53</sup> A change in academic subject and even physical education class may not offer the same benefit as free-play recess.<sup>49</sup> A reduction of time for physical activity may have even greater implications for boys. Schools that use only sedentary styles of learning may be a more difficult environment for boys to navigate successfully and contribute to the discordant academic abilities between boys and girls.<sup>54,55</sup> These findings suggest that decreasing and eliminating recess for students at risk for school failure may be counterproductive.

Finally, it is recognized among educators that recess represents the most powerful strategy to get the most

children to participate in physical activity.<sup>56</sup> In its "Physical Activity Guidelines for Americans," the US Department of Health and Human Services recommends 1 hour or more of physical activity per day, with a major part of the hour dedicated to moderate to vigorous physical activity at least 3 times per week for children and adolescents.<sup>57</sup> Physical education curricula should enhance attitudes, habits, and behavioral skills that result in continued physical activity throughout life.<sup>14</sup> Overall, recess offers the most available opportunity for children to play and to engage in physical activity, followed by physical education classes and after-school activities.<sup>58</sup>

### Reduced Out-of-School Opportunities for Play

Children cannot play safely outside of the home in many poor communities—urban, suburban, and rural—unless they are under close adult supervision and protection. This is particularly true in areas that are unsafe because of increased violence or where other environmental dangers exist.<sup>11,12</sup> In the past, when neighbors knew each other and often supervised each other's children, there was an extra layer of protection for neighborhood children when they played outside. In today's society, it is not unusual for neighbors not to know one another. Therefore, parents are alone in protecting and supervising their children, which can severely limit outside playtime.

Children who are not engaged in play and physical activity outside of school hours spend time engaged in sedentary activities, such as viewing hours of television, playing video games, or listening to music. This time is often spent in isolation without social interaction and without adult supervision. In sharp contrast to the benefits of



active, creative play, there is substantial evidence that excessive screen time has adverse effects.<sup>59–64</sup> The AAP policy statement on media education presented research that associates media exposure with negative physical and behavioral health problems in children, including obesity, violent and aggressive behavior, depression, anxiety, earlier sexual behaviors, poor academic performance and self-image, nightmares, and tobacco and substance abuse.<sup>63,64</sup>

The sedentary lifestyle is associated with obesity, for which children from low income and minority families are already disproportionately at risk.<sup>65</sup> The AAP and others have reported that children who are obese in early childhood are more likely to be obese adults and to be at risk for the comorbidities associated with obesity, including type 2 diabetes mellitus, hypertension, coronary artery disease, hypercholesterolemia, hyperlipidemia, asthma, and sleep apnea.<sup>14,66,67</sup> In addition to the long-term health effects, obesity may be associated with immediate social and emotional consequences, including low self-esteem, negative body image, depression, teasing and bullying, social marginalization, and discrimination.<sup>63,64,66,67</sup> Obesity can have socioemotional effects on academic achievement and opportunities and can, therefore, thwart educational trajectories associated with long-term success.<sup>66,67</sup>

### Family Considerations

Although lower-income parents have the same desires for their children to succeed and reach their full potential as do parents with greater economic and social assets, they must focus primarily on the family's day-to-day survival. When food and shelter are at risk, ensuring time for the children to have free and creative playtime may not be a priority. Economic hardship

is a major obstacle for these families, in which the parents are more likely to have a lower educational level or be single heads of households. Minority households (black and Hispanic) and immigrant parents are at increased risk of having children who live in poverty.<sup>1,68</sup> There is more likely to be a history of substance abuse in poorer families. The neighborhoods in which they live lack community resources, such as community centers, parks, and fully equipped supervised playgrounds that offer safe places for children to play and to gather. Children have fewer opportunities to participate in organized sports. Because of fear of violence, families do not venture outside with their children for fun physical activities, such as walking, bike riding, swinging, swimming, playing tennis, or jogging.<sup>11,12,69</sup> In a safe environment with community resources, these activities would not be an additional financial burden to already challenged families.

Poor families may also be at a disadvantage in a material-driven culture in which marketing messages, often claims without proof, abound about what children need to prosper. They may absorb the messages that the best toys are those that are the most expensive or that children are only academically prepared for preschool if exposed to a variety of enrichment tools and activities that claim to produce high-achieving children. Parents who cannot afford these market-driven materials may feel disempowered to actively play with and enrich their children using the most effective known tools—themselves. Children's creativity is enhanced with the most basic (and least expensive) toys, blocks, dolls, and art supplies. Children's academic preparedness may be most developed with low-cost time spent reading with parents. They will learn to love books when they associate

quality time with their parents with reading.<sup>70</sup>

Lower-income parents may have fewer resources, including time, to invest in playing with their children. Because play holds so many benefits, including fostering connection between parents and children, less play may be an added, although rarely mentioned, risk of poverty. No one is certain what skills will be needed for our children to be best prepared to lead us into the future, but we do have insight into which character traits will produce children capable of navigating an increasingly complex world. These include confidence, the ability to master the environment, and a connection to others. In addition, to be resilient—to retain hope and to be able to overcome adversity—young people need the added character traits of honesty, generosity, decency, tenacity, and compassion.<sup>71</sup> Children gain these essential traits within a home, when parents and children interact in a supportive manner and share unconditional love.<sup>71–76</sup> Play is a time-tested way for families to have these types of interactions.

### WHAT ARE THE SOLUTIONS?

Because there are many causes for the decreased amount of play in the lives of lower-income and poor children, there is no single solution. In addition, simplistic proposed solutions might not take into consideration the complex interplay of factors that have led to decreased play, including the need for safety. For example, if a child does not reside in a safe neighborhood, it may be unwise to simply propose more outdoor child-centered play. Similarly, it may be naïve to insist on more recess without simultaneously coming up with solutions that address the very substantive issue of educational disparities. It is critical, however, that as strategies are developed that

address educational needs and safety, the recognition of children's need to play be strongly advocated, because play is known to promote healthy development and resilience.<sup>46,52,55,58</sup>

To effectively preserve play in the lives of economically disadvantaged children, its presence in schools, communities, and homes must be supported.

In schools, the need to support social and emotional learning and healthy child development must be held alongside the need to increase academic scores. Otherwise, school engagement might suffer and efforts at creating a better-prepared generation might fail. The bottom line to school engagement is that schools should be the kind of places that children and adolescents want to be. This means that educators and policy makers must make opportunities for lower-income children to gain the benefits offered from physical education, recess, and the arts so they can reach their highest potential for cognitive, social, and physical development and so children and adolescents will like school. Advocates can also promote programs such as Head Start, the purpose of which is the promotion of school readiness for low-income children. Head Start provides an environment that enhances students' emotional, social, and cognitive development and has demonstrated effectiveness.<sup>77</sup> One of the keys to the success of Head Start has been the involvement of parents in social interaction with their children in playing, reading, and reading-related activities.<sup>78</sup>

Policy makers and community leaders must work together to prioritize the need for safe spaces for families to gather and for children to play. Supervised after-school programs can be critical to children who live in communities where outside playing might be dangerous or unsupervised.

Community-based programs that offer a wide variety of services, ranging from homework assistance to athletic programs and from character development to the creative arts can contribute heavily to the positive development of youth. Keeping school facilities open for use by community families in the evenings and on weekends when they are usually closed may increase engagement in these activities. Communities can also offer strategies to link families at or below the poverty level to early education, health care, family support, and parenting education.

Parents of all income levels should use time together at home to engage in both free and structured play with their children. Playtime is bonding time for families. A first step may be education about the value of play that simultaneously refutes false notions that for play to be effective, it must involve expensive toys. Parents from across the economic spectrum need to understand that it is their presence and their attention that enrich their children and that one-on-one play is a time-tested, effective way of being fully present. In parallel, we must be sensitive to the fact that time itself is a commodity when struggling for economic survival. The most comprehensive solutions, therefore, must address broader economic disparities and other factors that create stresses for economically disadvantaged parents.

Certainly, these solutions are broad and societal, going beyond the purview of the pediatrician's office. But as child health professionals committed to the attainment of optimal physical, mental, and social health and well-being for all infants and children, pediatricians have a role in advocating for broad-based solutions that will preserve child play.

## ADVICE FOR PEDIATRICIANS

As caring, objective child health professionals, pediatricians have a natural role to advocate for the conditions that allow for the optimal physical, emotional, and social development of children and adolescents. Because play contributes substantially to the healthy development and well-being of children, it is important that pediatricians promote the inclusion of play in homes, schools, and communities.†

- Pediatricians can educate parents about the importance of free, unstructured play in the normal development of children.
- Parents may be influenced by marketing messages that suggest the best toys are those that are financially out of reach. They should be educated that simple, inexpensive toys, such as dolls, jump ropes, blocks, balls, and buckets, are more effective in allowing children to be creative and imaginative than more expensive toys, which can make play a more passive and less physically involved experience.
- Pediatricians can educate parents about the benefits of using play as an opportunity to engage fully with their children. Playtime offers opportunities for parent-child bonding. Playtime offers parents the opportunity to promote healthy social-emotional development in their children through active engagement and shared imagination.
- Pediatricians can encourage parents to use love and understanding to encourage children to try again even when at first they fail. Parents can be informed that

†The guidance in this report is offered by the AAP and, therefore, is targeted to pediatricians. Other health professionals who serve children and adolescents, including other physicians, pediatric and family nurse practitioners, and physician assistants are welcome to consider incorporating this guidance into practice.

positive reinforcement goes further than negative responses as children engage in play alone and with others.

- Pediatricians can use well-child encounters to educate parents about the benefits of play to enhance physical activity that can help prevent childhood obesity. Parents should be educated about the potential for lifelong obesity in obese children, the lifelong health morbidities associated with obesity, and the long-term psychosocial impact of obesity.
- Parents should be encouraged to participate in physical activities with their children that will not have a financial impact on the family.
- Pediatricians can provide parents with information about resources that can provide financial, educational, and mental health assistance to families that have been marginalized by poverty. This may address the underlying stressors that interfere with parents' ability to engage fully in play activities.
- Pediatricians can educate parents about the negative impact of media exposure on children and encourage them to limit screen time and substitute other activities, including playtime and outdoor activities, for screen time. This is an opportunity to educate parents about the AAP recommendations regarding no media time for children younger than 2 years and fewer than 2 hours per day for older children.
- Pediatricians can provide parents and families with information about community resources that provide physical activities for children, such as team sports and camps. They should provide information about organizations that provide "scholarships" or grants that pay for activities that have associated costs.

- Pediatricians can educate parents about the importance of children's play outdoors in nature. Spending unstructured time in nature, surrounded by dirt, trees, grass, rocks, flowers, and insects inspires children's play and offers physical and emotional benefits.
- Pediatricians can advocate for safe play spaces for children who live in communities and attend schools with a high proportion of low-income and poor children by emphasizing that the lifelong success of children is based on their ability to be creative and to apply the lessons learned from playing.
- Pediatricians may consider offering presentations to help educators, community leaders, faith-based groups, and politicians understand the developmental benefits of play to children.
- Pediatricians may advocate for policies that reduce educational disparities while supporting the inclusion of recess, physical outlets, and the creative arts as means to enhance social and emotional learning and school engagement.

## CONCLUSIONS

Children who live at or below poverty level in the United States experience educational and health disparities from early childhood. These children deserve additional resources to achieve academically, foster school engagement, and develop their social and emotional competencies. Many children reside in families that face stresses related to daily survival, including whether they will have food or safe shelter, leaving less energy to focus on enrichment opportunities, including play. Some live in neighborhoods where violence may be the norm

and children playing on neighborhood playgrounds the exception. School systems are focused on overcoming their academic deficiencies in a safe environment often at the expense of time for arts, recess, physical education classes, and after-school activities that include playing, despite evidence that supports that what happens in play contributes substantially to social and emotional learning, even in the classroom.

Regardless of their socioeconomic status, all children have the right to safe places to play regularly, during which they develop cognitive, communication, problem-solving, negotiation, and leadership skills. They have the right to engage in safe and regular physical activity that will decrease the incidence of lifelong health disparities. The physically and emotionally healthy children of today will become the productive citizens who will contribute positively to society in the future.

## LEAD AUTHORS

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Kenneth R. Ginsburg, MD, MSEd

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**CONSULTANT**

George J. Cohen, MD

**STAFF**

Karen S. Smith

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# RISK DEFICIT DISORDER

David Eager <sup>1</sup> and Helen Little <sup>2</sup>

<sup>1</sup> A/Professor, University of Technology Sydney

<sup>2</sup> Lecturer, Macquarie University

## Abstract

The authors coined the term Risk Deficit Disorder (RDD) to describe the growing and unhealthy trend of attempting to remove all risk from within our community and the problems that this risk removal indirectly creates.

A number of risk deficits now pervade our society. In particular there is a trend to remove risk from children's play. The absence of childhood risk is leading to many problems both directly and indirectly. Problems such as obesity, mental health, lack of independence, and a decrease in learning, perception and judgement skills within our children have been cited in the literature.

For the child, the exploration and taking of managed risk is critically important for healthy childhood development. Learning, perception and judgement will be impeded if the child is not exposed to situations that involve an element of risk.

It has long been acknowledged that play provides a context that fosters all aspects of children's learning and development. Concerns have been raised by researchers, educators and health practitioners about the implications of curbing free play activities and they have argued that risk reduction strategies in playground management adversely impact on the quality of physical play.

We need to correct the risk-averse counter-productive negative mindset and replace it with a mindset that includes the benefits of risk. More importantly the provision or application of this risk needs to be embedded into playspace design. This paper is not advocating we design unsafe playspaces and turn back the hazard reduction clock. To do so would undo the progress and intervention strategies contained in our various safety Standards. What this paper argues is that a well designed playspace can have all the known hazards eliminated and still be exciting and challenging to the child at play.

**Key Words: children, play, playspace, safety, playground, risk benefit, risk deficit, child development**

## Introduction

Risk in our society is generally associated with something negative. What a lot of people fail to realise is that risk can have both positive and negative consequences.

Within the engineering profession risk is considered to be both positive and negative. However, in the wider community if you mention the term risk most associate it only with negative thoughts and consequences.

The reality is we live in a world that is full of risks. In any one day we are constantly exposing ourselves to physical injury: we run out the door half awake or cross a busy road

to catch a bus all on autopilot. Although we face situations such as these where we expose ourselves to negative outcomes, there are also many situations where we take risks in order to achieve positive outcomes. As adults we depend on our ability to adapt to new situations and problems and conquer challenges. To achieve this we needed to be engaged in risk-taking behaviour during our formative years. If we never took a risk we would never have learnt to walk, to climb stairs, swim, ride a bicycle, boil an egg, ask someone out on date, drive a car, go to university, and many more 'risky' activities. All these activities have one common element – for each there are unknown factors that make success uncertain. Therein lies

the risk. Risk is not always about being reckless but rather engaging with uncertainty in order to achieve a particular goal. Situations like these require us to weigh up our likelihood of success or failure based on what we know of our abilities and other relevant knowledge or information related to the situation. It is only through facing challenges such as these that we learn to appraise the risks involved and make appropriate judgments about our likelihood of success.

What is it that gives us the courage and the wisdom to expose ourselves to day-to-day risks without the fear of physical, social and mental damage? How did we develop these skills and learn to automatically incorporate them into our life?

Most of us learnt to appraise and manage risks through our childhood experiences. We made decisions based on our ability and judgment to assess each situation to determine whether it would have negative or positive effects on our lives. We developed this through past experience and a history of taking risks and getting through the consequences. We gained and honed these skills as children and now apply them in adulthood. We climbed that little bit higher, swung that little bit faster and mentally defended ourselves against adversity in the playground. We are better able to assess risk because we have been doing it since we were children. Increasingly opportunities for children today to have these types of experiences are restricted.

For many decades the playground industry and Local Government were driven by a desire to remove all risk from children's playgrounds. As a result a large percentage of existing playgrounds are dull and boring with no opportunities for risk-taking and challenge. Fortunately there is a growing understanding that we got it all wrong and that children actually need to be exposed to risk-taking activities and challenge. Consequently, playgrounds should be designed and maintained so that they are as safe as necessary, not as safe as possible.

What are the costs of a child growing up without exposure to risk? Do we really want

to unintentionally create a society that puts safety so high that it deprives children of the opportunities to be creative and to grow? Conversely, we do not want to expose them to unnecessary risks. The argument is not black or white. As Gill says, children need both safeguards and opportunities; we must recognize that keeping children safe involves them taking risks so that they can learn [1].

## Discussion

Research studies on children's experience of risk in their everyday play activities highlights that children are naturally drawn to activities that involve heights, speed, balancing precariously and so on. Activities such as these allow children to learn about themselves, and their capabilities in relation to both the environment and task demands and their changing abilities [2,3].

Other studies have shown that even young children can recognise hazards in their environment and identify behaviours that could potentially lead to injury. The ability to appraise risks is developed in the context of children's everyday play experiences [4,5].

Risk is the effect of uncertainty on objectives. The objectives will vary depending on the stakeholder. A parent will see risk differently to a child, just like a child will see risk differently to their parent. Regardless of this, a risk can be both a positive and a negative experience. A negative consequence can be an injury of the child; in which case the positive is often hard to see. However, the balance has shifted to controlling negative risks at the expense of providing opportunities for positive risks. This has resulted in a negative mindset towards all risks. What has happened to a nothing ventured, nothing gained mind-set? In saying this, it would seem irresponsible for a parent to expose their child to risk when it can be avoided, but, restricting a risk in one instance might expose the child to risk in another. This can be applied to playspace design. Unless we can provide play facilities that will hold the child's interest and provide the necessary challenge and stimulation that children require [6], they will play somewhere else, usually on the streets or other more hazardous places thus exposing them to even greater, and uncontrolled, risk.



A child's exposure to risk has lowered in society. A study conducted by the Chartered Institute of Housing in London has shown that in 1971, eight out of ten children aged 7 or 8 years went to school on their own. By 1990 this figure had dropped to less than one in ten... that freedom was being withheld until the age of 10, meaning that in just 19 years children had lost up to three years of freedom of movement [7]. Hillman *et al.* also found parallel trends in the US and Denmark, creating the assumption that the situation is similar across the developed world. This trend has not improved over the last 20 years.

It is often hard to see the positive side of taking risks, especially when a child is involved. However, if a situation can be created where a child can take risks without the potential for harm then parents can still maintain control. They will be able to weigh up the benefits using the resources available to them, whilst trying to reduce a potentially negative outcome.

### **Psychology of children**

Children have a natural urge to explore in order to find out things for themselves, to experiment with primary materials, to develop bodily skills through play and test themselves in activities that include a degree of challenge and risk [6].

Play provides a vehicle for children to both develop and demonstrate knowledge, skills and concepts [8]. Play allows children to actively construct their own understandings of their physical and social world and to understand their own capabilities in relation to their developing skills. In order to achieve this children require opportunities to challenge themselves, move out of their comfort zone and explore risk.

### **Risk deficit disorder**

Louv [10] coined the term 'nature deficit disorder' in response to children's lack of connection with nature in today's technological world. Similarly, we use the term 'risk deficit disorder' to describe the growing and unhealthy trend of attempting to remove all risk from within our community and the problems that this risk removal

indirectly creates. A risk deficit disorder (RDD) can be described simply as a lack of risk taking, leading to an absence of ability and knowledge to then perceive risks. A risk deficit child would be one who has not been exposed to risk, and is subsequently unable to challenge him- or her- self to a level which allows continual development. This risk deficit is being driven by a culture of fear about the safety of children even though they are statistically safer than at any point in human history. Gill also states that risk averseness is driven by the growth of road traffic and of car-dependent lifestyles, parents' longer working hours, a decline in the quantity and quality of public space, and the growth of indoor leisure activities [1].



Figure 1: Child using slide [9]

### **Children need exposure to risk**

Contemporary studies of children recognise their capacity to initiate and lead their own learning. However, as adults we have a duty to ensure that children have safe and secure environments as a context for their learning and development. As Tovey [11] argues a safe environment... is one where safety is not seen as safety from all possible harm, but offers safety to explore, experiment, try things out and to take risks.

From this perspective, a child requires some control and structure, but should still be able to have the freedom to make discoveries. This perspective should be incorporated in the design of a playspace.

We know that for children, play is an instinctive and voluntary action. They do not

preempt risk like adults do. They do not identify, assess, control and monitor risks the in the same way as an engineer does. A child see's life as an ideal world where anywhere and everywhere is an area for play. For this reason it is important that we maintain some control over how and where children decide to undertake play. As long as they have variety and are challenged to their limits they are content, or, as Hendricks [5] puts it, children need access to a variety of different landscapes... no one playspace can fulfil all the play needs.

So do children need exposure to risk to develop into competent adults? The authors' answer to this question is absolutely yes. However, as discussed earlier, this risk must be managed and it needs to have a positive outcome. Gill [1] outlines four main arguments for a child's exposure to risk:

1. Certain risks allow children to learn how to manage it, such as practical skills that promote self protection; swimming, cycling and road safety.
2. Children have an appetite for risk taking. If it is not satisfied then they will seek situations in which a greater risk might exist.
3. Children gain other benefits as a side-effect of being exposed to risk. The benefits of outdoor play far outweigh the risks.
4. The final argument outlines the longer-term benefits. Children build their character and personality when facing adverse circumstances where there is possibility of injury or loss.

The discussion tends towards the idea that all risk is good and necessary, however it is hard to contend with a parent who has lost their child in a tragic playground accident. It is important to note that a safe playspace design includes the removal of all hazards that can cause death or serious injury. It is the authors' opinion that risk exposure should be layered, allowing children of different ages and abilities to explore and take considered risks.

## **Adult's role**

According to Gill an adult's involvement in some part of child nurture is controlling where the children are, with the underlying goal of ensuring that they are engaged in appropriate activities [1]. The question of the level of control and the significance of this to a child's development within different settings should be considered. Whether it is inside the home or outside in the playground environment, the perception of responsibility by an adult has added a new dimension and significance to childhood play. Similarly, playgrounds are no longer seen only as a place for risky play. The perceived dangers of child violence, kidnapping, bullying, molesting and other fears have given more reason to impose greater control on a child's daily life than there was before. This can be seen as a mechanism that further complicates the risk prevention role of adults. However, a recent study found that whilst parents expressed concern for their children's safety in relation to factors such as increased traffic and 'stranger danger', they recognised that opportunities for children to engage in challenging physical play that involved an element of risk was important for skill development, confidence building and for learning about risk and how to avoid injury [16].

## **Correcting the RDD mindset**

As mentioned earlier in the discussion, society has a common notion that risk has a negative consequence for outcomes. However, risks are considered part of everyday life and can be regarded as an opportunity cost if applied correctly to advantage. The positives of risks are often obscured as they tend not to be appropriately considered in discussions. Also, the positive risks involved in play are not tangible and measureable. As claimed by both Gill [1] and Gleave [12], risky activities can have positive implications in terms of children's developmental, social and emotional needs, as well as their overall health. Without risk there is no sense of overcoming real life hurdles. Gill [1] argues that denying children this opportunity could result in a society of risk-averse citizens, unable to cope with everyday situations; or in children simply



finding more dangerous locations to carry out their risk-taking behaviour.



Figure 2: Adventure playground signage [29]

It is therefore vital for parents, the media, engineers, designers, local council workers and all stakeholders to become more aware when making decisions on the outcomes of risk and not to be weighed down by common skepticism that otherwise may jeopardize the way we want our children to develop and grow in society.

Figure 3 illustrates benefits of play that are immeasurable against the non-benefits (litigation, accidents, costs) that are real and measurable. It encourages play providers to have a balanced approach, without political influence. Due to the intangible benefits there will be a tendency for the provisions of play to be undervalued and lose out.

For a consensus to be reached between the contrasting mindsets it must be accepted that playgrounds are associated with risks and therefore should be accepted for their non-tangible benefits (health, social, physical and psychological). This would constitute a political judgment and not an engineering and technical judgment, although it may be informed by science [13].

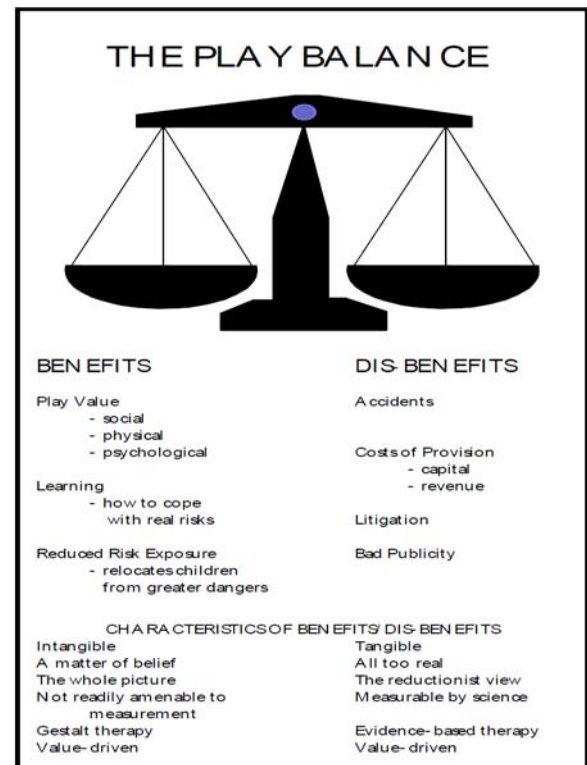


Figure 3: The play balance [13]

## Embed risk into playspace design

### History on playspace design

Due to the growing industrial landscape of the western world, and as a result, the increase in automobile numbers, children were unable to play on the streets. This led to the development of public playgrounds. Playgrounds were initially created as a way to offer children good places for self-development, but also to protect them from other, less suitable places, keep them away from crowded city areas, dangers in the street and juvenile delinquency [16]. These areas of play became quite successful and helped keep children away from the streets. However, due to an increase in child injury and the fear of violence, as well as stranger danger, the numbers using public play spaces is declining.

Current playground designs have impact attenuating surfaces and specially designed climbing areas. This is a step forward, but there is still more to be done to encourage the positive exposure to risk.

### ***What should a playspace achieve?***

The role of a playspace is to provide a place for children of all ages to develop physically, socially and mentally. To do this a playspace must have risk. Or as Boussh [27] puts it, the formula for a good playspace is: Risk-taking + Playgrounds = Growth.

A playspace should provide for children of diverse ages and capabilities, keeping them interested and challenged. However, most importantly it must identify the risks involved so as to avoid hazards.

Barbour [17] explains that children's play behaviours are determined in part by interrelationships among (a) the physical setting or playground; (b) levels of physical competence; and (c) peer relationships. She also notes that children's playground behaviours are influenced by the amount of space per child, the delineation of space, the type and configuration of fixed equipment, the degree of challenge, novelty, and complexity, the presence/absence of enclosed areas, and the availability and kind of portable materials or loose parts.

This means that a designer must incorporate a degree of physical challenge that also encourages children to interact. Metin [18] explains this further; variety and interactivity are the new way of considering the playground equipment concept, where the process is more important than the product. So we should not only look at the physical construction of the playspace, but also consider how and why a child will use the space. A study by Jansson and Perron [16] has attempted this. They found that the quality of individual playgrounds turned out to have an effect on attendance, at least when the level of independent mobility was rather high, as was the case among the older children in the study (9–11 years old).

A playspace should be designed to avoid the possibility of a death or serious injury. To do this we must understand what causes injuries. Hudson [19] has identified the four major elements of playground risk that together can account for nearly all playground deaths and injuries. By understanding the role of these a designer can plan safer playgrounds. They are:

1. *Improper supervision:* Supervision requires the individual to be able to see and move through the playground area. This involves separation of the equipment, open lines of sight and zoning of the playspace into activity groups.
2. *Age-appropriate design:* children need age appropriate challenges to develop their skills, but they have different developmental skills at varying age levels, including physical emotional, social, and intellectual.
3. *Falls to hard surfaces:* the fall height and performance of the surface can have a huge effect on decreasing injuries from falls.
4. *Little or no equipment maintenance:* generally the injury is as a result of someone else damaging the equipment. It must be inspected regularly.

Overall, falling provides the biggest exposure to injury as proven by a study into the origin of injuries on playgrounds. It found that height of fall was the most important risk factor for a severe playground injury [19].

### ***Embed hazard removal within the design***

A hazard is defined as an unacceptable risk and is a risk that has the potential for cause a death or permanent injury. It is essential that all hazards in the playspace be removed. Compliance with the playground safety Standard should happen throughout the various phases of the design life-cycle, and not just at handover. It is also vital that the perception of embedded risk is apparent to the child. This will provide the children with the incentive to seek out more adventurous and exciting learning experiences.

The hazard removal strategies embedded in AS 4685 act as an essential tool for removing the hazards that are not obvious to children. However, the Standard alone will not necessarily prevent injuries; therefore a playspace must achieve a balance between providing a safe play environment at the same time as enabling children to take part in a learning experience [20].

Ideally, playspace design and safety should be based on the principle that play equipment should be as *safe as necessary* and not as

*safe as possible* to allow children to engage in experiences that offer challenge and excitement [10]. In order to maintain these significant elements it is best practice to have a design that engineer out all possible hazards while maintaining the perception of risk.

The International Standards EN 1176 and 1177 recognise the importance of risk and emphasise the positive side of risk through provisions which allow designers to enable children to experience managed levels of risk, for example, with the design of a '3D spatial network' (see Figures 4 and 5). With different categories of age groups, designers need to incorporate and consider all potential hazards. They may allow children to climb to various heights between ground level and higher, with older children with more mobility skills able to climb higher on the device than younger children [27].

Embedding the risk, the designer considers all the potential falls at various heights. If children lose their grip and fall, they would first fall into the spatial network beneath which is designed to prevent any hazardous impacts. The impact attenuating surface of organic mulch or bark beneath provides a failsafe system (Figure 4).

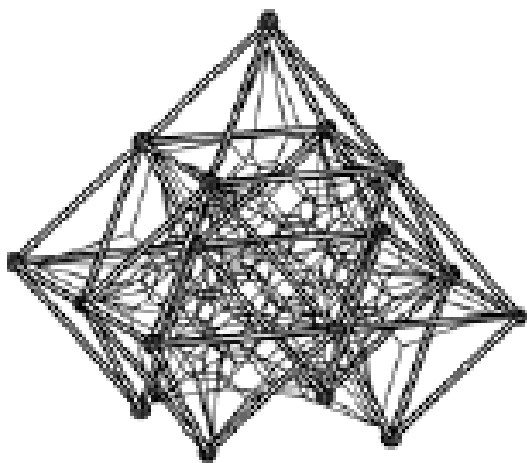


Figure 4: Spatial network [15]

The design approach of a playspace must have layered risk strategies that complement hazard reduction as much as possible. This gives some security and assurance to the parents, Local Government, and other stakeholders about the hazards involved.

Another technique used by designers to allow risk taking and creative behaviour is through providing open playspaces. Gleave [17] argues the use of bushlands offers children the combination of nature, adventure, challenge and a small degree of danger that they need for a positive play experience. She claims that bushlands are ideal for children learning to manage risk. These playspaces must be open and loose in design. This allows maximum creativity in a child's play. This is done by designing children's outdoor environments that use the landscape and vegetation as the play setting and nature as much as possible as the play materials [21].

### Bad playspace design

The *Dirty Dozen* as adopted by NPSI, identifies twelve hazards as the leading causes of fatalities in the playground [22]. This provides designers with some necessary steps to take to avoid any potential risk that will cause harm to children.

The risks identified do not represent the full range of risks involved, only those that occur most often and create the most injury. However, these 12 hazards provide the foundations to identify common hazards for a bad playspace.

1. *Inadequate surfacing*: The ground surface around the playspace is not provided with loose fill material to attenuate impacts. The fall onto hard surfaces has a higher probability of an accident.
2. *Inadequate use zone*: The area around the playground equipment which is less than 2.5 m in all directions from the edge of stationary play equipment.
3. *Protrusion & entanglement hazards*: A component or piece of hardware that protrudes in open areas where it is capable of catching items of clothing worn by children. This can cause in strangulation clothing toggles, hair, laces etc. Example: bolt ends that extend more than two threads beyond the face of the nut.
4. *Entrapment*: Openings on playground equipment are not large enough to allow the child's body to pass through the

opening when entering feet first. If openings are measured between 89 to 230 mm.

5. *Insufficient equipment spacing:* Play equipment with no proper spacing causing overcrowding of a play area, resulting in unsafe play conditions.
6. *Trip hazards:* Play structure components in the circulation space.
7. *Lack of supervision:* No supervision of children while playing. Play area not properly designed to make easy access for parents/carers to observe children while playing.
8. *Age-inappropriate activities:* Equipment settings not appropriate for the different ages.
9. *Lack of maintenance:* No regular preventive maintenance on play equipment.
10. *Crush, shearing and sharp-edge hazards:* Components of equipment in playground having sharp edges or points and moving parts.
11. *Platforms with no guardrails:* No proper rails for children to climb or hold onto securely when moving around on elevated surface.
12. *Equipment not recommended for public playgrounds:* Not recommended equipment used in the playspace which exposes children to much greater risk.

#### ***Example of a unique playspace design - Darling Harbour Precinct Playground***

The Darling Walk Playground is an example of the new generation of playgrounds, which have a mix of challenge embedded in the design together with a feeling of freedom. This feeling of freedom and challenge comes with some additional risks. Keenan [24] commented that for the past 20 to 30 years, the design of playgrounds has been driven by fear. Now however, even the people who zealously pushed for the introduction of safety standards have realised some risk is important. Children need the risks so that they can develop the competencies we want them to develop. The Darling Walk Playground will provide children with the extra risk they need.

The playground at Sydney's Darling Harbour opens in September 2011. It will cover half a hectare, 40 per cent of which will be devoted to water play. The park, as seen in Figure 5, also features a large spider web of climbing equipment over 10 meters high. The climbing structure has been designed so that when someone falls they are not badly injured, gradually being slowed down by sections of rope beneath as they fall. Other equipment will include:

- Water wheels and channels;
- Hand Pumps;
- Synchronised water jets;
- Large climbing rope structures;
- Balancing beams;
- Climbing walls;
- A spinning wheel;
- Sand pit with digging implements;
- Large swings;
- Giant slide;
- Rope bridge; and
- Flying fox [24].



Figure 5: Darling walk [24]

## Recommendations for good playspace design

A good playspace should consider some basic design properties that can be achieved through a wide consultative process. This should involve all stakeholder views and recommendations including adherence to the Standards. This should then be used to develop and design attractive, functional playspaces that can be enjoyed equally by everyone; taking into account differences in age, gender, culture and ability [25].

Merlino [26] Minister for Sport, Recreation and Youth Affairs stated a good playspace is determined by three essential factors:

- Play value;
- Accessibility/inclusion; and
- Safety.

We are not advocating designing unsafe playspaces and turning back the hazard reduction clock. To do so would undo the progress and intervention strategies embedded in our various safety Standards. This would be akin to removing seat belts and air bags from our cars. What this paper is saying is that a well designed playspace can have all the known hazards eliminated and still be exciting and challenging to the child at play. Let's engineer some apparent fear and adventure into our playspace design while retaining the primary hazard removal filter.

## Conclusion

The authors coined the term Risk Deficit Disorder to describe the disease that has invaded our society. RDD is a disease that is affecting the healthy and natural development of our children. RDD has stealthily infected our society and culture. Children who engage in challenging play are labelled now as being careless or irresponsible, while children who give in to fear are seen as good at avoiding risk. A society where perceptions have changed from *brave* to *the child as careless or irresponsible*, and the term *fear* has become *isn't that child good at avoiding risk*.

Children's exposure to risk and challenge is vital to their healthy development. From an engineering perspective, the best way to manage and control these risks is to embed the controls into playspace designs. A

playspace should be designed in a way that is hazard free coupled with a healthy level of risk while still allowing children of different ages to test and explore their abilities. If we can design playspaces according to the recommendations of this paper then we may be able to remove the *culture of fear* that is stunting the healthy development of our society's future.

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## Biography

**David Eager** is an Associate Professor within the Faculty of Engineering and Information Technology at University of Technology Sydney. David has a PhD in Engineering; a 1st Class Honours Degree in Engineering; and a Graduate Certificate in Dispute Resolution. He is the current Chair of the Australian Standards Committee CS-005 Playground Equipment and Surfacing. He is also a Fellow of Engineers Australia; and on the Boards of both Kidsafe and PLA.



**Helen Little** is a Lecturer within the Institute of Early Childhood, Faculty of Human Sciences at Macquarie University. Helen has a PhD in child development; lectures in the area of child development; and has a professional background in early childhood with teaching experience in preschools and primary schools. Her research interest is in the area of risk taking in outdoor play. Her doctoral thesis investigated the influence of individual, social and environmental factors on children's engagement in physical risk-taking behaviour in outdoor play.



## RISKY PLAY AND RISK MANAGEMENT IN NORWEGIAN PRESCHOOLS – A QUALITATIVE OBSERVATIONAL STUDY

**ELLEN BEATE HANSEN SANDSETER**

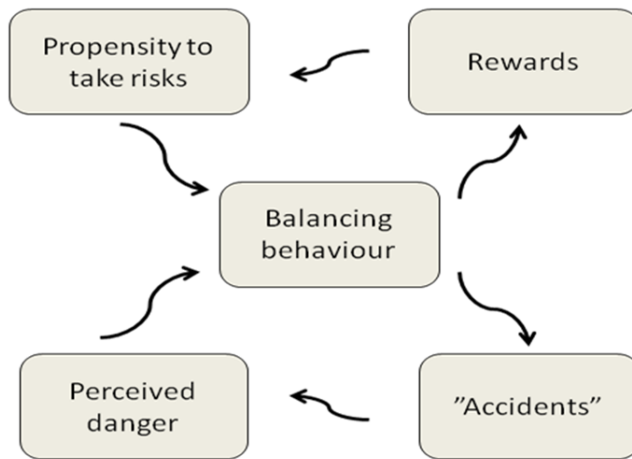
PhD-student, Queen Maud's College of Early Childhood Education (DMMH), Trondheim, Norway

**Abstract** - Due to the last decades' discussion on play safety on the one hand, and the benefits of giving children challenges and risks on the other hand, the need has grown for more knowledge on children's natural risk-taking in play. This article aims to explore how preschool children seek out risk-taking in play and how children and preschool staff manage these risks. In the present study, qualitative video observations of risk play in 29 children were collected in 2 Norwegian preschools. The data in the present study show how children intentionally seek out risk in their play through seeking great heights and high speed and by performing play in hazardous, dangerous and daring manners. Still, the results indicate that children's risk-taking decisions are balanced between their evaluation of positive and negative outcomes of the play situation. The staff in the present study has quite a liberal attitude towards children's risk-taking in play and sometimes encourages it. This article contributes a better qualitative understanding of how children engage in risky play.

### INTRODUCTION

Risky play in this study is defined as thrilling forms of play that involve a risk of physical injury. Children frequently seek and engage in challenging and risky forms of play even though, and in some degree *because*, it involves the possibility of getting hurt (Adams, 2001; Aldis, 1975; Smith, 1998; Stephenson, 2003). Due to Western society's safety concerns, the issue of children's risky play and the extent such play should be regulated are ongoing and important debates. These play safety debates have brought forth safety legislation and litigations from worried parents and child care workers. This has raised further discussions on the balance between safety legislation and litigations on one hand, and the benefits of such play for child development on the other hand (Ball, 1995, 2002, 2004; Boyesen, 1997; Breivik, 2001; Caesar, 2001; Chalmers, 2003a; Freeman, 1995; Furedi, 2001; Heseltine, 1995; Little, 2006; New, Mardell, & Robinson, 2005; Satomi & Morris, 1996; Sawyers, 1994; Smith, 1998; Stephenson, 2003; Stine, 1997; Stutz, 1995; Zeece & Gaul, 1993). Most of the time, play happens under adult supervision, therefore regulating what children are allowed to do and where they are allowed to go (Kytä, 2004). In this sense, adults are contributing to child safety when playing, and, at the same time, they represent the biggest constraint on the child's ability to encounter risks and challenges that are ultimately beneficial for development (see e.g. Ball, 2002; Furedi, 2001; Gill, 2007; Hughes & Sturrock, 2006).

Adams (2001) states that objective risk measures are difficult to establish because of each individual's subjective perceptions of risk: "The problem for those who seek to devise objective measures of risk is that people to varying degrees modify their level of vigilance and their exposure to danger in response to their *subjective* perceptions of risk" (Adams, 2001, p. 13). Adams suggests that an individual's risk-taking decisions (balancing behavior) in everyday life include behaving in a way that balances the individual's propensity to take risks, the potential rewards of risk-taking, the perceived danger in the situation and accidents or losses the individual has previously experienced (either one's own or others'), as shown in figure 1.



**Figure 1:** The risk “thermostat” model by John Adams (2001). The model shows how the individual’s propensity to take risks, perceived danger in the situation, possible rewards and possible accidents as results of the behavior are interacting with and influencing each other and the individual’s risk taking decision (balancing behavior).

Seen in relation to children’s risky play, this model gives an overall picture of the factors influencing children’s decisions to take risks in play situations. As Adams’ model suggests, risk-taking decisions are influenced by the individual’s risk propensity. Studies show that similar to adults (Apter, 1984, 2001, 2007; Costa & McCrae, 1992; McCrae & Costa, 1997; Zuckerman, 1994), children’s levels of sensation seeking and their perceptions of risk situations greatly influence their desire for risky play and willingness to take physical risks (Cook, 1993; Cook, Peterson, & DiLillo, 1999; Miller & Byrnes, 1997; Morrongiello & Lasenby-Lessard, 2006; Morrongiello & Matheis, 2004, 2007; Morrongiello & Sedore, 2005). This research has shown that children who are exhilarated by risks are more likely to engage in physically risky play and behavior. This also indicates that people with a high propensity to take risks will perceive the situation as less dangerous than a person with a lower propensity to take risks (Apter, 2007; Gerkovich, 2001). As seen in Adams’ model, an individual’s perceived danger of the risk situation is also a crucial factor for the risk-taking decision. Children’s propensity to risk-taking in play and their perception of danger in the situation is most likely influenced by their degree of sensation seeking. Therefore, differences from one child to the next would therefore be expected. Still, quite a few researchers have documented that children in general are explorative, both seeking and preferring risky play such as physical risk-taking activities and play in which fighting and physical strength are tested (Ball, 2002; Readdick & Park, 1998; Smith, 1998; Stephenson, 2003; Stine, 1997). Thus, one can assume that most children have a relatively high propensity to seek out challenges through risky play.

Adams’ (2001) model also suggests that the propensity to take risks is influenced by the potential rewards and accidents related to risk-taking. Although several researchers have argued that enabling children to engage in risky play brings developmental benefits such as a more realistic risk perception and enhanced risk management (Adams, 2001; Apter, 2007; Ball, 2002; Boyesen, 1997; Gill, 2007; Smith, 1998; Stutz, 1995; Sutton-Smith, 1997), these are primarily on an unconscious level. On a conscious level, the rewards of mastering risky play include fun, enjoyment, high arousal, excitement, thrill, pride, achievement and healthy self-esteem (Adams, 2001; Apter, 2007; Coster & Gleeve, 2008; Sutton-Smith, 1997). On the other hand, accidents and injuries are possible outcomes when engaging in risky play. Even though accidents on playgrounds do occur, research on the nature of childhood injuries actually shows that the most common risk factors for injury on playgrounds are not related to equipment, but rather children’s actions, normal rashness and improper usage of the equipment (Ball, 2002; Coppens & Gentry, 1991; Illingworth, Brennan, Jay, Al-Ravi, & Collick, 1975; Ordoñana, Caspi, & Moffitt, 2008; Rosen & Peterson, 1990). No matter how safe the equipment, the children’s need for excitement prompts them to use the equipment dangerously. This is in accordance with the findings that high sensation-seeking children are more injury prone than low sensation-seeking children (Morrongiello & Lasenby-Lessard, 2006). The risk-taking decision, as shown in Adams’ model, is a continuous evaluation of the possible rewards weighed up against the possible accidents. Children’s past experiences of accidents in similar situations and their evaluation of the potential severity of the injury will influence their perceived danger in the risk situation. This will contribute to their decision to engage in risky play or not, and if they do, how they enact that play. They balance their play behavior with regard to their past negative experiences in order to avoid repeating them



(Adams, 2001). In Coster and Gleeve's (2008) study, children explained that, when trying something risky, they did not want to repeat it because of the overwhelming fear they experienced, and watching others do it or just thinking about the possible negative outcome of the risk-taking action would keep them from trying it at all. Smith (1998) has argued that if left alone to encounter risks, children will find a way to manage them by either mastering the challenge or finding a way out. According to Adams (2001), the risk-taking decisions of young children involve individual risk management, which involves the individual calculating the chance of getting injured against the possible reward.

As shown, four factors included in Adam's model regulate risk-taking decisions and risk management among children; propensity to take risks, perceived danger, potential rewards and potential accidents. Still, Adams (2001) points out that many of the risky decisions involving children are made by adults because children are generally under the surveillance of adults. Therefore, children's risk-taking decisions are influenced also by supervising adults' evaluations of the risky situation and their decision to act upon children's risk-taking in play. On one hand, research has indicated that lack of supervision is one of the causes of childhood injuries in play (Morrongiello, 2005; Morrongiello, Carbett, McCourt, & Johnston, 2006; Rosen & Peterson, 1990; Taylor & Morris, 1996). In accordance with this, studies have shown that children attending child care centers, institutions in which supervision by adults is usually rather extensive, experience fewer injuries than children spending their day at home with their parents. Also, injuries in child care centers are mostly minor (Briss, Sacks, Adiss, Kresnow, & O'Neil, 1994; Leland, Garrard, & Smith, 1993; Schwebel, Brezaussek, & Belsky, 2006). Studies indicate that supervision by overprotective and anxious mothers increases the chances of child injuries (Dal Santo, Goodman, Glik, & Jackson, 2004), and that such overprotective behavior by parents may elicit anxiety in their children, as well as a decreased sense of control over dangerous situations (Allen & Rapee, 2005). According to Smith (1998), the optimal way for caregivers and supervisors to handle children's risk taking is to let children encounter risks and challenges within a relatively safe play setting. How caregivers and adults carry out supervision of children is probably influenced by culture. New et al. (2005) points out that Norwegian, Swedish, Danish and to some extent, Italian preschool teachers have fewer concerns about children's risk-taking than American preschool teachers. Research on requirements for playground safety in Australian (Little, 2006), New Zealand (Chalmers, 2003a, 2003b; Greenfield, 2003), British (Ball, 2002, 2004) and American (Caesar, 2001; Sawyers, 1994; Swartz, 1992; Wardle, 1997; Zeece & Graul, 1993) indicates that the concerns and efforts to regulate and strictly monitor the children are stronger in these countries than in Scandinavian countries, where the benefits of mastering risks, experiencing various weather conditions and exploring the national landscape are widely encouraged (New, et al., 2005).

## **Aim of the Study**

The research questions in this article are:

- a) How do preschool children seek out and manage risks in play?
- b) How does preschool staff manage children's risk-taking in play?

The aim of the article is to promote a better understanding of the ways in which children engage in risky play, and how risk is managed by children and supervising adults.

## **METHOD**

### **The Settings and Subjects**

Risky play occurs primarily outdoors (Sandseter, 2007a; Stephenson, 2003). The two preschools in this study were chosen because they both spent a great deal of time outdoors. This selective choice of participants makes the sampling procedure in this study purposive (Berg, 2007; Merriam, 2002; Patton, 1990). One of the preschools was an outdoor preschool, where children spend most of their time outdoors in nature areas. Outdoor preschools in Norway are preschools where outdoor learning in natural environments is emphasized. This outdoor preschool was situated in a large forest. It had a building, but they rarely spent time indoors, no matter the weather. The preschool playground, in this case the immediate vicinity outside the preschool building, was a forest area where the only play equipment was a sandpit and a rope in a tree, with no fences surrounding the playground. The other preschool was an ordinary Norwegian institution in a residential area, with a preschool building surrounded by a standard playground with sandpits, swings, a climbing tower, a play hut, switchbacks and some climbing trees. The playground in this preschool was surrounded by a fence. Both the preschools complied with the government pedagogical laws and guidelines for all preschools in Norway, which emphasize children's play and learning in various contexts rather than focusing strictly on schooling activities.

All the four and five-year-old children in the two preschools were observed and videotaped while playing. There were a total of 29 children, 21 girls and 8 boys. Informed consent to observe the children was obtained by proxy from parents (Greig & Taylor, 1999). Parents and children were informed of the project and the fact that a researcher would join the children in their outdoor play carrying a video camera. At any moment, the children were free to let the researcher know if they did not want to be observed or videotaped.

### **The Video Observations and Analysis**

The study was carried out in the settings of the two preschools. A total of nine days were spent in each of the preschools, participating in all of their outdoor activities on their playgrounds. The researcher also took part in hikes with the two preschools to other play environments (four of the days). These were hikes where the children and staff walked approximately from two to five kilometers into the woods to play and spent time in nature areas where there were cliffs, trees and hills for climbing and sliding/sledding. The children were observed from winter to summer. An important point of the research was to explore the risky play that emerged among children themselves. Therefore, it was necessary for the researcher to take a somewhat withdrawn position, but still be visible and familiar with the environment and, in that sense, participatory (Flick, 2006).

The video observations were based on previously developed categories of outdoor risky play based on interviews with children and staff in Norwegian preschools (see Sandseter, 2007a, 2007b): a) play in great heights, b) play with high speed, c) play with dangerous tools, d) play near dangerous elements, e) rough-and-tumble play, and f) play where children can disappear/get lost. This was done to both obtain a thorough focus on risky play, ruling out other kinds of play, and to limit the amount of data gathered to what is readily analyzable (Silverman, 2005). Field notes were written when video recording was not possible. Saturation was reached when the observations did not provide any further knowledge or information to contribute to the research question (Flick, 2006).

The data consisted of field notes from approximately 90 hours of observation and 6 hours of focused video clips. The videos and field notes were transcribed electronically in a text file (a total of 50 pages, single spaced). The transcription was detailed and attempted to capture a holistic picture of the play situation, including what activity was performed, what happened in the situation, how the children acted (movements, gestures), what the children expressed (sounds, spoken words, facial expressions), how the preschool staff reacted to the situation (action, speech, involvement), etc. A thematic analysis was conducted on the data based on the research questions (Boyatzis, 1998; Coffey & Atkinson, 1996; Grbich, 2007; Miles & Huberman, 1994). The coding process was performed manually by noting descriptive codes in the margin of the transcriptions of each risky play situation. The codes that emerged described the ways children performed risky play (codes such as height, speed, control of movements, focus on task, rashness, etc.), and the ways preschool staff dealt with children's risk-taking in play (codes such as watch from distance, partaking, taking initiative, constraining, prohibit, etc.). The codes describing similar features were then grouped together in main themes and handled interpretively in relation to Adams' risk thermostat model and former research. The interpretive perspective in this analysis is the researcher's qualitative interpretation of the children's and preschool staff's risk-taking and risk management in the observed situations: *"...qualitative researchers are interpreters who draw on their own experiences, knowledge, theoretical dispositions, and collected data to present their understanding of the other's world."* (Glesne, 2006, p. 175). In qualitative research, the researcher is the instrument (Patton, 2002). Other interpretive perspectives could also be both possible and relevant. This description is only one of several possible interpretations. Therefore, the ability to generalize the results is limited, but modest speculation can be done regarding the applicability of the present findings to other similar but not identical situations, known as an extrapolation (Patton, 2002).

## **RESULTS**

### **The Children's Risk-Taking and Risk Management**

The results of the present study revealed that children often deliberately sought out risky play and performed several strategies of heightening the risk to get rewarding experiences, while still moderating their actions to avoid loss or injury. The most common strategies were increasing the level of height and speed and rashness in performing the play, and being dared.

Increasing the level of height and speed were common ways for the children to intensify the risk in play. There was not a single day without several observations of play such as climbing, balancing and jumping down from great heights. Both preschools had great opportunities for the children to achieve great heights in their play, both on the preschool playgrounds and on hikes. The children sought out this play by climbing high up in the

climbing tower, on the roof of a play hut, in trees, on rocky walls, and on cliffs and high steep hills. On their hikes, both preschools visited forest areas where there were a great deal of opportunities for climbing, balancing and jumping down. Children were observed heightening the level of speed in their play in situations when they were sliding/sledding, swinging, running, bicycling, skating and skiing. To heighten the speed, the children sought out the longest and steepest hills for sledding in the winter, pushed each other down the sledding hill or the slide, threw sand or water on the slide, and pushed each other on the swing, all in hopes of attaining a greater speed in the play. The following quote from one of the winter hikes with the outdoor preschool exemplifies one of these situations:

*John (5 years old) and Stefan (4 years old) have walked up to the top of the longest and steepest sledding hill in the forest. They have placed themselves together on the sledding mattress; Stefan is facing the right way, down the hill, while John sits backwards on the mattress. Both Stefan and John use their hands in the snow to increase speed on top of the hill, and soon they race down the hill at an incredibly high speed. They race down, whirling around with no control of the movement of the mattress or the environment or nearby children into which they could potentially crash. They fall off the mattress at the bottom of the hill and tumble into the snow under some trees on the side of the hill. They shriek and laugh, and get up and start brushing off the snow, laughing even more.*

The degree of rashness in children's performance of risky play also influenced the risk present in the play situation. Often, the children would engage in the play in a creatively dangerous way, such as swinging several children together on one swing, swinging sideways to crash into each other, leaping from branch to branch while climbing, trying to pass each other on a branch in the tree, sliding on the stomach with head first, or standing upright on the sledding board down the hill ("surfing"). This is shown in the following quote from the ordinary preschool:

*Several children are sledding down the snowy hill inside the preschool playground. Martin (5 years old) pulls a sledding mattress up the hill. He arranges the mattress on top of the hill and tries to keep it still while stepping on to it in an upright standing position. After a couple of attempts, he manages and rides down the sledding hill at a high speed, standing on the mattress as if it was a surfboard. At the bottom of the hill, he falls off the mattress and tumbles onto the snow. He laughs with joy and pulls the mattress up to the top again, ready for another ride.*

In the present study, the children would also sometimes dare themselves or one another to achieve a greater risk in play than they normally did. This could be both direct by verbally challenging someone to do something risky, or indirect by watching others climb high or performing a dangerous stunt. In these situations, the risk-taking decision would express itself as seen in the following quote from one of the hikes with the outdoor preschool:

*John (5 years old) is watching Tom (4 years old) climbing a tree. The tree has just a few branches to hold on to while climbing, but Tom has reached a height of approximately 4 meters above the ground. Tom climbs cautiously and calmly with great concentration. John is waiting for his turn to climb the tree, and as soon as Tom reaches the ground, John starts climbing up. John climbs with a bit of effort up to approximately 1 meter above the ground. There he stops, clinging to the trunk, and says, "Oy..." He laughs nervously, "this was high...!" He remains at this height for a while, looking down, looking up, tries to stretch himself a bit further up the trunk, but ultimately starts the decent of the climb. He says, "I'll do it this way," and he slides his feet on the trunk a few centimeters down to the ground.*

In this situation, none of the other children watching the situation ridiculed John because of his withdrawal from the tree. The children seemed accustomed to the fact that some of them dared to take more risks than others. As such, all the children experienced the rewarding excitement when reaching the limits of what they dared, even though the limits were individually different. When the children in the present study took risks in play by achieving high speed and rashness in play, they expressed their positive experience by laughing, shrieking and screaming with fearful joy in almost an ecstatic way, sometimes even before starting the activity. When the children took risks in play by achieving a greater height and playing rashly in great heights, they expressed both deep concentration and intense excitement. For instance, while climbing high up in a tree, getting prepared to jump down from a height, or balancing along a tree branch, the children were deeply concentrating and focused on the challenge that they had encountered. The exhilaration was triggered at the moment they had managed the challenge. At that moment, they expressed an intense joy, for example, as in a situation on one of the hikes with the ordinary preschool:

*Sam (4 years old) is trying to climb a tall, thin tree. The trunk of the tree is smooth and difficult to grip, and there are few branches to climb on. Sam has difficulties but he keeps on trying. He is completely quiet. He*

*slowly ascends the tree, little by little. After some time, he reaches the few branches right below the top of the tree, the goal of his climb, and he shouts out, "Yes! Yes!" He now stays up in the tree, approximately 2 meters over the ground holding onto a couple of branches. He takes a few climbing steps down the trunk and then up again while he says to himself, "I really did dare that...!"*

Even though a great deal of risky play was observed during the observation period, no situations lead to accidents or injuries. The children seemed to know their own levels of competence and the level of risk with which they were comfortable when achieving great heights, speed and rashness in their play. Also, the level seemed individually different from child to child. The children reduced the height and speed by themselves if they were able, such as climbing down or braking with their foot while sledding, or calling out for help from the staff if needed. One example is Stefan (4 years old), who was swinging on the rope in the tree outside the outdoor preschool's house:

*Stefan has watched Maria (5 years old) swing in the Giant's-stride with such a high speed that she leveled the roof beam of the house. Stefan gets on the swing and asks the preschool staff standing nearby to push him to get a higher speed. The preschool teacher pushes Stefan high up in the air as Stefan shouts, "Woooo!" The preschool teacher then let go of Stefan, and he swings back and forth with a high speed. Stefan laughs and shouts, "Oaaaaaa!" the entire time while swinging and the preschool teacher continues to push Stefan to increase the speed. Gradually, the swing starts spinning around as it goes back and forth, and Stefan laughs and shouts even more. Suddenly Stefan looks scared and shouts to the preschool teacher, "It's enough!" The preschool teacher asks, "Enough?" Stefan shouts again, "It's enough speed!" The preschool teacher then helps Stefan reduce the speed, and when a lower speed is established, Stefan continues to swing, now making the preferred speed by his own move, and shouting with joy, "Yo, ho! Yo, ho!" After a while, he stops the swing with his foot and then walks away.*

Sometimes children also withdraw completely from the play or refused to engage in the play at all because they assessed the risk as too high for them to manage. As such, children seemed to manage the risk by taking decisions of reducing, escaping from or avoiding the risk in the play situation.

### **The Preschool Staff's Management of Children's Risky Play**

The results of the present study revealed four usual strategies that the staff took when dealing with children's risky play. These were restricting/constraining, keeping a close eye, not present/distance and contributing/initiative.

As a whole, the staff was not present or kept distance in most of the situations of risky play. There were very few occasions of staff restricting/constraining children's play. When this occurred, it was most often when children climbed high up in trees or rocky walls, and sometimes when children performed intense rough-and-tumble play resembling a real fight or when they put themselves at unintentional risk by being unaware of dangerous elements. On these occasions, the staff would tell the children to stop this particular play or reduce the risk in the play situation (descend further down in the tree, be less aggressive in the play fight, or to move away from dangerous elements). One example of restriction of children's climbing is from the field notes from the ordinary preschool:

*Since arriving at the preschool, some of the children have already come out on the playground and started to play. Three girls are climbing in the tree nearby the gate to the playground. Two of the girls are climbing upwards, approaching the top of the tree. As I pass through the gate, one of the preschool teachers walks towards the girls and tells them to immediately come down and remain at a lower level in the tree. The girls do as she says, and she walks away from the scene.*

Situations of rough-and-tumble play occurred in both preschools, but in the outdoor preschool, the researcher was told by the children that play fighting, play fencing and play wrestling were forbidden by the staff. Still, there were several observations of such play in the outdoor preschool, often in the setting of role play in which children pretended to be fantasy creatures such as King Kong, Tarzan and Spiderman. On these occasions, the rough-and-tumble play happened out of sight from the staff. The prohibition of this kind of play implies that the staff was not comfortable with the children engaging in this. In the ordinary preschool, there were several situations of play fighting, as well. In some situations, the staff intervened and prohibited the play situation. An example from the video observations involves three boys play fencing each other:

*Ian (5 years old), Mark (5 years old), and Tim (5 years old) are play fencing each other with branches, making scary faces and roaring animal sounds. Tim suddenly starts to cry and runs away from the two others. Ian and Mark climb up on the top of the flat roof of a small shack on the preschool playground and*

*continue their fencing and roaring. Ian then jumps down to the ground, fencing with the branch in the air and roars loudly. One of the staff members approaches the two boys holding hands with Tim who still cries. She asks if they have hit Tim while playing. Ian and Mark answer that they did not hit Tim, but that he probably thought they would. Ian says, "I only did like this...oaaaaa [roars and lifts his hand in the air in a threatening manner]...and then I hit against him...because I am a one-eyed-Monster!" The staff member then tells the boys to stop playing this way as someone can get hurt.*

Sometimes the staff did not break off the play situation, but just kept a close eye on the activity. One of these occasions was when a four-year-old boy in the outdoor preschool climbed a rocky wall of approximately 3 meters height. The preschool staff kept a close distance watching the boy, reminding him to be cautious, ready to assist the boy if necessary. In some situations, the children in the present study suddenly found themselves higher up from the ground in play than they thought comfortable. In these situations, the child would climb down if he or she managed, or if he or she did not manage, call for help from one of the staff members. In situations when staff members were called on to assist a child stuck in a tree, the response from the staff member on all occasions was that the child would have to get down on his or her own. This applied for both preschools. The staff member would assist the child by being there and guiding the child down on her own, but the staff would not lift the child down. Addressed to the researcher, some of the staff explained that the rule was "If you can get up, you can get down," and that children were not allowed to climb in trees or other climbing equipment if they could not get down by themselves. Close supervision was also the case when children played with dangerous tools. The tools were not free to use, and the children would have to ask the staff to bring them out if they wanted to play with them. On these occasions, the staff stayed close to the children, instructing them on how to use the tools, helping them if they asked for assistance, and reminding them to be careful. They constantly kept an eye on the activity and made sure other children stayed at distance. Also, when children went out exploring on their own, with the potential of getting lost, the staff often had an eye on the children at a distance. In the present study, the children in the outdoor preschool with no fences surrounding the playground had extensive freedom to move around where they wanted. When on hikes, both preschools offered the opportunity to go exploring alone, but dangers of the explored environment, such as dense forest, steep hills and cliffs, and small lakes, made the staff more attentive to where the children moved around on their own. They would call them back to keep them under surveillance if they went too far or out of the view of the staff. Accordingly, the staff was also attentive when children played near dangerous elements, and kept a close distance at which they would be able to rescue or help children if needed.

On the occasions in which the staff were close to or included in risky play, they would sometimes not restrict or constrain the play, but rather contribute and take initiative of the play. Occasions of staff participating in chasing games and climbing trees were sometimes observed, but this kind of staff involvement was most often the case in play with high speed such as swinging, sliding, sledding and skating. This is exemplified by a quote from an observation of sledding in the outdoor preschool:

*The preschool teacher and Tom (4 years old) are sitting on the sledding mattress on top of the longest and steepest sledding hill. They start sledding down the hill and soon achieve a very high speed. Approaching the bottom of the hill, they swerve out in the snowdrift on the side of the hill and tumble over each other. Both Tom and the preschool teacher laugh excitedly. The preschool teacher says, "We fell off, but it was still fun!" Tom shout, "Yees! It was completely wild! Let's go all the way up and do it again! We'll go even faster and we'll make the mattress whirl!" The preschool teacher answers, "Yes, maybe we should do that!" The two of them start walking up the hill and Tom says: "This was really fun!"*

In these situations, the staff encouraged the children to achieve high speed on the swings, they pushed children down the sledding hill, or they sat on the sledding board with the children and they took initiative by rolling and sliding down a wet, steep grass hill.

## CONCLUDING DISCUSSION

The first research question of the article was, "How do preschool children seek out and manage risks in play?" The results show that children intentionally seek out risks in their play. They tend to do this either by achieving great heights and high speed, by performing the play in hazardous and creatively dangerous manners, or by daring each other. As expected, due to former research and theory, the present observations indicate that the immediate reward of such play for children was the excitement and joy that it brought, even though it was sometimes a fearful joy (Adams, 2001; Apter, 2007; Gerkovich, 2001; Sutton-Smith, 1997; Zuckerman, 1994).

The way children sought risks in hazardous and creatively dangerous ways supports the findings that children's normal rashness is the most common risk factor for injury on playgrounds, rather than features of the equipment (Ball, 2002; Coppens & Gentry, 1991; Illingworth, et al., 1975; Ordoñana, et al., 2008; Rosen & Peterson, 1990). The potential accidents and losses related to risky play include getting hurt or injured while playing. In the present study, there were no injuries observed during the risky play situations. Still, decisions to avoid or reduce risks in play, such as withdrawal from the situation and refusal of engaging in the play, occurred as means of managing the risk level. This is in accordance with former research showing that children tend to assess the risk in the situation and find suitable ways of getting out of it (Coster & Gleeve, 2008; Smith, 1998). When the child perceives the danger of experiencing an accident as greater than a positive outcome of the activity, the child will try to manage the risk by withdrawal. According to Adams (2001), this is the nature of balancing behavior; the risk-taking decision is influenced by the evaluation of the potential rewards weighed against the potential accidents. Adams' model also suggests that each individual's propensity to take risks will influence the risk-taking decision. The present results indicate that the observed children differ in how they perceive the danger and their propensity to take risks in play, as argued in former research on individual differences in children's risk-taking and sensation seeking (Cook, 1993; Cook, et al., 1999; Miller & Byrnes, 1997; Morrongiello & Lasenby-Lessard, 2006; Morrongiello & Matheis, 2004, 2007; Morrongiello & Sedore, 2005). Still, in accordance with former research (Adams, 2001; Aldis, 1975; Smith, 1998; Stephenson, 2003), all children in the present study seemed to seek risks and thrills suitable for their individual level of acceptable risk, and by that experience the rewards of positive emotions such as joy and excitement.

The second research question in this study was, "*How does preschool staff manage children's risk-taking in play?*" The results show that the staff usually took one of four different strategies when dealing with children's risky play: restricting/constraining, keeping a close eye, not present/distance and contributing/initiative. In this way, the present results demonstrate that supervision from adults present influenced children's risk-taking in play, and that the preschool staff made risk-taking decisions on behalf of the children. On some occasions, the supervision of adults led to restrictions and guiding of the risk-taking behavior, such as how high they could climb or if they were allowed to go explore on their own outside the fence border. In other situations, the staff took a more withdrawn role and let the children find their way out by themselves. Sometimes the staff took initiative in risky play and encouraged the children to take risks in play. As such, the risk-taking decision was taken over, or at least influenced highly, by the supervisor. Still, the extent of restrictions and constraints observed in the present study were few and modest. This supports the former suggestion that Scandinavian (Norwegian) preschool teachers have fewer concerns about children's risk-taking than several other countries (Ball, 2002, 2004; Caesar, 2001; Chalmers, 2003a, 2003b; Greenfield, 2003; Little, 2006; New, et al., 2005; Sawyers, 1994; Swartz, 1992; Wardle, 1997; Zeece & Graul, 1993). In this way, the children in the present study had great freedom to explore challenges and risks in play, and to independently make risk-taking decisions without too many constraints from the preschool staff. According to Smith (1998), the best way to supervise children seems to be supporting the them in exploring risks and challenges, and helping them pursue this in safe settings. The preschool staffs' involvement in children's risky play in the present study seems to support such an attitude of exploration and risk-taking. The staff only intervened or restricted risky play if there were threats of serious injury among the children. In several situations, the staff actually contributed and took initiative in risky play among the children. According to Smith (1998), adults taking initiative and encouraging children to be involved in risk-taking in play is a positive way for children to encounter challenges, as long as the child is not pushed beyond their own limit of acceptable risk into the negative experience of anxiety.

The balancing act of letting children explore and take risks while still keeping them safe from fatal injuries is not easy. The safety legislation on children's play environments and the recent growing safety concerns among parents and caretakers should not result in restricting children from engaging in risky and challenging play activities. Rather, caregivers and supervisors should let children encounter risks and challenges within a relatively safe play setting (Smith, 1998), even though one would have to take this important knowledge at the risk of some minor injuries. At playgrounds, one must consider both the risks and the developmental benefits of letting children face the risks (Ball, 2002). A preoccupation with strict surveillance and restrictions of risky play would hinder the children from positive mastery experiences such as fun, enjoyment, high arousal, excitement, thrill, pride, achievement and healthy self-esteem (Adams, 2001; Apter, 2007; Coster & Gleeve, 2008; Sutton-Smith, 1997). Paradoxically, risk-avoidance puts children at greater risk because they may miss out on important developmental benefits (Adams, 2001; Apter, 2007; Ball, 2002; Boyesen, 1997; Gill, 2007; Smith, 1998; Stutz, 1995; Sutton-Smith, 1997). Through risky play, children prepare themselves to handle "real risks and dangers," it is "serious risk-management exercise" (Adams, 2001).

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# Societal Values and Policies May Curtail Preschool Children's Physical Activity in Child Care Centers

**AUTHORS:** Kristen A. Copeland, MD,<sup>a,b</sup> Susan N. Sherman, DPA,<sup>c</sup> Cassandra A. Kendeigh, BA,<sup>a</sup> Heidi J. Kalkwarf, PhD,<sup>a,b</sup> and Brian E. Saelens, PhD<sup>d</sup>

<sup>a</sup>Division of General and Community Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio; <sup>b</sup>Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, Ohio; <sup>c</sup>SNS Research, Cincinnati, Ohio; and <sup>d</sup>Departments of Pediatrics and Psychiatry & Behavioral Sciences, Seattle Children's Hospital Research Institute, and the University of Washington, Seattle, Washington

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Address correspondence to Kristen Copeland, MD, Division of General and Community Pediatrics, Cincinnati Children's Hospital Medical Center, 3333 Burnet Ave, MLC 7035, Cincinnati, OH 45229. E-mail: [kristen.copeland@cchmc.org](mailto:kristen.copeland@cchmc.org)

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**WHAT'S KNOWN ON THIS SUBJECT:** Three-fourths of US preschool-age children are in child care; many are not achieving recommended levels of physical activity. Daily physical activity is essential for motor and socioemotional development and for the prevention of obesity. Little is known about physical-activity barriers in child care.



**WHAT THIS STUDY ADDS:** Injury and school-readiness concerns may inhibit children's physical activity in child care. Fixed playground equipment that meets licensing codes is unchallenging and uninteresting to children. Centers may cut time and space for gross motor play to address concerns about school readiness.

## abstract



**BACKGROUND AND OBJECTIVES:** Three-fourths of US preschool-age children are in child care centers. Children are primarily sedentary in these settings, and are not meeting recommended levels of physical activity. Our objective was to identify potential barriers to children's physical activity in child care centers.

**METHODS:** Nine focus groups with 49 child care providers (55% African American) were assembled from 34 centers (inner-city, suburban, Head Start, and Montessori) in Cincinnati, Ohio. Three coders independently analyzed verbatim transcripts for themes. Data analysis and interpretation of findings were verified through triangulation of methods.

**RESULTS:** We identified 3 main barriers to children's physical activity in child care: (1) injury concerns, (2) financial, and (3) a focus on "academics." Stricter licensing codes intended to reduce children's injuries on playgrounds rendered playgrounds less physically challenging and interesting. In addition, some parents concerned about potential injury, requested staff to restrict playground participation for their children. Small operating margins of most child care centers limited their ability to install abundant playground equipment. Child care providers felt pressure from state mandates and parents to focus on academics at the expense of gross motor play. Because children spend long hours in care and many lack a safe place to play near their home, these barriers may limit children's only opportunity to engage in physical activity.

**CONCLUSIONS:** Societal priorities for young children—safety and school readiness—may be hindering children's physical development. In designing environments that optimally promote children's health and development, child advocates should think holistically about potential unintended consequences of policies. *Pediatrics* 2012;129:265–274

The prevalence of high BMI increases as children age and has remained steady over the past 10 years,<sup>1</sup> despite numerous public health efforts to curb the childhood obesity epidemic. Recent guidance<sup>2</sup> based on empirical evidence suggests targeting prevention and interventions in the earliest age groups to address the epidemic,<sup>3–5</sup> as by the time children are school-aged, 19% are already obese, and sedentary habits have already been established.<sup>6,7</sup>

Seventy-five percent of US children aged 3 to 5 years are in child care; 56% are in centers, including nursery schools, preschools, and full-day centers.<sup>8</sup> Epidemiologic evidence suggests that children are not getting enough physical activity in these settings,<sup>9–14</sup> even though it is a key strategy for preventing excessive weight gain.<sup>15–21</sup> Children spend most (70%–83%) of their time being sedentary in child care—even when excluding time spent in naps and meals—and only spend 2% to 3% of the time in vigorous activities.<sup>9–11</sup> This is particularly concerning, because daily physical activity is not only essential for healthy weight maintenance, but also for practicing and learning fundamental gross motor skills<sup>22–25</sup> and socioemotional and cognitive skills.<sup>26–34</sup>

In the United States, child care facilities are licensed by individual states. The primary purpose of state licensing codes is to protect the health and safety of children. Thus, most of the language in the codes regarding physical activity relates to elements of playground safety, for example, maximum heights of climbing equipment, the size of fall-zones, and the types and depths of approved fall-zone surfaces. Individual centers may choose to implement center policies that are more promoting of physical activity, as long as they comply with the state's minimum health and safety standards, as well as state and/or federal standards (eg,

Head Start) for early learning. Licensing guidelines related to physical activity promotion vary widely among states<sup>35</sup>; only nine states specify a minimum amount of time to be spent in outdoor play.<sup>36</sup>

Children obtain vastly different amounts of physical activity in child care among states,<sup>37,38</sup> which may in part be due to weather-related differences across regions.<sup>39</sup> Surprisingly, however, children's physical activity levels are highly variable among child care centers even within the same geographic region, and this variability is explained primarily (27%–47%)<sup>9,10, 40</sup> by individual center characteristics, rather than by child characteristics (3%–10%).<sup>9,10</sup>

The purpose of this qualitative study was to understand why children's physical activity may vary among child care centers, and to identify barriers that might prevent children from obtaining adequate amounts of physical activity while in centers. This work was undertaken to generate hypotheses that could be tested in future quantitative studies to identify important barriers to children's physical activity in child care and inform future policy-, facility-, or teacher-related interventions to increase children's physical activity in child care. We have previously reported some of the barriers identified in this work related to children's clothing,<sup>41</sup> inadequate facilities,<sup>39</sup> weather-related policies,<sup>39</sup> and teachers' attitudes and behaviors.<sup>42</sup> This article presents additional findings, particularly regarding the impact of parents' values and input that affects children's center-based activity, highlighting those that are particularly relevant to pediatric clinicians, policy makers, and applied-pediatric researchers.

## METHODS

A detailed description of the methods used in this study and the demographics

of the sample has previously been reported.<sup>41,42</sup> We conducted 9 focus groups with child care teachers/providers between August 2006 and June 2007 to explore their perceptions of facilitators and barriers to children's physical activity in centers, and to elicit child care providers' normative beliefs.<sup>43,44</sup> We then conducted 13 one-on-one interviews in the spring of 2008 to assess the credibility of our focus group findings ("member checks").<sup>45</sup> Participants were recruited through fliers and the local child care resource and referral agency, and assigned randomly to a focus group session that met their schedule. No more than 1 participant per child care center was eligible to attend each focus group, so that there was heterogeneity of experiences in each group.<sup>44,46</sup> Participants were eligible if they currently worked or had worked in a full-day center in Hamilton County, Ohio within the past 3 years. Of the 49 focus group participants, 27 (55%) identified themselves as African American, 48 (98%) were female, and 44 (90%) had some post-high school education. Participants had worked in child care an average of  $13 \pm 9$  years (range, <1–37 years). Focus group participants came from 34 urban and suburban centers including 5 Montessori, 6 Head Start, 2 church-affiliated, 2 Young Men's Christian Associations, 4 worksite- or university-affiliated, and 3 corporate/for-profit centers. This study was approved by the institutional review board at Cincinnati Children's Hospital Medical Center; all participants provided verbal informed consent to participate and received \$25 remuneration.

Focus groups lasted an average 1.5 hours, were moderated by an experienced focus group facilitator (S.N.S.), and attended by the principal investigator (K.A.C). Discussions were audio-recorded and transcribed verbatim.

The semistructured focus group guide included questions on benefits and barriers to children's activity at the child, parent, teacher, center, institutional, policy, and societal levels. Open-ended questions were followed by more specific probes to clarify and extend responses. Prompted by pictures of typical child care center playgrounds, participants were asked to describe what they and the children enjoyed and did not like about their playgrounds. Examples of questions from the topic guide that contributed to the themes in this article are listed in Table 1. By consensus, 2 investigators (K.A.C. and S.N.S.) modified the focus group topic guide in an iterative fashion to explore new issues raised in previous focus group sessions and concluded after the ninth focus group that no new information was emerging from discussions. As theoretical saturation<sup>43,44</sup> was achieved, recruitment for focus groups was terminated.

By using an inductive editing approach,<sup>46</sup> 3 investigators (K.A.C., S.N.S., and C.A.K.) trained in different disciplines (pediatrics, social science research, and child care) independently read each of the transcripts, identified emergent themes, and then as a group defined and categorized a codebook. The 3 investigators independently coded each transcript, and then met as a group to resolve any differences in coding by consensus. *nvivo* (QSR International version 7) was used to record coding decisions and to manage the data.

The themes elicited from the focus groups were reviewed with 13 interview participants, 9 of whom had participated in the focus groups ("member checks"), and 4 of whom could not participate because of scheduling conflicts. Interviewees were encouraged to expand on or question each of the themes. Interview participants provided additional insights and supporting

experiences, which were used to further analyze the findings, but did not differ with the investigators' original analysis and interpretations. All quotes presented in this article are from the original 9 focus groups.

## RESULTS

### Time in Child Care May Be the Only Opportunity for Physical Activity and/or Outdoor Play

An overarching theme was that many participants expressed concern that the time in child care may be the child's only opportunity for outdoor play (Table 2). Because many of the children were in care for such long hours, there was little free time for outside activities (¶1, ¶2). This was particularly the case for parents that worked multiple jobs (¶3), and/or did not earn sufficient income to afford outside extracurricular activities (¶4). Participants noted that some children may lack a safe place to play near their home (¶5), and several suspected that physical activity and trips to a safe park were not a "value" of the parents (¶6). This made the time in nonparental care even more critical for obtaining physical activity.

### Concerns About Injury and a Focus on Safety Limits Children's Physical Activity

Although participants acknowledged the importance of physical activity, they also acknowledged that vigorous activity and outdoor play presented a risk—that children could get injured. The child's safety was cited as a main concern of both parents and teachers. Participants relayed pressure from parents not to allow their children to get injured while under their watch (¶7), and at times were asked to keep children from participating in vigorous activity to keep them from being injured (¶8, ¶9, ¶10).

Participants appreciated having state inspections of their playground and strict licensing codes, which helped them feel confident about the safety of the equipment, yet several worried that the guidelines had become so strict that they might actually be limiting rather than promoting children's physical activity. Several participants discussed how overly strict standards had rendered climbers unchallenging and uninteresting to the children, thus hampering children's physical activity (¶11, ¶12, ¶13). The new play equipment that was safe per these standards soon became boring to the children (¶11, ¶12) because they quickly mastered it. To keep it challenging, teachers noted that children would start to use equipment in (unsafe) ways for which it was not intended (¶14) (eg, walking up the slide), because participants noted that children were "wired" to seek out challenges (¶15). Some noted that preschool-aged children were drawn to more challenging "school-aged" equipment that the state had deemed was only appropriate for children over age 8 (¶16).

Last, participants cited crime-related safety concerns in the neighborhood where the center was located (¶17) as potentially inhibiting children's physical activity. In summary, participants cited societal and adult concerns about children's safety, and licensing guidelines designed to prevent childhood injury, both as potential obstacles to children's physical activity opportunities in child care.

### Financial Issues Limit Physical Play Space and Available Equipment

Several participants cited budgetary reasons for why their centers could not offer children optimal physical activity opportunities (¶18). Most centers had tight operating margins, and thus could not afford extensive equipment offerings (¶19, ¶20), which was cited



**TABLE 1** Sample Questions Used in Focus Groups That Elicited Teachers' Concerns That Safety, Budgets, and a Focus on Academics May Hamper Children's Physical Activity in Child Care<sup>a</sup>

1. What are some types of activities that children in your center engage in that **increases their heart rate**? (including indoor and outdoor games)
2. How are **outside games** different than **inside games**?
  - o How are **outside rules** different from **inside rules**?
3. What are some possible **benefits** to children being outside?
  - o **Probe on whatever they mention** (*expect*: a learning tool, exposure to nature, calming tool, health promotion, or preventing illness).
4. What are some possible **disadvantages** to children being outside?
  - o **Probe on whatever they mention** (*expect*: injuries, catching a cold/getting sick, less control over the children).
5. In your opinion, **what is the role of physical activity or active play in child care**? How important do you think it is for the children? (*Probe on whatever is mentioned, and encourage participants to react to what others have said.*)
6. *Place pictures of three preschool playgrounds where all participants can see them.* Look at these three pictures of playgrounds. Think about how you might use these playgrounds with the children under your care. Starting with picture #1:
  - o What are some **positive features** of this playground, starting with the **children's perspective**?
  - o In what ways is the playground attractive **to you** as a teacher/child care provider?
  - o What are some of the **disadvantages** of this playground compared with the other pictures, or compared with other playgrounds you know?
  - o Optional probes:
    - What would make the playground **more attractive to you**? (Clarification or follow-up: What could be changed in the playground to make you want to spend more time there?)
    - What would make it more attractive **to the children** you care for?
    - (*If it hasn't already been discussed*) Now think about your responsibilities in supervising and instructing the children. How easy or difficult do you think it would be to supervise children on this playground, and what would you change about it?
7. Now **think about the playground at your preschool or child care center**, or another playground that you are intimately familiar with.
  - o What do **the children like** about your playground?
  - o What are some things **you like** about your playground as a teacher/child care provider?
  - o What are some **disadvantages of or problems** with your playground?
  - o **What would make the playground better**, to make it more attractive to you or to make you want to spend more time there?
  - o What would **make the playground more attractive to the children** you care for?
  - o **In what ways is it difficult to supervise** the children on your playground? What could be changed to make it easier?
8. What **types of things keep you from using your playground** sometimes? *Probe on the following in whatever order the participants mention them*
  - o What types of **weather** keep children from going outside or using your playground?
    - What do you do on days that weather or other things keep you from going outside? (*expect to hear at least some participants mention an indoor gross-motor room*)
  - o Tell me about your interaction with **parents** regarding taking the children outside. Do parents encourage you to take children outside?
    - Have parents ever said or done anything in the past that makes it difficult for you to take the children outside? (*expect to hear: improperly dressed, parents' request not to take children outside due to injury or fear of getting sick*) In response to parent behaviors mentioned:
    - How do you handle that?
    - How do you feel about that behavior?
9. What kind of **policies** does your center have about using the playground, including **weather conditions**, playground **schedule**?
  - o For those with **and** those without weather policies, how is the decision usually made about whether to take the children outside? (eg, left up to individual teacher discretion, or the director decides?)
  - o How is outside time, playground time, and indoor muscle room time scheduled at your center? (**Clarification**: Do you have set times you are allowed to use the playground?)
    - *Optional probe if they mention set times*: What happens if it's raining during your set time?
    - *Optional probe if they mention conflicts with other teachers about their designated time on the playground*: How did you feel about that, how did you handle that?
  - o What rules if any does your center have about physical activities such as running, climbing, and jumping in the classrooms?
10. Think about all the rules and policies we've mentioned. If you could change the policies or rules at your center, what would you change about them?
  - o (*optional probe*) What do you think about the rules and policies at other center that you've heard mentioned?
11. How do you think **licensing regulations** affect children's physical activity?
  - o *Follow up if needed*: For instance, How do Safety requirements for playground equipment affect children's physical activity on playgrounds?
  - o Ratio requirements for different age groups on the same playground?
  - o Licensing regulations regarding weather?
12. Can you think of anything that we haven't already discussed that may sometimes keep children from being physically active?
13. What could be done at your center to get the children to be more active? *With ideas offered, ask participants what they think about the ideas, how they would react if the suggested intervention occurred at their center*

<sup>a</sup> For each of the questions, nonspecific and nonleading probes were used to follow up on any ideas expressed. Examples of these probes were "Tell me more about that," or "Can you provide an example?"

by one participant as costing >\$10 000 per climber.

Participants lamented that with budgetary constraints, and given parental

concern about a focus on "academics" (discussed below), classroom and curricular activities took precedence over gross motor play offerings (¶21,

¶22). Many did not have a dedicated indoor gross motor room where children can be active during inclement weather (¶21, 22). Participants'

**TABLE 2** Example Quotes Supporting Key Themes Related to Physical Activity in Child Care

Time in Child Care is Only Opportunity for Outdoor Play	
Long hours in care	<p>¶1: The new thing that we find is childhood obesity. A lot of children depend on us during the day because they get picked up so late. We provide the physical activity that they're gonna get.</p> <p>¶2: I think [physical activity is] very important because a lot of those kids are in daycare from morning 'til late afternoon. They're probably not getting much [physical activity].... I know a lot of our kids leave at 6:00. You're talking 3 to 5 year olds, they're going to go home, dinner, bath, and they're not gonna have time for that outside play.</p>
Parents work multiple jobs	<p>¶3: With the way that parents work these days, you got some parents that's got 2 and 3 jobs sometimes and they don't necessarily have the time to go over that kind of stuff with their kids. 'Cause I got some parents that work on weekends as well as all week long. So to me, it's like we are that surrogate mom.... So I think we have to push gross motor a lot because a lot of them don't know about it. But a lot of them don't get outside. I have a little girl that tells me all the time she doesn't really go outside. When they go home, it's dinner, bath, sleep, and back to school again. They have to learn it somewhere.... Yeah, [the time in child care is] the only time she gets to go outside.</p>
No other activities/no time for free play	<p>¶4: Usually the people I work with are lower income so they don't have extra activities. They're not, you know, the parents are dropping them off, they're running to work, running to school, and then they come, kids go home and all they doing is watching TV, you know, basically getting ready for bed. So I think the physical part and the socialization part [of physical education] is very important for the kids that I work with.</p>
No safe place to play	<p>¶5: Some kids don't even get to go outside once they leave the center. They have to live inside because of the areas they live in or something. A lot of parents where we are so they're scared to let their kids go out because of drive-bys and drug activities so their kids play inside a lot so they really enjoy the outside.</p>
Physical activity not seen as a value	<p>¶6: They are just sitting inside at home. Going outside, getting activity, taking walks, going on bikes doesn't seem to be a value of mom and dad. It's really hard at school to make kids feel that this is good for you. It's important. We should all do this. If I had a magic wand, I'd wave it at home.</p>
Barriers to Children's Physical Activity in Child Care	
Injury/Safety concerns	
Child safety is main concern of parents and teachers	<p>¶7: I can think of one instance where a girl fell on the playground and I tried to help her up and she blamed me.... Her parents thought I made her fall. I am the one that told them to call her home.... So the climbers and the monkey bars are a lot of fun but they are also very dangerous.</p> <p>¶8: Sometimes you have parents who are afraid to let their children do things because they're afraid they'll get hurt.</p> <p>¶9: I had a parent, she said her daughter was just prone to getting hurt... Because she would always would fall, get a cut, her head hurt. Every week there was an incident. Mom said, "Tell her she needs to sit down." I was like, "We can't do that." She said, "She don't need to play. Tell her to just sit down." I said, "But we can't tell her she can't play."</p> <p>¶10: [Parent said:] "I don't want him playing on the climber anymore because he got hurt." "Well, so when we go outside we need to isolate him? What is it you want him to do?" ... She said, "I just don't want him climbing so when you come out he needs to bring a book."</p>

distaste for their inadequate play spaces sometimes caused them not to use them, thus children's active play opportunities could be curbed even when spaces were available (¶23, ¶24).

### Physical Activity versus Academics

A common theme expressed by many participants was that they felt pressure to prioritize academic classroom learning (eg, shapes, colors, prereading skills) over outdoor and active play time. Several felt this pressure directly from parents, including both upper-income (¶25, ¶26) and lower-income (¶27) families. Some participants felt this pressure from state early-learning standards (¶28, ¶29). Many teachers agreed with this goal in principle and sought to always ensure that, when it did occur, there was a purpose to physical activity so that children were not just "running around" (¶29, ¶30). Teachers felt the need to teach cognitive concepts when outside, such as numbers or one-to-one correspondence (¶31), to ensure that children were not practicing and learning only gross motor skills. At the same time, participants recognized that children learned through play, and, in particular, active play. Several commented that the energy release and creative stimulation of outdoor activities helped place children in a better mindset to learn and concentrate later, either indoors or outdoors (¶32, ¶33). Some even felt that children learned best through movement (¶34).

### DISCUSSION

We identified three potential barriers to children's physical activity in child care from this qualitative study: (1) safety and injury concerns, (2) economic and budgetary issues, and (3) a focus on "academics," even in the preschool setting. Several of these themes interacted with one another. For example,

TABLE 2 Continued

Barriers to Children's Physical Activity in Child Care	
Playground licensing renders climbers unchallenging	<p>¶11: It seems like an awful lot of play equipment kind of limits them. Climbers these days are—you can climb up a ladder or you can climb up the wall or you can climb up the rope, and then you're on a platform but there's not as much to do.... It just seems like years ago there were more things that were perhaps more dangerous, but also more challenging. It's like you can't really ever be completely safe and push yourself to try to reach a new potential because you're limited because you gotta be safe. Which is great, I want them to be safe! But at the same time, I feel sad that children don't get to do as much as they used to be able to do.</p> <p>¶12: I don't think they really get their heart rate up much from climbing because with all the new licensing regulations, our climbing equipment isn't that hard anymore.... Everything is so safety-oriented that there is not a place to really take a risk.</p> <p>¶13: All the new equipment looks alike.... It's real cool the first time you see it, and then you go to the next playground and there it is again. It's all the same. It's all very, very safe and it's all exactly the same. Even if it's in a different configuration, there are no new skills they can learn here.</p> <p>¶14: I don't know what the licensing regulations are but I know that we used to have this climber where they could climb really high and it was really challenging. Then they changed it to whatever it is now. I guess it had something to do with fall zones and everything. Now we have this climber that it looks cute, much cuter than the old one, but it's not as high, and the old one was kind of scary.... This one there is just not a lot of—you see children trying to climb into places they're not supposed to climb in because it's just not challenging. They're walking up the slide much more than they ever did with the other one. You can see they are just trying to find those challenges.</p> <p>¶15: I think young kids are just wired to be learning something new. If they are in an environment that's too familiar to them, they're gonna figure out some way to do something new which usually does not work for [teachers].</p> <p>¶16: Well, on our playground there are certain types of equipment that have stickers on them that say "For use of children 6 and under" and other equipment will say "For use of children 8-12." So even though some of our kids are 6 and 7, might be able to do the activities on the larger equipment, they're really not supposed to be on that because the sticker says they're not supposed to and our school is supposed to abide by that. So it can limit some of the activities of the children who are able to do that.</p>
Center neighborhood safety	<p>¶17: Yes, I had a parent say she didn't want her child outside because the neighborhood we're in, you know. She lives in this neighborhood but she didn't want her child out. Our center is in [an area that] has a very bad reputation. [The parent said], "I don't want my child outside because I'm not there to watch my child and I don't know, she may get shot."</p>
Economic concerns Playgrounds are expensive	<p>¶18: We have budget problems. We only got so much money. [The school doesn't] have the money. That limits a lot of things we can do.</p>

a center's tight budget limited its ability to offer expensive outdoor equipment, thus centers prioritized things they felt mattered most to the parents: more time, space, and materials in the classroom. Unless parents valued and prioritized outdoor time (and several participants felt many parents did not), children would not have opportunities to be physically active. Out of concern for potential injury, some parents requested their child not participate in outdoor activities, and "read a book instead." This solution addresses all three themes—book reading is safer than outdoor play, books are significantly cheaper than purchasing and maintaining outdoor play equipment, and reading a book is seen as more of a learning experience than outdoor play. Because children spend long hours in care and many lack a safe place to play near their home, these barriers to physical activity in child care may limit children's only opportunity to engage in physical activity.

One seemingly novel finding was that a heightened societal focus on safety resulted in twin outcomes: child care playgrounds had been modified to prevent child injury, but the modifications also rendered them less challenging and interesting for children. It is not clear if these playground "improvements" have caused children to be less active on playgrounds over time, although others have found children to be less active on child care playgrounds with more pieces of fixed equipment.<sup>47,48</sup> Our findings resonate with studies of older children, who have been reported to lose interest in playground equipment that is not sufficiently challenging or varied.<sup>49,50</sup>

Another surprising finding was that a societal focus on "academics" extended even to the preschool-aged group. Several commented that parents wanted to know what their child "learned" that day, but were not



TABLE 2 Continued

Barriers to Children's Physical Activity in Child Care	
Inadequate or nonexistent indoor gross motor room	<p>¶19: Not having enough equipment or enough activities to do. Depending on the center, what their budget allows them. Some centers may have one swing set or one climber. They might have 30 children and there is not enough stuff for everyone to do, so either kids get bored and they start doing things that aren't appropriate or they just get bored and don't do anything. Depends on the budget and the equipment they have.</p> <p>¶20: I think one of [our problems] is not having enough bikes for all the kids.... Probably the same for the climber. We have a climber and a grass area and a little path. It's just a small piece of a climber and so there is always a long line waiting to go up the slide and do stuff like that.</p> <p>¶21: I don't think that physical activity is high on the priority list of things that schools want to necessarily provide. We don't have a strategic muscle room. We just kind of have a hallway that has become the muscle room. When we push for more funding for that or ask for a specific area where we can get that.... And the higher-ups are not interested in that. They want more books, more focus on the indoor activities and so the money, just the funding is not coming for it. And it's very frustrating 'cause I feel that's a very important part of their day, but I don't think that everyone feels that way.</p> <p>¶22: ...they took our muscle room and changed it into a classroom! We have a classroom there now.</p> <p>¶23: The muscle room isn't really large enough or have enough equipment for 14 four-year-olds. It just really is inadequate. I hate the muscle room. If I can avoid it, I will.</p> <p>¶24: Our muscle room is small. It's for one class, One class [and too small for that]... if it's a day where I have 20 kids, I don't even go. I won't even go in there.... When they ride bikes, they are just basically going circles around the climber.</p>
Academic concerns	
Pressure to prioritize classroom learning over physical activity	<p>¶25: I think a lot of teachers know the importance of active play but I think a lot of parents are pushing for a lot of academics. Some schools have been juggling with the idea of eliminating recess which I think is just awful. As educators, we know how important it is but parents who are not in the education field don't realize how important it is. [<i>Teacher at a child care center affiliated with an middle-upper-income school district</i>]</p> <p>¶26: I think the parents that we deal with are more interested in what you're teaching their child than they are in other things. They want your accountability of things. And luckily, with me only being 2s and 3s [year-olds], I tell them up front we do colors and shapes but I don't drown it into their head or hold up the flash card. They learn it by reading a book and you say, "What color is this apple?" [<i>Teacher from nursery school in an upper-income neighborhood</i>]</p> <p>¶27: I think you hit on a really key point when you said the parents want to know what you're teaching them. Because even though I feel that the gross motor is something that's important for the children to experience and engage in, I don't think that their parents necessarily do. Like for example, the fact that they're not getting it when they go home. -A parent whose child is not getting that when they're at home doesn't come to school and say, "You know, I'm wondering if my child got to ride the bike today." They want to know what letters they know, what shapes they know, where they're at with reading... and we have some 2-year-old parents who want to know if their child knows letters, which is not necessarily age appropriate, but their child can't climb the stairs by themselves yet. So, I don't think it's an important thing to parents sometimes. [<i>Teacher from a center serving an low-income neighborhood</i>]</p>

interested in whether they had gone outside, or had mastered fundamental gross motor skills. Participants felt that academics were valued by both low- and upper-income parents, and thus were motivated to demonstrate a "purpose" for gross motor time so that the children would not be seen as just "running around." Some felt pressure from state learning standards and local kindergarten-readiness initiatives. Participants discussed ways of incorporating lessons about numbers or letters on the playground, and thus potentially meet both learning and physical activity standards. Recent successful interventions have integrated activity throughout the day in the classroom.<sup>51–53</sup> It is unknown to what extent these initiatives or parental pressure for academics have contributed to restricting children's time outdoors in child care, because children's outdoor playtime has not been systematically studied. More research is needed to examine cognitive and physical activity outcomes in concert, because participants noted that the 2 are interconnected in this age group.

Participants also noted economic barriers to physical activity in child care: that playground equipment was expensive and that programmatic budgets were usually dedicated to classroom materials and instruction (ie, focus on academics). It is unknown, however, to what extent budgetary issues actually impede children's physical activity, for example, if children attending centers with the majority of children on tuition assistance are any less active than children attending centers that do not accept children on tuition assistance. These questions warrant additional investigation.

Our findings highlight potential areas for additional research and targets for intervention. Although participants recognized the interconnections

TABLE 2 Continued

Barriers to Children's Physical Activity in Child Care	
Activity needs purpose	<p>¶28: I think the State of Ohio is getting away from the gross motor part, too. They are focusing more for preschool on the language and the literacy. They have a new program called the Early Learning Initiative which is to standardize preschool across the state. And they do not consider gross motor or outdoor time or the muscle room time as learning time, so they want children to have 4-1/2 hours of structured learning time, but they're not considering gross motor or fine motor as part of that time. So I think they're getting away from that piece of it, and it concerns me a little bit.</p> <p>¶29: Sometimes kids spend more time outside and aren't getting the other things they need out of preschool. If they are just outside running in circles and... not participating in interactive activities that teachers have planned to meet certain goals of the preschool... and the state and federal standards that we have to abide by all the time. That's one downfall that we need to make sure that even when they're outside, they're participating in meaningful activities—that they're learning something. There is learning going on, not just exerting energy.</p>
Incorporating learning into outdoor play	<p>¶30: I think it's very important that they are learning skills and not just running around, although there are some children that need to burn off that energy, but they're not learning how to do any of the things that they should at home, like the riding the bike or throwing the balls and overhand throwing. They're not learning that at home 'cause there is no time for it.</p> <p>¶31: Like hopscotch, where they are learning numbers, and taking turns, social skills, things like that. We are big on individualization in Head Start, so if there is a child who doesn't know their numbers or one-on-one correspondence, they don't know how to count... then the teachers need to be working on certain skills that will enhance those developmental skills of the child. If they draw a hopscotch outside, it's for these handful of children that need to work on number concepts. They're putting fun stuff out there, but it has a purpose behind it that they're trying to work on.</p>
Activity helps children concentrate, active learning	<p>¶32: I had to do my thesis on Head Start and how they... said that the physical part was just as important. Because sometimes I can't even get the kids to focus if you're trying to do a circle or group or something, until we all got up and played or danced or did something and got all their energy out of them, and then they was ready to sit down and focus for the 15 minutes.</p> <p>¶33: It's just not natural for them to sit still. You lecture them at that age. They need to move. It's not something they want to do, it's a necessity. They need to get outside. They need to smell the fresh air. They learn better. I completely agree with you.</p> <p>¶34: [Movement has] been tied to emotional development and physical development and cognitive development.... They learn through moving. If they aren't able to move their bodies and explore and figure things out with their bodies, the rest of it isn't gonna click, either. It's just important for all-around development.</p>

between physical and socioemotional development, they did not think many parents understood this. This presents an educational opportunity for pediatric clinicians, who interact regularly with families, to guide children's healthy development. Recognizing that school readiness is a prevalent concern, pediatricians may need to highlight for parents the many learning benefits of outdoor play (better concentration, learning about science, negotiation with peers), and reassure parents that active time does not need to come at the expense of time dedicated to "academics" and "learning." Because we have previously reported that children sometimes are dressed unsuitably for active play,<sup>41</sup> pediatricians can remind parents about the importance of "dressing for success," which in preschool would be dressed for active play. The pediatric visit (more common in early years than in older childhood) is also an excellent opportunity to dispel myths parents may believe about the chances their child will get sick when exposed to cold or damp weather, because we have also reported this is a prevalent concern.<sup>42</sup> Last, in dispensing injury prevention advice, pediatricians should be careful not to reinforce messages that physical activity is inherently dangerous. Pediatricians can balance these safety messages with an equal dose of health promotion messages about the crucial importance of daily physical activity for both physical and mental health; and for the motor, socioemotional, and cognitive development of young children.

### Limitations

There may have been selection bias in that those who chose to participate tended to view children's physical activity more favorably, and may have been more attuned to the interconnections between physical and cognitive development in this age group in comparison with the "typical" child care

provider. Our findings should be interpreted as exploratory, because this was a qualitative study of child care providers within a single county in Ohio. The primary purpose of qualitative research is to probe phenomena in-depth, not to generalize the results to other populations. Yet the barriers participants discussed—concerns about safety, budgets, and academics—potentially characterize other geographic areas. Although we tried to recruit participants of different ethnicities, there were no Latino participants, which partially reflects local demographics (<1% of county residents are Latino). We recruited a heterogeneous sample in terms of center program philosophy, years of experience, and sociodemographics of children served, yet it is not possible through qualitative research to make inferences on demographic predictors of participants' attitudes or behaviors, nor is it possible to derive prevalence estimates of the ideas expressed. Future studies are needed to investigate the generalizability of these findings.

## Implications

In promoting optimally safe, healthy, and enriched learning environments for young children, there may be a need to reset the balance between the salient priorities of injury prevention and kindergarten readiness with those that have not received as much recent attention, that is, physical activity promotion. Child advocates must think holistically about potential unintended consequences of policies designed to protect children's safety (eg, licensing codes that have rendered climbers uninteresting, or early learning standards that encourage child-care providers to cut time dedicated for outdoor play). Given that childhood obesity is quickly eclipsing childhood injury as a leading cause of morbidity, and that time in child care may be the child's only opportunity for outdoor play, licensing standards may need to explicitly promote physical activity in as much detail as is devoted to safety. The third edition of the American

Academy of Pediatrics and American Public Health Association's health and safety standards for child care ("Caring for Our Children," third edition<sup>54</sup>) do just this, and are the first to include explicit guidelines and practical tips for promoting physical activity in child care.

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## **Societal Values and Policies May Curtail Preschool Children's Physical Activity in Child Care Centers**

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Review

## What is the Relationship between Risky Outdoor Play and Health in Children? A Systematic Review

Mariana Brussoni <sup>1,2,\*</sup>, Rebecca Gibbons <sup>3</sup>, Casey Gray <sup>4</sup>, Takuro Ishikawa <sup>1</sup>, Ellen Beate Hansen Sandseter <sup>5</sup>, Adam Bienenstock <sup>6,†</sup>, Guylaine Chabot <sup>7,†</sup>, Pamela Fuselli <sup>8,†</sup>, Susan Herrington <sup>9,†</sup>, Ian Janssen <sup>10,11,†</sup>, William Pickett <sup>11,†</sup>, Marlene Power <sup>12,†</sup>, Nick Stanger <sup>13,†</sup>, Margaret Sampson <sup>14</sup> and Mark S. Tremblay <sup>4,15</sup>

- <sup>1</sup> British Columbia Injury Research & Prevention Unit, Child & Family Research Institute, University of British Columbia, British Columbia Children's Hospital, F511-4480 Oak Street, Vancouver, BC V6H 3V4, Canada; E-Mail: takuro.ishikawa@cw.bc.ca (T.I.)
- <sup>2</sup> Department of Pediatrics, School of Population & Public Health, University of British Columbia, British Columbia Children's Hospital, F511-4480 Oak Street, Vancouver, BC V6H 3V4, Canada
- <sup>3</sup> School of Population & Public Health, University of British Columbia, 2206 East Mall, Vancouver, BC V6H 3V4, Canada; E-Mail: rlgibbons6@gmail.com
- <sup>4</sup> Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research Institute, 401 Smyth Road, Ottawa, ON K1H 8L1, Canada; E-Mail: casgray@cheo.on.ca
- <sup>5</sup> Department of Physical Education and Health, College of Early Childhood Education, Queen Maud University, Thrond Nergaards Vei 7, NO-7044 Trondheim, Norway; E-Mail: ebs@dmmh.no
- <sup>6</sup> Bienenstock Natural Playgrounds, 64 Hatt Street, Dundas, ON L9H 7T6, Canada; E-Mail: adam@naturalplaygrounds.ca
- <sup>7</sup> Evaluation Platform on Obesity Prevention, Quebec Heart and Lung Institute, Laval University, 2725 Chemin Ste-Foy, Local Y4283, QC G1V 4G5, Canada; E-Mail: guylaine.chabot@criucpq.ulaval.ca
- <sup>8</sup> Parachute, 150 Eglinton Avenue East, Suite 300, Toronto, ON M4P 1E8, Canada; E-Mail: pfuselli@parachutecanada.org
- <sup>9</sup> School of Architecture and Landscape Architecture, University of British Columbia, 379-2357 Main Mall, Vancouver, BC B6T 1Z4, Canada; E-Mail: susan.herrington@ubc.ca
- <sup>10</sup> School of Kinesiology and Health Studies, Queen's University, 99 University Avenue, Kingston, ON K7L 2P5, Canada; E-Mail: ian.janssen@queensu.ca
- <sup>11</sup> Department of Public Health Sciences, Carruthers Hall, Queen's University, Kingston, ON K7L 2P5, Canada; E-Mail: will.pickett@queensu.ca
- <sup>12</sup> Forest School Canada, 411 Corkstown Road, Ottawa, ON K2K 2Y1, Canada; E-Mail: mpower@forestschoolcanada.ca



- <sup>13</sup> Department of Environmental Studies, Huxley College of the Environment, Western Washington University, 416 High Street, Bellingham, Washington, DC 98225, USA; E-Mail: [nick.stanger@wwu.edu](mailto:nick.stanger@wwu.edu)
- <sup>14</sup> Library Services, Children's Hospital of Eastern Ontario, 401 Smyth Road, Ottawa, ON K1H 8L1, Canada; E-Mail: [msampson@cheo.on.ca](mailto:msampson@cheo.on.ca)
- <sup>15</sup> Department of Pediatrics, Children's Hospital of Eastern Ontario Research Institute, 401 Smyth Road, Ottawa, ON K1H 8L1, Canada; E-Mail: [mtremblay@cheo.on.ca](mailto:mtremblay@cheo.on.ca)
- † These authors contributed equally to this work.
- \* Author to whom correspondence should be addressed; E-Mail: [mbrussoni@cw.bc.ca](mailto:mbrussoni@cw.bc.ca); Tel.: +1-604-875-3712; Fax: +1-604-875-3569.

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**Abstract:** Risky outdoor play has been associated with promoting children's health and development, but also with injury and death. Risky outdoor play has diminished over time, concurrent with increasing concerns regarding child safety and emphasis on injury prevention. We sought to conduct a systematic review to examine the relationship between risky outdoor play and health in children, in order to inform the debate regarding its benefits and harms. We identified and evaluated 21 relevant papers for quality using the GRADE framework. Included articles addressed the effect on health indicators and behaviours from three types of risky play, as well as risky play supportive environments. The systematic review revealed overall positive effects of risky outdoor play on a variety of health indicators and behaviours, most commonly physical activity, but also social health and behaviours, injuries, and aggression. The review indicated the need for additional "good quality" studies; however, we note that even in the face of the generally exclusionary systematic review process, our findings support the promotion of risky outdoor play for healthy child development. These positive results with the marked reduction in risky outdoor play opportunities in recent generations indicate the need to encourage action to support children's risky outdoor play opportunities. Policy and practice precedents and recommendations for action are discussed.

**Keywords:** risk taking; physical activity; supervision; injury; independent mobility; playground

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## 1. Introduction

The use of the word “risk” has changed over time, from a neutral term denoting the probability of a given outcome to being synonymous with “danger” and implying a negative value judgment [1–4]. In this article, we use the word “risk” in the context of risky play to denote a situation whereby a child can recognize and evaluate a challenge and decide on a course of action [3]. This is in contrast to common use of the word to describe hazards that children cannot assess for themselves and that have no clear benefit [3]. Accordingly, risky play is defined in this article as thrilling and exciting play that can include the possibility of physical injury [5]. Types of risky play include play at height, speed, near dangerous elements (e.g., water, fire), with dangerous tools, rough and tumble play (e.g., play fighting), and where there is the potential for disappearing or getting lost. These categories are based on Sandseter’s research observing children at play, and interviewing them regarding their perceptions of risky play [6,7]. Since publication, they have become commonly used internationally in research on this issue [8–13]. Detailed definitions and examples of each type of risky play are provided in Table 1.

**Table 1.** Definitions used to guide the systematic review (risky play behaviours).

<b>Risky Play</b>		
Thrilling and exciting forms of play that involve a risk of physical injury. The risk can be real or perceived [7,14]		
<b>Risky Play Categories [5,6]</b>	<b>Definition</b>	<b>Examples</b>
<i>Great heights</i>	Danger of injury from falling	Climbing/jumping from surfaces, balancing/playing on high objects (e.g., playground equipment), hanging/swinging at great heights
<i>High speed</i>	Uncontrolled speed and pace that can lead to collision with something (or someone)	Swinging at high speed
<i>Dangerous tools</i>	Can lead to injuries and wounds	Cutting tools (e.g., knives, saws, or axes), strangling tools (e.g., ropes)
<i>Dangerous elements</i>	Where children can fall into or from something	Cliffs, water, fire pits, trees
<i>Rough and Tumble Play</i>	Where children can be harmed	Wrestling or play fighting with other children or parents
<i>Disappear/get lost</i>	Where children can disappear from the supervision of adults or get lost alone	Exploring alone, playing alone in unfamiliar environments, general independent mobility, or unsupervised play

Some studies support the importance of risky play for children’s development, learning, mental health, and physical health, including physical activity, and healthy weights [5,12,15]. In one study, children in an experimental group exposed to a 14-week risky play intervention improved their risk detection and competence, increased self-esteem and decreased conflict sensitivity, relative to their pre-intervention performance, as well as when compared to a control group [16]. A cross-sectional study compared children with and without ready access to unsupervised outdoor play opportunities and found more developed motor skills, social behaviour, independence and conflict resolution in the former group [17]. Furthermore, experience with risks during childhood is believed to assist with developing

risk management strategies, and the ability to negotiate decisions about substance use, relationships and sexual behaviour during adolescence [18,19].

Risky outdoor play opportunities have also been associated with negative health outcomes, such as injury or death. A study of 390 U.S. National Parks identified 46 injury-related fatalities to children and youth [20] among the 542 million visitors to the parks over a 2-year period [21]. While the most common cause was motor vehicle crashes (20%), other causes included risky outdoor play activities such as swimming (11%; play with dangerous elements), hiking and climbing (16%; play at height). Winter sports, such as skiing and snowboarding (play at speed) can also represent an important source of risky outdoor play-related injuries for children, with one review indicating rates of 2.86 to 6.6 injuries per skier days [22]. Playgrounds are a common arena for risky outdoor play. In Canada, approximately 2,500 children age 14 and under are hospitalized annually as a result of playground falls (play at height)—81% are for fractures [23]. Over a 10-year period in the U.S., there were over 2.1 million playground equipment related injuries to children treated in emergency departments, 75% of which were from falls [24]. Approximately 6,000 children were admitted to hospital annually, 92% for fractures [24].

The vast majority of risky outdoor play-related injury incidents result in minor injuries requiring minimal or no medical treatment [25–27]. The importance of preventing these minor injuries has been debated in the injury prevention field. Proponents for preventing all injuries cite the impossibility of predicting the consequences of most injury events, such as whether a fall will result in a bruise *vs.* a head injury [28,29]. Others point to the fact that injuries are an inevitable side effect of physical activity, which is necessary for a healthy and active lifestyle [12,30].

In many Western nations, prominent injury prevention strategies for children at play have included playground equipment safety standards and the promotion of close adult supervision [31,32]. Each strategy is described below, along with its potential influence on children's engagement in risky outdoor play.

### *1.1. Playground Safety Standards*

Playground safety standards exist in many nations and influence playground design. The Canadian Standards Association's (CSA) standards for "Children's Playspaces and Equipment" CAN/CSA-Z614 [33], originally published in 1990, are voluntary in Canada, but various local and provincial agencies mandate their adherence [34]. Standards can have an important role in ensuring the reduction of hazards on playgrounds that result in serious injuries. For example, head entrapment and strangulation were historically the main causes of death on playgrounds and have now become extremely rare [35,36]. One Canadian study compared injury rates in elementary schools that did and did not replace play equipment in order to meet new standard requirements [37]. Results indicated a decreasing but non-significant downward trend in injury incidents (ranging from minor incidents attended by school staff to a child sent home or to a health facility) in intervention schools; and a non-significant increasing injury trend in non-intervention schools, though they experienced less injuries overall than intervention schools.

Some standards are specifically designed to curtail risky play. For example, CSA standards set limits on the height of play equipment [38,39]. Concerns have been raised that standards have

excessively restricted playground design options and resulted in Kit, Fence, Carpet (KFC) playgrounds with limited appeal and affordances for play [34,40,41]. KFC playgrounds have been rated as having inferior opportunities for promoting children's emotional, social, physical and cognitive development [40]. CSA standards provide recommendations for surfacing materials, including sand, pea gravel, bark mulch and rubber surfacing. Rubber surfacing—the “C” in KFC—has become increasingly popular despite its relatively high cost, limited play affordance [40,41], and increased risk of fractures when compared to bark surfacing [42]. Ball [41] undertook a cost-benefit analysis of rubber surfacing to determine whether it warranted the investment in terms of injury reduction. He found that the relatively rare occurrence of serious injuries and fatalities on playgrounds might not warrant such an extensive and costly intervention that imposes substantial limits on children's play. Ball [41] points to statistics showing that serious playground injuries in the UK have not decreased as standards have become more stringent and rubber surfacing more common, despite drops in children's use of playgrounds as they have become less enticing.

### 1.2. Adult Supervision

Research has indicated that higher levels of direct supervision are associated with lower injury rates in children up to 10 years of age [43–45]. A study comparing parent supervision practices for children aged 2 to 6.5 years attending an emergency department for an injury with an age/sex matched control group attending for an illness, found that the control group received significantly higher levels of supervision [43]. Another study interviewed parents of children aged 0 to 4 years who were attending a hospital for an injury, regarding the level of supervision provided in the hour before and immediately prior to the injury event [46]. Children admitted to hospital had significantly lower supervision scores than children who were treated and released from the emergency department, indicating an association between quality of supervision and injury severity. Interventions to encourage increased and active caregiver supervision are an important focus for injury prevention [31,32,47,48].

As children grow and develop, parents' supervision of children tends to transition toward less proximal forms [49]. Morrongiello, Corbett and Kane [50], distinguish between “monitoring” and “supervision” to illustrate this change, defining monitoring as a general awareness of child's activities, as compared to supervision being a more active watching and listening (note that this distinction is not made in the clinical and developmental psychology literature [51]). Using these definitions, injury prevention research indicates that supervision, not monitoring, is related to lower rates of children's injury; thus, researchers advocate high levels of active supervision extending throughout childhood and adolescence [50,52]. Morrongiello *et al.* [50] developed the Supervisions Attributes and Risk-Taking Questionnaire (SARTQ) and found that the SARTQ's parental need for psychological control scale (e.g., “I often tell my child what s/he should do even when s/he has not asked my opinion”), and belief in supervision scale (e.g., “I don't let my child out of my sight for too long”) were positively related to levels of direct supervision and negatively related to injuries for children aged 7 to 10 years. Schwebel *et al.* [52] found that parental monitoring was not a predictor of injury in 11 year olds, and hypothesized that this was because children were increasingly making decisions without parents' input. They speculated that the decision-making skills of children and adolescents were not yet sufficiently developed and encouraged increased adult supervision for injury prevention.

Interventions to promote supervision have a direct impact on children's opportunities for risky outdoor play. Many of the behaviours that are discouraged in interventions to promote caregiver supervision while children are at play (e.g., "Stamp-in-Safety" [47] and "Playground Safety Stars" [53]) are examples of risky outdoor play. Furthermore, caregivers are encouraged to actively supervise children, which would largely eliminate independent mobility and reduce opportunities for the other types of risky outdoor play.

### *1.3. Influence of Injury Prevention on Risky Outdoor Play and Injury Rates*

Parental and societal attitudes placing ever-increasing emphasis on supervision and child injury prevention [54–56] have influenced children's outdoor unsupervised activity, including independent mobility, and other opportunities to engage in risky outdoor play [54,57–59]. A study retrospectively comparing the play experiences of American mothers with those of their children aged 3 to 12 years found substantial decreases in time spent outdoors and in unstructured play, and increases in adult-structured activities [60]. Of the 830 respondents, 82% identified safety concerns, such as abduction and traffic, as limiting their children's outdoor play. Similarly, while 75% of UK adults recalled playing in their local streets, 40% of children aged 7 to 11 years reported playing there in 2009 [61]. Adults reported local streets (29%) as their most favoured places to play in childhood; whereas children favoured playing inside a home (41%) [61]. Generational decreases in permission to travel to school without an adult between the ages of 7 to 11 years have been documented in England, from 86% in 1971, to 35% in 1990, and 25% in 2010 [58].

The influence of injury prevention strategies such as playground standards and supervision on injury rates is not clear. In Canada, playground related hospitalizations for children aged 1 to 13 years decreased from 45.8 to 32.7 per 100,000 population between 1994/1995 and 2011/2012 [35]. It is likely that a combination of factors influenced this trend, including injury prevention strategies, but also decreases in children's time spent at playgrounds, possibly because playgrounds became less enticing, and/or resulting from increased parental fear for child safety, active supervision and reduced independent mobility.

Notable drops in playground injury hospitalization rates have not been documented in other nations with similar approaches to injury prevention. In the U.S., rates remained relatively stable between 1992 and 2005 [24,62]. Similarly, UK data show no consistent pattern between 1988 and 1999 [41]. In the Netherlands, there was an increase in injury rates between 1996 and 2009 [63].

### *1.4. What is the Relationship between Risky Outdoor Play and Health?*

Child injury prevention programs have largely sought to limit risky play because of the possibility of physical injury. Societal and parental attitudes have also encouraged increasing supervision and diminishing independence, resulting from concerns about safety and abduction, as well as expectations that parents not appear to be neglectful of their children [64–66]. As efforts to keep children safe have expanded, their access to risky outdoor play has diminished [54,58,67]. There has been increasing discussion of children's developmental need for risky outdoor play, and the potential for adverse consequences from a lack of risky outdoor play experiences on other aspects of children's health and health behaviours [5,8,12,68]. Relevant literature has been published in a variety of disciplines

but has not yet been synthesized to inform the discussion. The purpose of this systematic review is to examine the relationship between risky outdoor play and health related behaviours and outcomes in children, including physical activity, injuries, motor skill development, social health, mental health and spiritual health.

## 2. Methods

The current review is registered with the international prospective register of systematic reviews PROSPERO network (registration No. CRD42014006838).

### 2.1. Study Inclusion Criteria

The review aimed to identify all studies that examined the relationship between risky outdoor play and health related outcomes in children (aged 3.00–12.99 years). In studies that specified the school level of participants rather than the age, the standard age range for that grade level in the region where the study was conducted was used. Studies were included if risky play behaviours (see Table 1) identified by Sandseter and colleagues [5,6] were measured, or if environments that afford risky play (see Table 2) were observed or purposefully created. Eligible exposures of risky play included those obtained via objective (e.g., GIS, standard measuring tape measurement of vertical height of playground equipment) and subjective (e.g., researcher observations of rough and tumble play frequency, parent-reported permission for unsupervised play) measurement. Furthermore, studies were required to include a less risky or non-risky play behavioural or environmental comparison (including internal comparison) or control.

**Table 2.** Definitions used to guide the systematic review (risky play environments).

<b>Risky Play Environment</b>		
Environment that affords or accommodates risky play behaviours [69].		
<b>Affordances</b>		
Features of the environment can enable and invite children to engage in certain types of play behaviours [70]. Affordances are unique for each individual and can be influenced by personal characteristics (e.g., strength, fear) and other features that may inspire or constrain actions (e.g., trees with low branches afford climbing).		
<b>Risky Play Environments</b>	<b>Affordances for Risky Play</b>	<b>Risky Play Category</b>
<i>Climbable features</i> [69]	Affords climbing	Great heights
<i>Jump down-off-able features</i> [69]	Affords jumping down	Great heights
<i>Balance-on-able features</i> [69]	Affords balancing	Great heights
<i>Flat, relatively smooth surfaces</i> [69]	Affords running, RTP	High speed, RTP
<i>Slopes and slides</i> [69]	Affords sliding, running	High speed
<i>Swing-on-able features</i> [69]	Affords swinging	High speed, great heights
<i>Graspable/detached objects</i> [69]	Affords throwing, striking, and fencing	RTP
<i>Dangerous tools</i> [69]	Affords whittling, sawing, axing, and tying	Dangerous tools
<i>Dangerous elements</i> close to where the children play (e.g., lake/pond/sea, cliffs, fire pits, etc.) [69]	Affords falling into or from something	Dangerous elements
<i>Enclosure/restrictions</i> [69] (e.g., differently sized sub-spaces or private spaces where children can explore on their own or hide away from larger groups, mobility license [39,70])	Affords getting lost, disappearing	Disappear/get lost

RTP = rough and tumble play.

Positive and negative health related outcomes were considered in terms of the four domains of the expanded definition of health endorsed by the World Health Organization Executive Board in 1998 [71]: “Health is a dynamic state of complete physical, mental, spiritual and social well-being and not merely the absence of disease or infirmity”.

Restriction of children’s opportunities for risky play is increasingly being discussed in terms of a potential negative impact on physical activity behaviours (e.g., [68]). In light of being recognized by the World Health Organization’s Global Strategy to combat non-communicable diseases [72], physical activity and related behaviours (*i.e.*, sedentary behaviour) were included as outcomes in this review.

To allow for precision in our assessment of the relationships between risky play, physical activity and sedentary behaviour, we differentiated between acute (single bout) and habitual (usual) outcome behaviours. To be categorized as acute, the outcome behaviour must have been measured during exposure to the risky play activity and the comparator activity (e.g., sedentary behaviour measured during play in an adventure playground and during play on a traditional playground), such that it was possible to compare the behaviour in each setting. To be categorized as habitual, the assessment of the exposure and outcome must have been reported in generalities (e.g., play where children can disappear/get lost assessed as average amount of time children were allowed to play without supervision in a typical week and physical activity assessed as average reported minutes per week of MVPA) such that it was possible to determine the strength of association between engaging in a risky play behaviour and usual physical activity and sedentary behaviour levels.

Study designs eligible for inclusion were randomized controlled trial (RCT) and non-randomized controlled study (NRS) designs (e.g., cross sectional, retrospective, prospective, case control, longitudinal, controlled before-and-after studies). In longitudinal studies, data that aligned with our age criteria at a baseline or follow-up assessment were retained and earlier or later data assessments conducted while children were aged outside of that range were excluded.

## 2.2. Study Exclusion Criteria

As the volume of literature on risky play for most indicators was anticipated to be very low, we limited our exclusion criteria. Studies were excluded if they examined indoor play, structured/organized sport, the use of risky substances or risky sexual behaviours; if the mean age of participants was less than 3 years or greater than 12.99 years; and if the outcome of interest was not in line with one of the four categories included in the World Health Organization’s 1998 expanded definition of health [71]. Non-English studies were only excluded if they could not be translated using Google Translate. The volume of literature on injuries was anticipated to be very high, and to have been largely captured by existing systematic reviews dealing with falls and supervision (e.g., [73,74]). To extend—not duplicate—existing work, studies were excluded if the total number of children exposed to the risky play exposure was not identified, such that relative risk of injury could not be determined.

## 2.3. Search Strategy

The risky play electronic search strategy was created by Margaret Sampson and conducted in MEDLINE (1946–11 December 2013) and PsycInfo (1806–December 2013, week 2) using the Ovid interface. CINAHL, SportDiscus (EBSCOhost), and ERIC (Proquest) were searched from database



inception to 12 December 2013. All co-authors were canvassed to nominate relevant studies to guide Margaret Sampson in the development of the search strategy. Reference lists of books on the topic of risky play, proceedings of the Risky Play Symposium “As safe as possible or as safe as necessary: Can injury prevention include healthy risk promotion?” [68], eligible studies and closely related articles were reviewed. PubMed “related citations” searching was conducted on eligible studies and closely related articles. Key content experts were contacted and asked to identify the most influential papers from their personal libraries examining risky play and health in (children) to ensure no key relevant articles were missed by the search. No new relevant articles were identified through key content experts.

The initial search identified that studies tended to cluster around disappear/get lost (*i.e.*, independent mobility, unsupervised play) and rough and tumble play behaviours. Supplemental searches were conducted to target these risky play behaviours specifically. The rough and tumble play targeted search was conducted 7–10 March 2014 and the disappear/get lost targeted search was conducted 17–18 March 2014 using the same sources as the initial search. The search strategies can be found in Supplementary File 1. References were imported into Reference Manager Software (Thompson Reuters, San Francisco, CA, USA) where duplicate references were removed (Margaret Sampson and Rebecca Gibbons).

Two reviewers screened titles and abstracts of potentially relevant articles (Rebecca Gibbons and Takuro Ishikawa). Two independent reviewers examined all full text articles (Rebecca Gibbons and Casey Gray). Any discrepancies were resolved by discussion and consensus between the two reviewers. Consensus was achieved for all eligibility decisions.

#### 2.4. Data Extraction and Quality Assessment

Data extraction was completed by Rebecca Gibbons and checked by Casey Gray. The quality of evidence for all studies was assessed by Casey Gray and a subset was checked by Takuro Ishikawa [36]. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework was used to assess the quality of the evidence from this systematic review. Important features of each study were identified (*i.e.*, study design, risk of bias, consistency of results, directness of the intervention, precision of results, and possibility of a dose response gradient) and their potential influence on the estimate of effect for each outcome was judged [75]. Risk of bias for each individual study was examined in accordance with the Cochrane Handbook (<http://handbook.cochrane.org/>). The quality of evidence for each outcome of interest was examined separately for RCTs, which according to GRADE start as high quality evidence, and Non-Randomized Studies, which start as low quality evidence. The quality of each was rated down if most of the included studies were judged as having a high risk of bias. The quality of evidence was rated if there was evidence of a large effect or a dose response gradient [75].

The nature of risky active play interventions makes it impossible to blind participants and caregivers to group allocation. In addition, the frequent use of caregiver-, teacher-, and self-report measures to assess risky play type and health outcomes is likely to introduce a degree of social desirability bias. However, if these were the only potential sources of bias identified the quality of the evidence was not downgraded, following the guidance of Timmons *et al.* [76]. Studies were divided by type of risky play (e.g., rough and tumble play, great heights), and subdivided by health indicator and

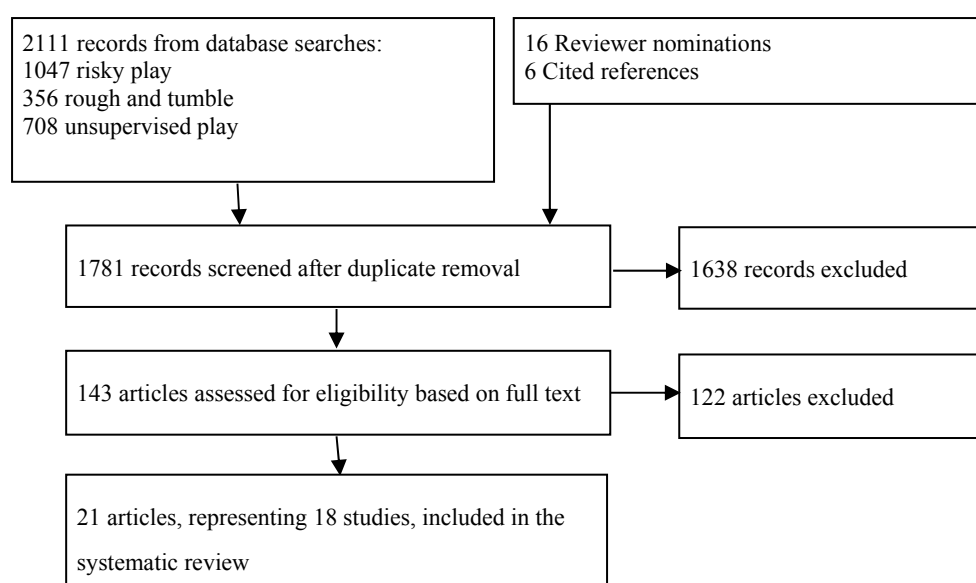
type of study design (RCT and Non-Randomized Studies). Details on data extraction follow in subsequent sections of this manuscript. Details on GRADE methodology can be found elsewhere [75].

### 2.5. Analysis

Meta-analysis was planned where data were sufficiently homogeneous in terms of statistical, clinical, and methodological characteristics. Otherwise, narrative syntheses were conducted. A priori comparisons for subgroup analysis were planned for gender if data reporting permitted. Studies that examined risky play supportive environments were grouped together as it would not be possible to disentangle or attribute specific health indicators to the various types of risky play behaviour affordances in these studies.

## 3. Results

The PRISMA flow diagram for study inclusion and exclusion is included in Figure 1. All studies included in the review are summarized in Supplementary File 2, Table S1. All records that were screened at level 1 are included in Supplementary File 3. Eighteen eligible studies (21 articles) were identified from eight countries, with a cumulative sample of ~50,000 participants. The final sample included seven studies where children can disappear/get lost, one study involving great heights, five studies of rough and tumble play, and five studies of risky play supportive environments. No studies specifically examining the relationship between high speeds, dangerous elements or dangerous tools with indicators of health were found. Most studies included results for more than one health indicator and were presented accordingly. Due to heterogeneity in the measurement of risky play and health indicators used in each study, meta-analysis was not possible. In some cases, relative risk was not provided and these studies were retained for descriptive purposes. Results were summarized for all included studies, and where analytical methods were sufficiently homogenous, narrative synthesis was conducted. Quality of evidence is provided in the Summary of Findings in Tables 3–6.



**Figure 1.** PRISMA flow diagram.

**Table 3.** Association between “play where the children can disappear/get lost” and health in children and youth.

Quality Assessment							No. of Participants	Absolute Effect (95% CI, SE)	Quality
No. of Studies	Design	Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations			
Habitual physical activity (age range between 10 and 15 years, data collected over a single session up to a 5 year follow-up, habitual physical activity measured using accelerometry, pedometry, and scores on the Physical Activity Questionnaire for Children)									
5	Observational studies <sup>a</sup>	No serious risk of bias <sup>b</sup>	No serious inconsistency <sup>c</sup>	Serious indirectness <sup>d</sup>	No serious imprecision	None	3915 <sup>e</sup>	<div>F<sub>388</sub> = 6.2, <i>p</i> = 0.013</div> <div>F<sub>467</sub> = 7.3, <i>p</i> = 0.017</div> <div>F<sub>388</sub> = 6.2, <i>p</i> = 0.013</div> <div>F<sub>467</sub> = 5.8, <i>p</i> = 0.017</div> <div>F<sub>388</sub> = 3.7, <i>p</i> = 0.040</div> <div>F<sub>388</sub> = 3.4, <i>p</i> = 0.049</div> <div>Boys % time LPA = 26.2 (7.3), MVPA 5.9 (3.6), <i>p</i> &lt; 0.05</div> <div>Girls % time LPA 23.7 (7.6), MVPA 3.9 (2.5), <i>p</i> &lt; 0.05 <sup>f</sup></div> <div><i>b</i> = 29.3, SE<sup>2</sup> ± 9.57</div> <div>CI: 9.39–50.06, <i>p</i> &lt; 0.01</div> <div><i>b</i> = 32.43 ± 13.53</div> <div>CI: 3.23–61.62, <i>p</i> = 0.03 <sup>g</sup></div> <div>P7 boys high IM = 87.4%, low IM = 74.8%, <i>p</i> = 0.012</div> <div>OR = 2.44, CI: 1.10–5.41, <i>p</i> &lt; 0.05</div> <div>S2 girls high IM = 36.2%, low IM = 16.9%, <i>p</i> = 0.002</div> <div>OR = 4.50, CI: 1.95–10.4, <i>p</i> &lt; 0.05 <sup>h</sup></div>	VERY LOW

Table 3. Cont.

No. of Studies	Design	Quality Assessment					No. of Participants	Absolute Effect (95% CI, SE)	Quality
		Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations			
								$r = 0.180, p = 0.001; r = 0.112, p = 0.001; r = 0.188, p = 0.001$ $r = 0.092, p = 0.005$ Beta = 33.55, CI: 19.23, 47.87, $x = 4.59, p < 0.001$ Beta = 17.89, CI: 6.20, 29.58, $x = 3.00, p = 0.003$ Beta = 24.13 (4.40, 43.78), $x = 2.41, p = 0.016$ Beta = 30.48 (16.73, 44.23), $x = 4.35, p = 0.001$ Beta = 21.03 (8.43, 33.64), $x = 3.27, p = 0.001$ <sup>i</sup>	
								OR = $1.58 \pm 0.228$ , CI: 1.19–2.10, $p = 0.002$ OR = $1.49 \pm 0.194$ , CI: 1.16–1.93, $p = 0.002$ OR = $1.47 \pm 0.236$ , CI: 1.08–2.02, $p = 0.015$ <sup>j</sup>	
<b>Acute physical activity (age range between 0 and 18 years, data were collected over the course of one week, up to 2 months, acute PA measured through accelerometry and direct observation using SOPARC)</b>									
1	Observational studies <sup>k</sup>	No. serious risk of bias	No serious inconsistency	No serious indirectness <sup>l</sup>	Serious imprecision <sup>m</sup>	None	2712	Estimate = $-0.592$ , SE = 0.125, $t = -4.73, p < 0.0001$ OR = 0.55 (0.30–0.79); Estimate = $-0.592$ , SE = 0.125, $t = -4.73, p < 0.0001$ OR = 0.69 (0.42–0.95) <sup>n</sup>	VERY LOW
<b>Social competence (age range between 7 and 12 years, data were collected during one session, social health was measured through semi-structured maternal interview)</b>									
1	Observational studies <sup>o</sup>	High risk of bias <sup>p</sup>	No serious inconsistency	No serious indirectness	Serious imprecision <sup>q</sup>	None	251	$r = 0.37, p < 0.001; r = 0.15, p < 0.05; r = 0.16, p < 0.05;$ $r = -0.15, p < 0.05$ <sup>r</sup>	VERY LOW

Table 3. Cont.

**Notes:** CI, 95% confidence interval; CPM, counts per minute; IM, independent mobility; LPA, light physical activity; MVPA, moderate to vigorous physical activity; OR, odds ratio; PA, physical activity; SOPARC, System for Observing Play and Recreation in Communities; **Habitual physical activity:** 0 Randomized trials, 5 observational studies [77–82]; <sup>a</sup> Includes 4 cross-sectional studies [77–81] and 1 longitudinal study [82]; <sup>b</sup> No psychometric testing of independent play measure [77]. Participants with excluded weekday PA data had significantly higher mean scores for Area-IM and minutes of daylight from 3:00 pm to sunrise. Participants with excluded weekend PA had significantly higher mean Local-IM and Area-IM, and lived in less deprived neighbourhoods [78]; 51% of recruited participants were included in the analysis as a result of attrition and missing data. A higher proportion of excluded children were from schools in outer suburban neighbourhoods (64.9% vs. 35.1%), and a lower proportion was from schools in inner urban (35.7% vs. 64.3%) and regional neighbourhoods (27.6% vs. 72.4%) [81]; <sup>c</sup> In a study of 927 children, in which 22.3% could play in any street, park, or go for a walk without an adult (parent reported data), IM was not associated with likelihood of achieving recommended pedometer based PA cut-points in boys or girls [82]; <sup>d</sup> Two studies used indirect measures of habitual PA [79,81]; Sample included 14 and 15 year old children [77]; <sup>e</sup> Page *et al.* [78,79] used the same sample of 1300 children from the PEACH Project. Study findings are reported for both papers however, participants are only counted once; <sup>f</sup> Boys with more IM were more active overall on weekdays (509,174.8 counts/day) than boys with less IM (472,530.2); girls with more IM were more active overall on weekdays (406,276.1) than girls with less IM (472,530.2 counts/day); boys with more IM engaged in more MVPA on weekdays (40.4 min) than boys with less IM (36.1 min); girls with more IM engaged in more MVPA on weekdays (27.5 min) than girls with less IM (24.9); Boys with more IM were more active overall on weekend days (395,607.5 counts/day) than boys with less IM (360,493.0 counts/day); girls with more IM were more active overall on weekend days (341,835.3 counts/day) than girls with less IM (28,722.3 counts/day),  $p$ 's < 0.05, F statistic was not reported; Boys with more IM had greater weekend MVPA (27.5 min) than boys with less IM (24.2 min), although neither group achieved recommended levels. Boys with more IM had more weekend light PA (165.5 min) than boys with less IM (164.2),  $p$  < 0.05, F statistic was not reported. Percentage of time boys granted high IM spent engaged in light PA and MVPA, respectively, was significantly higher than in boys with low IM (23.7 (7.2) and 4.2 (2.9) minutes in LPA and MVPA, respectively); Percentage of time girls granted high IM spent engaged in light PA and MVPA, respectively, compared with 22.2 (5.6) and 3.2 (2.2) for girls with low IM. F statistic was not reported [80]; <sup>g</sup> Frequent outdoor play  $\geq 3$  days per week. Children with frequent independent outdoor play had more daily minutes of light PA than children with less frequent independent outdoor play. Children with frequent independent outdoor play accumulated more total PA than children with less frequent independent outdoor play. For usual travel to non-school destinations, there were no significant differences in PA between the lower and higher IM groups [81]; <sup>h</sup> IM was positively associated with self-reported PA among boys in their final year of primary school (P7). P7 boys were more likely to be physically active in univariate (OR = 2.34, CI: 1.13–4.86,  $p$  < 0.05) and multivariate (modelled with peer support and peer socialisation) analyses. Girls in their second year of high-school (S2) were more likely to be physically active in univariate (OR = 2.80, CI: 1.56–5.03,  $p$  < 0.05) and multivariate (modelled with maternal support) after controlling for baseline PA. IM was not associated with PA for boys or girls during their final year of high-school. Sample included 641 children: unrestricted play included 58.9% of boys and 40.1% of girls in P7, 80.4% of boys and 69.1% of girls in S2, and 84.6% of boys and 80.3% of girls in S4. All sex differences and time trends were significant except in S4 where girls and boys did not differ in percentage of unrestricted play [77]; <sup>i</sup> Pairwise Pearson correlations between Local IM and weekday average CPM; Local IM and weekend average CPM, Area IM and weekday average CPM, Area IM and weekend average CPM. Sub-analyses by sex show significant cross-sectional associations between local IM and average weekday CPM for boys and girls; between Local IM and average weekend CPM for girls, but not boys; between Area IM and average weekday CPM for boys and girls; and no significant associations between Area IM and average weekend CPM for boys or girls [78]; <sup>j</sup> Boys' Local IM associated with likelihood of playing outside every day; girls' local IM not related to frequency of outdoor play. Boys' Area IM associated with likelihood of playing outside every day; Girls' Area IM associated with likelihood of playing outside every day; Outdoor play represents frequency of playing outside at unstructured activities ranging from 1: every day to 7: hardly ever. Frequency of outdoor play was related to beliefs about traffic (perceptions of safe places to cross, heavy traffic roads, pollution) and nuisance (perceptions of crime, noise, bullying in local neighbourhood) scores for girls, and social norm scores (*i.e.*, children to play with on streets, people walking and cycling around) for both boys and girls [79]; **Acute physical activity:** 0 Randomized trials; 1 observational study [79]; <sup>k</sup> Includes 1 cross sectional study [79]; <sup>l</sup> Sample included participants outside of the targeted age range (0–2 year olds and 14–18 year olds) however, mean age of participants permitted inclusion. Age break down was: 0–5 years ( $n$  = 1155), 6–12 years ( $n$  = 1111),

13–18 years ( $n = 446$ ). Results were reported for total sample only [83]; <sup>m</sup> The magnitude of the number of included studies was small ( $N = 1$ ) [79]; <sup>n</sup> Children's PA activity on the playground was lower in the presence of a parent and non-parent supervising adult, respectively compared with when no adults were present [83]; **Social Competence:** 0 Randomized trials; 1 observational study [84]; Includes 1 cross-sectional study [84]; <sup>p</sup> Outcomes were self-reported [84]; <sup>q</sup> The magnitude of the median sample size was intermediate ( $N = 251$ ). The magnitude of the number of included studies is small ( $N = 1$ ) [84]; <sup>r</sup> Children with greater IM met more often to play with peers, play with school mates, and play with neighbourhood children. IM was negatively correlated with frequency of play with relatives or parents friends' children [84].

**Table 4.** Association between risky play supportive environments and health in children and youth.

Quality Assessment							No. of Participants	Absolute Effect (95% CI, SE)	Quality
No. of Studies	Design	Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations			
Acute physical activity (age range between 3 and 9.99 years, data collected over a single session up to a 2 year follow-up, acute physical activity measured through direct observation with observer behaviour mapping and accelerometry)									
1	RCT	Low risk of bias <sup>a</sup>	No serious inconsistency	No serious indirectness	Serious imprecision <sup>b</sup>	None	221	11.2 ± 0.9 min/day MVPA, 10.0 ± 0.9 min/day MVPA Coefficient = 1.82 CI: 0.5–3.1, <i>p</i> = 0.006 72,100 ± 14,700 counts, 7200 ± 13,800 counts Coefficient = 9.35 CI: 3.5–15.2, <i>p</i> = 0.002 <sup>c</sup>	MODERATE
4	Observational studies <sup>d</sup>	Serious risk of bias <sup>e</sup>	No serious inconsistency <sup>f</sup>	No serious indirectness	Serious imprecision <sup>g</sup>	None	552	1612 CPM (SD = 491), <i>p</i> = 0.014 es = 0.9 SD <sup>h</sup> 39%, <i>p</i> < 0.05 <sup>i</sup> 75 min; H = 26.6, <i>p</i> < 0.01 <sup>j</sup>	VERY LOW
Habitual physical activity (age range between 4.7 and 7.3 years, data collected at baseline, 13 weeks, and 2 years follow-up, habitual physical activity measured through accelerometry)									
1	RCT	No serious risk of bias <sup>a</sup>	No serious inconsistency <sup>k</sup>	No serious indirectness	Serious imprecision <sup>b</sup>	None	221		MODERATE
Habitual sedentary behaviour (age range between 4.7 and 7.3 years, data collected at baseline, 13 weeks, and 2 years follow-up, habitual sedentary behaviour measured through accelerometry)									
1	RCT	No serious risk of bias <sup>a</sup>	No serious inconsistency <sup>l</sup>	No serious indirectness	Serious imprecision <sup>b</sup>	None	221		MODERATE
Acute sedentary behaviour (age range between 4.7 and 7.3 years, data collected at baseline, 13 weeks, and 2 years follow-up, habitual physical activity measured through accelerometry)									
1	RCT	No serious risk of bias <sup>a</sup>	No serious inconsistency	No serious indirectness	Serious imprecision <sup>b</sup>	None	221	22.7 ± 9.9 min/day, 23.2 ± 10.3 min/day; coefficient = −2.13; CI: −3.8–(−0.5), <i>p</i> = 0.01 <sup>m</sup>	MODERATE
Antisocial behaviour (age range between 5 and 9.99 years, distance between pre- and post-measures not reported, aggression measured through direct observation with observer behaviour mapping)									
1	Observational study <sup>n</sup>	Serious risk of bias <sup>a</sup>	No serious inconsistency <sup>p</sup>	No serious indirectness <sup>q</sup>	No serious imprecision <sup>r</sup>	None	~400		VERY LOW

Table 4. Cont.

**Notes:** CI, 95% confidence interval; CPM, counts per minute; LPA, light physical activity; MVPA, moderate to vigorous physical activity; PA, physical activity; RCT, randomized controlled trial; **Acute physical activity:** 1 Randomized trial [15]; 4 Observational studies [85–88]; <sup>a</sup> The comparison condition was “usual care”. Following baseline testing outcome assessors were no longer blinded to group assignment [15]; <sup>b</sup> The magnitude of the median sample size is intermediate. The magnitude of the number of included studies is small (N = 1); <sup>c</sup> Children in the 13-week loose parts/adult risk reframing intervention had a larger increase in minutes/day of MVPA during break times than children in the comparison group at 13 weeks (pre-intervention minutes/day MVPA =  $10.8 \pm 0.9$  and  $11.4 \pm 0.9$ , respectively). No difference between groups for LPA; Intervention children had a larger increase in total counts during break times than comparison group (pre-intervention counts =  $69,700 \pm 14,400$  and  $74,100 \pm 15,200$ , respectively) [15]; <sup>d</sup> Includes 3 pre- and post-test studies [85,86,88] and 1 longitudinal study [87]; <sup>e</sup> Two studies assessed acute PA subjectively using observers to record “active play” occurrences [86,88]; <sup>f</sup> There was no difference in mean CPM when children played on a traditional playground in the spring, a traditional playground in the winter, or a nature setting in the spring. The traditional playground used for comparison included many built and natural elements that afford components of risky play and thus may not have allowed a true less risky comparison [87]; <sup>g</sup> The magnitude of the median sample size is intermediate. The magnitude of the number of included studies is small (N = 3); <sup>h</sup> Children had higher mean CPM after an 11 week loose parts playground intervention compared to baseline (Mean CPM = 1028, SD = 770) [85]; <sup>i</sup> The proportion of time children spent engaged in active play at post-test was significantly higher than at pre-test, 16%. Active play time was significantly higher following construction of a risky play affording playground environment than at pre-test. It is not clear how long after playground construction post-testing was conducted [86]; <sup>j</sup> Median length of stay on an adventure playground was higher than traditional playground and contemporary playground (21 and 32 min, respectively). Kruskal-Wallis one-way analysis of variance by ranks determined differences were significant at the 0.001 level [88]; **Habitual physical activity:** 1 Randomized trial [15]; 0 Observational studies; <sup>k</sup> No difference in whole day minutes of PA between children who participated in a 13 week playground based intervention with a 2 h risk-reframing intervention administered to parents and teachers compared with control group [15]; **Habitual sedentary behaviour:** 1 Randomized trial [15]; 0 Observational studies; <sup>l</sup> No difference between children who participated in a 13-week playground-based intervention with a 2-h risk-reframing adult intervention when compared to children in the control group for minutes per day sedentary [15]; **Acute sedentary behaviour:** 1 Randomized trial [15]; 0 Observational studies; <sup>m</sup> Post intervention time spent sedentary during break times in loose parts intervention and control group, respectively. Children in the 13 week loose parts intervention had a larger decrease in minutes/day of sedentary time during break times than the comparison group, whose sedentary time increased over the intervention period (pre-intervention min/day sedentary time =  $23.8 \pm 10.4$  and  $22.2 \pm 9.9$ , respectively) [15]; **Antisocial behaviour:** 0 Randomized trials; 1 Observational study [86]; <sup>n</sup> Includes 1 pre-post test study; <sup>o</sup> Aggression was rated subjectively using direct observation [86]; <sup>p</sup> No change in aggression from pre- to post-risky play supportive playground construction [86]; <sup>q</sup> It is likely that the time frame (2 weeks, immediately after the new playground was built) was not sufficient to detect a difference in aggression from pre- to post-test [86]; <sup>r</sup> The magnitude of the number of included studies is small (N = 1).



**Table 5.** Association between great heights and health in children and youth.

Quality Assessment							No. of Participants	Absolute Effect (95% CI, SE)	Quality
No. of Studies	Design	Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations			
Bone fractures (age range between 5 and 12 years, data collected over 1 year, bone fractures measured using incident reporting sheets)									
1	Observational studies <sup>a</sup>	No serious risk of bias	No serious inconsistency	No serious indirectness	Serious imprecision <sup>b</sup>	None	25,782	58% ≤59”; 33% 60–79”; 9% >79” <sup>c</sup>	VERY LOW

Notes: 0 Randomized trials; 1 observational study [89]; <sup>a</sup> Observational studies include 1 longitudinal study [89]; <sup>b</sup> The magnitude of included studies is small (N = 1); <sup>c</sup> During a 1 year observation period of all schools in a single school board, 57 fractures occurred (52 unaided falls, 5 pushed) on the playground. Of those, the percentage of children who sustained a fracture from a fall at or below 59", 60–79" and greater than 79" are reported here, respectively. There were no serious injuries from falls reported by any of the schools [89].

**Table 6.** Association between rough and tumble play and health in children and youth.

Quality Assessment							No. of Participants	Absolute Effect (95% CI, SE)	Quality
No. of Studies	Design	Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations			
Social competence (age range between 42 months and 11.2 years, data collected over a single session up to 2 years, aspects of social competence were measured using teacher-report questionnaire, peer nominations of popularity and rejection, social cognitive problem solving task, observer rated)									
5	Observational studies <sup>a</sup>	Serious risk of bias <sup>b</sup>	Serious inconsistency <sup>c</sup>	No serious indirectness	Serious imprecision <sup>d</sup>	None	359 <sup>e</sup>	$r = 0.30; p < 0.05; R = 0.09$	VERY LOW
								$r = 0.28; p < 0.05; R = 0.07$	
								$r = -0.28, p < 0.05; R = 0.07$	
								$r = 0.28, p < 0.05, R = 0.07$	
								$r = -0.32, p < 0.05; R = 0.10$	
								$r = -0.30, p < 0.05; R = 0.09$ <sup>f</sup>	
								$r = 0.42, p = 0.37$ <sup>g</sup>	
								Year 1: $r = 0.22\ p < 0.05; r = -0.37, p < 0.01$	
								year 2: $r = 0.25, p < 0.05$	
								Year 1 RTP to 2 social variables: $r = 0.28, p < 0.01$ <sup>h</sup>	
								$r = 0.34, p < 0.05; r = 0.54, p < 0.01$	
								$B = -0.87, R^2 = 0.14, p = 0.03$	
								$B = 1.39, R^2 = 0.32, p = 0.001$	
								$B = 3.30, R^2 = 0.22, p = 0.006$ <sup>i</sup>	
								$r = 0.30; r = 0.30, p < 0.05$ <sup>j</sup>	
$r = 0.56, p < 0.01$ <sup>k</sup>									

Table 6. Cont.

Quality Assessment							No. of Participants	Absolute Effect (95% CI, SE)	Quality
No. of Studies	Design	Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations			
Anti-social behavior (age range between 64 months and 13.5 years, data were collected over 8 months up to 22 months, aspects of anti-social behaviour were was measured using direct observation, teacher ratings, and a video behaviour discrimination task)									
2	Observational studies <sup>l,m</sup>	No serious risk of bias <sup>n</sup>	Serious inconsistency <sup>o</sup>	No serious indirectness	Serious imprecision <sup>p</sup>	None	176 <sup>q</sup>	$P$ (RTP leading to aggression) = 0.28%, $z = 4.00$ , $p < 0.05$ $\chi^2(40, N = 42) = 8.17$ , $p < 0.004$ ; $r = 0.47$ , $p < 0.01$ <sup>r</sup> $r = 0.29$ , $p < 0.01$ $P$ (RTP rough leads to aggression) = 2.26%, $p < 0.05$ <sup>s</sup>	VERY    LOW

**Notes:** RTP, rough and tumble play; **Social competence:** 0 Randomized trials; 5 Observational studies [90–96]; <sup>a</sup> Observational studies include 1 longitudinal study [90] and 4 cross sectional studies [91–96]. Dewolf [91] was an unpublished graduate thesis; <sup>b</sup> It is unclear if participants were blinded to the outcomes assessed, and likely that their behaviour was affected by being observed. The research noted that after speaking to the children about their play the children were “distinctly aware of her presence” during later interactions. The outcome assessor (the researcher) was not blinded to the outcomes being assessed [91]; <sup>c</sup> RTP was not correlated with popularity [96]; For popular children, RTP was not correlated with antisocial behaviour. For rejected children, RTP was not correlated with interpersonal cognitive problem solving [93]; RTP in year 1 was not related to year 2 social problem solving scores for popular or rejected children [95]; RTP was not correlated with social impact, likes most nominations, likes least nominations, antisocial, or film for boys or girls. For girls, RTP also did not correlate with social preference, or interpersonal cognitive problem solving [94]; Boys’ engagement in RTP with other boys was not related to peer-acceptance by girls. Boys’ RTP with mixed-sex peers was negatively related to peer acceptance by girls and teacher rated social competence [92]; Boys’ RTP chase was negatively correlated with peer nominations of likes least ( $r = -0.22$ ,  $p < 0.05$ ), and was not correlated with peer nominations of likes most, social impact, or social preference; RTP rough was negatively correlated with peer nominations of likes most ( $r = -0.37$ ,  $p < 0.01$ ) and was not correlated with peer nominations of likes least, social impact, or social preference [90]; <sup>d</sup> Low median sample size. Moderate number of included studies ( $N = 5$ ). <sup>e</sup> Pellegrini [93–95] used the same sample. Results are reported separately but participants are counted once. Pellegrini [95] sample had 94 participants at year 1 and 72 participants at year 2; Pellegrini [90] sample consisted of 82 boys; Pellegrini [96] sample consisted of 42 boys; <sup>f</sup> Boys’ RTP with same sex peers was correlated with acceptance by same sex peers; Boys’ RTP+ pretend play with same sex peers was correlated with acceptance by same sex peers. Boys’ RTP with mixed sex peers was correlated with same sex peer acceptance. Boys’ RTP with same sex peers was related to teacher-rated social competence. Boys’ RTP with same sex peers was related to teacher-rated social competence. Boys’ RTP with mixed sex peers was negatively correlated with other sex peer acceptance and teacher rated social competence [92]; <sup>g</sup> Positive peer nominations was correlated with proportion of RTP events [91]; <sup>h</sup> RTP chase correlated with peer nominations of likes least, but not peer nominations of likes most, social impact, or social preference. RTP rough was negatively correlated with peer nominations of likes most, but was not related to peer nominations of likes least, social impact, or social preference [90]; <sup>i</sup> RTP flexibility was correlated with interpersonal cognitive problem solving (positive and negative solutions respectively). Popularity was not correlated with any aspect of RTP; RTP relative frequency negatively predicted popularity; RTP flexibility accounted for unique variance in the model to predict negative, and positive solutions to an interpersonal cognitive problem, respectively [96]; <sup>j</sup> For boys, RTP correlated with social preference and interpersonal cognitive problem solving, respectively, but not social impact, likes most or likes least peer ratings; For girls, RTP did not correlate with social preference, social impact, likes most, likes least, interpersonal cognitive problem solving [94]; <sup>k</sup> For popular children, RTP correlated with interpersonal cognitive problem solving [89]; **Antisocial behaviour:** 0 Randomized trials; 2 Observational studies [90,93,94]; <sup>l</sup> Includes 1 longitudinal study [90] and 1 cross sectional study [93,94]; <sup>m</sup> Pellegrini [90] is a longitudinal study, however only data from year 1 are included. Children in year 2 met age-based exclusion criteria; <sup>n</sup> It was not possible to blind assessors to outcomes, however assessors were blinded to children’s sociometric and dominance status [90,93,94]; The probability of RTP leading to observer rated aggression for popular children was not significant; For popular children, RTP was not correlated with anti-social behavior [93]; RTP frequency was not correlated with aggression frequency for boys or girls. RTP was not likely to lead to aggression for children in this study. For boys and girls RTP did not correlate with ability to discriminate between RTP and aggression on a film or with anti-social behaviour [94]; RTP (chasing) was not correlated with observed or teacher rated aggression. RTP (rough housing) was not correlated with teacher rated aggression [90]; <sup>p</sup> The magnitude of the median sample size was low; The magnitude of the number of included studies was small ( $N = 2$ ); <sup>q</sup> The total sample includes 1 study of 82 Caucasian boys only [90]. Pellegrini [93,94] participants were from the same study. Results are reported separately but participants are only counted once. <sup>r</sup> The probability of RTP leading to observer rated aggression within the 3 min observation period was significant for rejected children. RTP was significantly more likely to lead to observer rated aggression for rejected children than with popular children. RTP positively correlated with anti-social behaviour for rejected children [93]. <sup>s</sup> RTP (rough housing) was correlated with observed aggression. The probability that RTP (rough housing) would lead to aggression within the 3 min observation period was 2.26% [90].

### 3.1. Play Where Children can Disappear/Get Lost

#### 3.1.1. Habitual Physical Activity

Six observational papers (one longitudinal, five cross sectional) from five studies examined the relationship between “play where the children can disappear/get lost” and habitual physical activity. The majority of the studies reported that independent mobility was positively related to physical activity [77,81], total activity counts [80], activity counts per minute [78], minutes of moderate to vigorous physical activity (MVPA), light activity [80], and self-reported likelihood of playing outside everyday [79]. Kirby *et al.* [77] found that boys (not girls) who were in their final year of primary school and whose parents did not restrict their independent outdoor play were more than twice as likely to be categorized as physically active than their peers with restricted independent play. Girls (not boys) in their second year of high school were more than four times as likely to be categorized as physically active compared with their peers with restricted independent play. Stone *et al.* [80] reported small differences between the children who had higher independent mobility and those with restricted independent mobility. Children with higher independent mobility had higher weekday and accelerometer counts per day, higher weekday MVPA minutes (boys and girls had 4.4 and 2.4 more minutes), and spent a greater percentage of the two hours immediately after school in light physical activity (boys and girls had 2.5% and 1.5% more time) and MVPA (boys and girls had 2.7% and 0.7% more time) than children with lower independent mobility. Furthermore, on weekend days boys (not girls) with higher independent mobility had 3.3 more minutes of MVPA and 4.3 more minutes of light physical activity than restricted children. Schoeppe *et al.* [81], found that children who played outside without supervision three or more days per week did not have higher MVPA, although they did accumulate significantly more daily minutes of light and total physical activity; sex-based analysis showed this relationship existed for girls, but not boys. Independent mobility to non-school destinations was not related to physical activity outcomes [81]. In one study, Page *et al.* showed that being allowed to visit locations without supervision in the local neighbourhood (Local) and in the wider area (Area) were each associated with more average weekday accelerometer counts per minute. Boys with higher Area and Local independent mobility and girls with higher Area independent mobility were approximately 1.5 times more likely to play outside everyday than children with lower independent mobility [79]. Local independent mobility was associated with higher weekday counts per minute for boys and girls, and higher weekend counts per minute for girls. Area independent mobility was associated with higher weekday counts per minute, but not weekend counts per minute for boys and girls. Unstandardized betas ranged from 17.89 to 33.5 [78].

In contrast, one study found that children with higher independent mobility did not have an increased likelihood of achieving pedometer based physical activity cut-points than children with lower independent mobility [82]. No studies showed a negative relationship between independent mobility and habitual physical activity.

#### 3.1.2. Acute Physical Activity

Two observational studies (one cross sectional; one repeated measures) examined the relationship between ‘play where the children can disappear/get lost’ and acute physical activity. The independent

variable was assessed as presence or absence of a supervising adult [83], and as parent reported independent mobility [80]. Both studies showed that disappear/get lost was positively related to acute physical activity. Using a structured observer scoring system, Floyd *et al.* [83] observed that the presence of a parent or non-parent supervising adult was associated with a lower likelihood (ORs = 0.55 and 0.69) that children would engage in vigorous activity than when no adult was present. No studies demonstrated that disappear/get lost was unrelated or negatively related to acute physical activity.

### 3.1.3. Social Competence

One observational study met the inclusion criteria. Prezda *et al.* [84] reported a largely positive relationship between disappear/get lost and social health. Specifically, small to moderate correlations suggest that that children with greater independent mobility met more often to play with peers; play with school mates; and play with neighbourhood children than their peers with less independent mobility. Children with greater independent mobility were less likely to play frequently with relatives or parents friends' children [84].

## 3.2. Great Heights

One observational study that examined the relationship between height at which children play and the occurrence of injuries met our inclusion criteria. In a study that spanned one school year and included 25,782 students (all children registered with the participating school board), Rubie-Davies *et al.* [89] showed that fracture frequency and severity was not related to height of playground equipment. Ulna-radius fractures (most frequent type of fracture, accounting for 42% of playground fractures) were as likely to occur below 59" (54%) as they were above the mark (46%). The 6 reported tibia fractures occurred below 59". No fractures to the head or spine occurred as a result from a fall from playground equipment.

## 3.3. Rough and Tumble Play

### 3.3.1. Social Competence

Five observational studies examined the relationship between rough and tumble play and social competence in seven papers. Two studies examined the relationship between rough and tumble play and interpersonal cognitive problem solving. One study showed moderate to large positive correlations, suggesting that for popular children as assessed by number of peer ratings of "likes most" [93] and for boys [94], rough and tumble play was related to higher interpersonal cognitive problem solving scores. However, rough and tumble play and interpersonal cognitive problem solving were not related for rejected children [93], or for girls [94]. Moreover, rough and tumble play in year 1 was not related to interpersonal cognitive problem solving one year later for popular or rejected children [95]. In a second study, flexibility of rough and tumble play was positively predicted 32% and 22% of the variance in interpersonal cognitive problem solving (*i.e.*, the total number of positive and negative solutions to a problem solving task) [96].

Four studies examined the relationship between rough and tumble play and social status in 6 papers [90–94,96]. The results were inconsistent in showing a relationship between rough and

tumble play and popularity among children and youth. Where correlations were significant, they were moderate in size). For boys, rough and tumble play positively correlated with social preference within one's peer group (*i.e.*, the number of 'likes most' nominations minus "likes least" peer nominations) [94]. Boys' rough and tumble play with other boys was moderately and positively correlated with acceptance among boys and teacher rated social competence (a composite of teacher-perceived aggression, peer acceptance and sensitivity). In same sex peer groups, boys' rough and tumble play plus pretend play with other boys was positively correlated with acceptance among boys. In mixed sex peer groups, boys' rough and tumble play was positively correlated with peer acceptance among boys [92]. In another study, peer nominations of "likes most" was positively correlated with the proportion of rough and tumble play events observed [91].

Two studies showed statistically negative relationships between rough and tumble play and social status. Boys' rough and tumble play with mixed sex peer groups was negatively related to peer acceptance by girls, and to teacher rated social competence [92]. In a sample of boys, sub-analysis by type of rough and tumble play showed boys' rough and tumble play that consisted of chasing (Chase) was negatively correlated with "likes least" nominations ( $r = -0.22, p < 0.05$ ), and rough and tumble play that consisted of physical behaviours (Rough) was negatively correlated with "likes most" nominations ( $r = -0.37, p < 0.01$ ) [90].

Half of the studies showed that rough and tumble play was not related to social status for particular forms of rough and tumble play and sex-based analyses. Rough and tumble play was not correlated with children's popularity (peer nominations of "likes most" minus "likes least") [96]. Sub-analysis by sex showed that rough and tumble play was not correlated with social impact (the total of "likes most" plus "likes least" nominations), "likes most" nominations, or "likes least" nominations for boys or girls [94]. For girls rough and tumble play did not correlate with social preference ("likes most" minus "likes least" nominations) [94]. Boys' rough and tumble play with other boys was not correlated with peer acceptance by girls [92]. Sub-analysis by type showed boys' rough and tumble play Chase was not correlated with peer nominations of "likes most", social impact or social preference [90]. Boys' rough and tumble play Rough was not correlated with peer nominations of "likes least", social impact, or social preference [90].

### 3.3.2. Anti-Social Behaviour

Two observational studies examined the relationship between rough and tumble play and aggression in three papers [90,93,94]. These studies showed somewhat inconsistent results. Specifically, rough and tumble play was not correlated with frequency of aggression for boys or girls [94], and was not likely to lead to aggression for popular children [93]. However, rough and tumble play was likely to lead to aggression for children whose peers had nominated them as being rejected, as assessed by number of "likes least" peer ratings [93]. Finally, rough and tumble play in the form of chasing was not correlated with observed or teacher rated aggression, and rough and tumble play in the form of rough housing was not correlated with teacher rated aggression in a sample of all boys [90]. In contrast, in the earlier study, Pellegrini [93] reported a significant probability that rough and tumble play in the form of rough housing would lead to aggression.

Two studies examined the relationship between rough and tumble play and anti-social behaviour. Rough and tumble play was correlated with anti-social behaviour for rejected children, but not for popular children [93], for boys or for girls [94].

One study examined the relationship between rough and tumble play and children's ability to discriminate between rough and tumble play and aggression in a film. Pellegrini [94] showed that for boys and girls, rough and tumble play was not correlated with ability to distinguish rough and tumble play from aggression in a film.

### 3.4. Risky Play Supportive Environments

#### 3.4.1. Acute Physical Activity

One Cluster RCT and four observational studies examined the relationships between risky play supportive environments and acute physical activity. For their RCT, Engelen *et al.* [15] modified the playground environment of participating schools by introducing loose, primarily recycled materials (e.g., tires, milk crates) for use in play. They also hosted 2-h risk reframing sessions for parents and school staff where adults were encouraged to consider the benefits of play and consequences of limiting children's opportunities for risk taking and physical activity. Engelen *et al.* [15] showed that 5–7 year old children in the loose parts/risk reframing intervention had a small but significant increase in minutes per day of MVPA (1.8 min, 95% CI 0.5–3.1) and in total activity counts (9400 counts, 95% CI 3.5–15.2) during break times, and engaged in 12% more MVPA than children in the control group schools after the 13 week intervention period. However, no difference was seen for light physical activity. The increased physical activity remained higher for a subset of the intervention group that was assessed 2 years later when they were 7–9 years old.

Two of the observational studies showed that children engaged in greater physical activity from pre- to post-test after being introduced to a risky play supportive environment. After 11 weeks on a loose parts playground there was a large effect size, with children reaching higher physical activity counts per minute on average compared to baseline (1612 vs. 1028) [85] and following construction of a "tire" playground children increased the proportion of time they engaged in active play from 16% to 39% [86]. Hayward *et al.* [88] observed that children spent significantly more time (75 min) at an adventure playground (supplies play material and not play equipment, with few to no observing adults) than at a traditional playground with pre-fabricated structures (21 min) and a contemporary playground (32 min) with several adults supervising.

One study did not show a difference in mean physical activity counts per minute when children played on a traditional playground in the spring, a traditional playground in the winter, or a nature setting in spring [87].

#### 3.4.2. Habitual Physical Activity

One Cluster RCT examined the relationship between risky play supportive environments and habitual physical activity. No difference was observed in whole day minutes of physical activity between children who participated in a 13 week playground based intervention with a 2 h risk-reframing intervention administered to parents and teachers compared to children in the control group [15].

### 3.4.3. Habitual Sedentary Behaviour

One Cluster RCT examined the relationship between risky play supportive environments and habitual sedentary behaviour and showed there was no difference between children who participated in a 13 week playground based intervention with a 2 h risk-reframing adult intervention when compared to children in the control group for minutes per day sedentary [15].

### 3.4.4. Acute Sedentary Behaviour

One Cluster RCT examined the relationship between risky play supportive environments and acute sedentary behaviour and showed that children in the loose parts intervention had a small but significant decrease in sedentary time per day (2.13 min, 95% CI  $-3.8 - (-0.5)$ ) during break times after the 13 week intervention period [15].

### 3.4.5. Anti-Social Behaviour

One observational study examined the relationship between risky play supportive environments and aggression and showed no change in aggression from pre- to post-risky play supportive playground construction [86].

### 3.4.6. Social Behaviour

Although not quantitatively assessed, Hayward *et al.* [88] noted that at the two prebuilt playgrounds (*i.e.*, traditional and contemporary), use focused on the equipment, whereas interactive play was most common at the adventure playground. In addition, Bundy *et al.* [85] reported that according to teachers, children became more social, creative, and resilient after exposure to the loose parts intervention than they were before it was created.

## 3.5. Summary of Findings

Few studies met the inclusion criteria and there were no studies that investigated some subcategories of risky play, such as play with dangerous tools or play at speed. These types of risky play were often subsumed within studies examining broader concepts, such as risky play supportive environments. Only one RCT was included, and the bulk of other research was rated as having low methodological quality and subject to bias and confounding. The heterogeneity of risky play and outcome measures rendered meta-analysis impossible.

Overall, the systematic review revealed positive effects of risky outdoor play on health. Seven of eight papers examining play where children can disappear/get lost in children found increases in habitual and acute physical activity, and social health [77–84]. Floyd *et al.* [83] showed lower physical activity for children supervised by an adult. There was no association between play at height and injuries, with fracture frequency and severity being unrelated to height of playground equipment [89]. Notably, no serious injuries (*e.g.*, to the head or spine) were reported during the year in which 25,782 children were followed. Studies examining rough and tumble play showed mixed results when examining effect of popularity, gender, and type of rough and tumble play. Overall, engaging in this

type of risky play did not increase aggression, and was associated with increased social competence for boys and popular children. Risky play supportive environments generally led to an increase in physical activity and decrease in acute sedentary behaviours [15,85,86,88]. There was also an indication that these environments promoted increased play time, and behaviours, such as social interactions, creativity and resilience [85,88]. One study reported no relationship between physical activity and acute physical activity in a natural vs. traditional play environment [87]. However, the traditional playground included many built and natural elements that afford components of risky play and thus may not have facilitated a true comparison.

Gender analyses resulting from studies included in this systematic review did not find consistent gender patterns and, in some cases, gender comparisons were not conducted. McCormick *et al.* [82] found no gender differences in independent mobility and physical activity. Page *et al.* [78,79] found differences in sub-analyses. For example, Page *et al.* [78] found associations between local independent mobility and average weekend accelerometry counts per minute for girls, but not boys, but found no gender differences for other analyses. Page *et al.* [79] found that local independent mobility was associated with likelihood of daily outside play for boys but not girls, though gender differences were not found in examining area independent mobility. Frequency of outdoor play was associated with beliefs about traffic, neighbourhood nuisance and social norms for girls, but only social norms for boys [79]. Kirby *et al.* [77] found that boys aged 11 to 14 years, had greater independent mobility than girls. Pellegrini [94] found rough and tumble play was not correlated with aggression frequency for either gender. Colwell *et al.* [92], found that while boys' engagement in rough and tumble play with same-sex peers was generally viewed positively by teachers and peers, engagement in rough and tumble play with girls was not.

#### 4. Discussion

The growing discussion regarding the benefits and disadvantages of risky play on children's health prompted this systematic review of the evidence [8,12,68,97–99]. We included 21 articles representing 18 studies that addressed the effect on health and health behaviors from three types of risky outdoor play (play where children can disappear/get lost, play at great heights, and rough and tumble play), as well as risky play supportive environments. The studies examined a variety of health behaviours and outcomes, with physical activity being the most common. Also examined were social competence and behaviours, injuries, and aggression. The findings overall suggest positive effects of risky outdoor play on health.

Only one study related to injury outcomes met inclusion criteria in our review because it was the only one to indicate the total number of children exposed to the risk. It found no association between fall height and injury [89]. Other studies have reported similar results (e.g., [100]). In contrast, a previous systematic review examining risk factors for unintentional fall-related injuries in children aged 0 to 6 years found an association between injuries and fall height and the quality of the surfacing [73]. Likewise, literature reviews that included examination of playground injuries reported similar findings [101,102]. Another systematic review found that absolute incidents of reported injuries of any severity from children's unstructured physical activity (which included playground climbing frames, jungle gyms) were high relative to injuries from sport, and active transportation.



However, the incidence rates per 1000 hours of unstructured physical activity for medically treated injuries was lower than among sports and active transportation, ranging from 0.15–0.17 injuries per 1000 hours of play [103]. Challenges in interpreting these heterogeneous findings relate to inconsistencies in defining injuries, lack of information on exposure to the risk, and limited examination of the interaction between fall height and absorption quality of playground surfacing material.

The broad research literature indicates that societal and familial gender role expectations shape boys' and girls' behaviours. Parents are more likely to encourage boys to engage in risk taking behaviours and girls are socialized to perceive themselves as more vulnerable than are boys [66,104–106]. Gendered aspects of parenting practices have been associated with greater exploratory and less restrictive behaviours among boys than among girls [105,107–111]. Of the studies included in our systematic review, only Kirby [77] specifically found greater independent mobility for boys than girls, and there were no consistent gender patterns discernable in other studies. Some studies did not conduct gender comparisons. Nevertheless, our results indicate the importance of continued efforts at systematic examination of gender differences.

Our review revealed the need for more studies that would be rated as “good quality evidence”, as they are most effective in influencing the positivist perspectives of the medical and health fields. However, we raise limitations inherent in the systematic review process that discounts large volumes of evidence as scientifically unsound [112,113]. These challenges are particularly relevant in research with children in natural settings, where randomized controlled scientific experiments can represent a “reality” with little applicability to community settings. Indeed, many research studies with compelling multi-disciplinary evidence for the importance of risky play were excluded from this review. We note that even in the face of this exclusionary process, the result of this review supported risky outdoor play for children's health.

Generational differences indicating markedly decreasing access to risky outdoor play have been documented [54,57,58,60,114]. Safety concerns, such as injury or abduction, represent one of the main reasons for limiting children's risky outdoor play [67,115,116]; and playground safety standards and active supervision are prominent safety strategies [31,32]. Our findings suggest a need to critically examine approaches to child injury prevention while at play, as these strategies can have unintended adverse consequences on children's health. Children with opportunities for disappearing/getting lost had increased physical activity and social health, whereas supervised children had lower levels of physical activity [77–81,83]. The range of ages studied included 7 to 15 years (except Floyd *et al.* [83], which included all ages), suggesting that monitoring may be a more appropriate approach than active supervision for these age groups. In general, we recommend considering policy, practice and built environment approaches to risky outdoor play that balance safety with children's other health outcomes.

Policy precedents can provide guidance and opportunities for action. For example, the British Government endorsed the UK Play Safety Forum's policy statement that children's need for risk be accommodated through stimulating and challenging environments that limit unacceptable risks of death or serious injury [68,117]. To operationalize this approach, the Play Safety Forum developed a practical tool for risk-benefit assessment of children's play spaces, which considers the benefits of risky play and the reasonableness of safety measures [3]. This tool identifies hazards (potential sources of harm), the risk from that hazard (likelihood and severity of harm), and helps determine the need for modification or removal of the hazard. Some hazards are viewed as acceptable because they offer

developmental benefit to children (e.g., changes in height; loose materials such as sticks). Hazards that have no benefit to children or are difficult for children to perceive are removed (e.g., sharp edges; head entrapment) [3]. Another example of an approach to risky play that combines policy and practice comes from Norway where the kindergarten curriculum emphasizes the importance of engaging in and mastering risk, ensuring that risky play remains a part of children's lives from the early years [99].

Our findings that risky play supportive environments had numerous positive impacts on health, behaviour and development [15,85,86,88] make it clear that built environment solutions are also necessary. The papers included in our review suggest the quality of play spaces, determined by factors such as presence of natural elements (trees, plants), materials that can be manipulated by the children (e.g., wood, crates), and the freedom to engage in activities of their choosing influenced play affordances, children's interest in playing there, and the play spaces' value in health promotion [15,85–88]. This is supported by research in landscape architecture describing evidence-based criteria for playground design [70]. The inclusion of diverse high quality landscapes for children's play is a criteria for the UNICEF Child Friendly Cities initiative [118].

Given the progressive decline of risky play opportunities, there is a need for action to slow or reverse the trend in order to promote and preserve children's health.

## **5. Conclusions**

The evidence from our systematic review indicates that the overall positive health effects of increased risky outdoor play provide greater benefit than the health effects associated with avoiding outdoor risky play. Although these findings are based on 'very low' to 'moderate' quality evidence, the evidence suggests overall positive effects of risky outdoor play on a variety of health indicators and behaviours in children aged 3–12 years. Specifically, play where children can disappear/get lost and risky play supportive environments were positively associated with physical activity and social health, and negatively associated with sedentary behaviour [77–85,88]. Play at height was not related to fracture frequency and severity [89]. Engaging in rough and tumble play did not increase aggression, and was associated with increased social competence for boys and popular children, however results were mixed for other children [15,85,86,88]. There was also an indication that risky play supportive environments promoted increased play time, social interactions, creativity and resilience [85,88]. These positive results reflect the importance supporting children's risky outdoor play opportunities as a means of promoting children's health and active lifestyles.

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## Author Contributions

Mark Tremblay, Mariana Brussoni, Casey Gray, Margaret Sampson, Ellen Hansen Beate Sandseter, Adam Bienenstock, Guylaine Chabot, Susan Herrington, Ian Janssen, William Pickett, Marlene Power, and Nick Stanger conceived and designed the study. Margaret Sampson developed the search strategies. Rebecca Gibbons, Takuro Ishikawa and Casey Gray performed the manuscript reviews. Casey Gray, Rebecca Gibbons and Takuro Ishikawa analyzed the data. Mariana Brussoni, Rebecca Gibbons and Casey Gray wrote the paper. All authors revised the paper critically for important intellectual content, and provided final approval of the version to be published.

## Conflicts of Interest

The authors declare no conflict of interest.

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