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Three Positive Parenting Practices and Their Correlation with Risk of Childhood Developmental, Social, or Behavioral Delays: An Analysis of the National Survey of Children's Health

Sarah E. Cprek¹, Corrine M. Williams¹, Ibitola Asaolu¹, Linda A. Alexander¹, and Robin C. Vanderpool¹

¹ Department of Health Behavior, University of Kentucky College of Public Health, Bowman Hall Room 336, Lexington, KY 40506-0059, USA

Abstract

Objectives—(1) Investigate the relationship between three specific positive parenting practices (PPP)—reading to children, engaging in storytelling or singing, and eating meals together as a family—and parent-reported risk of developmental, behavioral, or social delays among children between the ages of 1–5 years in the US. (2) Determine if a combination of these parenting practices has an effect on the outcome.

Methods—Chi square and multiple logistic regression analyses were used to analyze cross-sectional data from the National Survey of Children's Health 2011/2012 in regards to the relationship between each of the three individual PPP as well as a total PPP score and the child's risk of being developmentally, socially, or behaviorally delayed ($N = 21,527$). Risk of delay was calculated using the Parents' Evaluation of Developmental Status Questionnaire, which is a parental self-report measure that has been correlated with diagnosed child delays. These analyses controlled for poverty and parental education. All analyses were completed using SAS Version 9.3.

Results—A strong correlation was found between each of the three PPP as well as the total PPP score and the child's risk of developmental, social, or behavioral delays ($p < 0.05$ for each test). These associations were found to have a dose–response relationship ($p < 0.05$ in all but one analysis).

Conclusions—Daily engagement in PPP could possibly reduce children's risk of delay, and specifically engaging in all three PPP may have greater benefit.

Keywords

Parenting; Parenting practices; Developmental delay; Social delay; Behavioral delay; Early childhood development; Reading to children; Family meals; Storytelling

Sarah E. Cprek sarah.cprek@uky.edu.
Corrine M. Williams corrine.williams@uky.edu
Ibitola Asaolu msibitola@gmail.com
Linda A. Alexander lindaalex@uky.edu
Robin C. Vanderpool robin@kcr.uky.edu

Introduction

Over 26 % of children ages 4 months to 5 years have been found to be at risk for developmental, social, or behavioral delays in the United States (US), according to the 2011/2012 National Survey of Children's Health (NSCH) [1]. The first 5 years of life represent a critical period for children's brain development, having a significant impact on cognitive, emotional, and social competencies, which influence how children will grow and function from preschool years through adolescence and into adulthood [2, 3]. During these influential years, parents play a critical role in the promotion of children's learning and development. Studies have shown that parents' participation in literacy activities such as book reading and storytelling are foundational to children's language growth, emergent literacy, and cognitive development [4–6]. Similarly, family meals have been found to positively impact children's social and behavioral skills [4, 7, 8]. However, according to the NSCH and *Healthy People 2020*, only 47.8 % of parents report that a family member reads to their child daily, 56.8 % report engaging in daily storytelling or singing, and 60.6 % report having a daily meal together [1, 9, 10]. Moreover, these rates were not evenly distributed among the population, finding disparities along race, income, and educational divides [1, 3, 6, 11–14].

Research has shown that shared reading experiences directly relate to a child's vocabulary size, phonemic awareness, print concept knowledge, and positive attitudes toward literacy [4]. Literacy skills are a key contributing factor to success in academic outcomes such as progressing through grades, high school graduation, and overall performance on college entrance exams [5, 15]. Reading to children and participating in storytelling or singing early in development have also been shown to have an impact on literacy skills [5, 15]. Further, literature suggests family mealtimes can have a positive impact on development because they provide an environment where children are a captive audience to adult conversations, which can be linguistically complex and cognitively challenging [8]. Socially, mealtimes provide an opportunity for parents to model, coach, and control a child's behavior [7, 8].

Previous research has identified several negative risk factors for childhood delays during early years of development, including poverty, inadequate prenatal care, adolescent mothers, and isolation from parents due to divorce or single parent households [1, 2, 11, 13, 14, 16, 17]. These factors have been found to have an additive effect for a child's risk of being developmental, social, or behavioral delayed. Specifically, if a child has only one of the risk factors, they are statistically the same as those with no identified risk factors; however, a child with two or more of the risk factors is four times more likely to develop social and academic problems [2]. While this additive impact of negative risk factors is known, the inverse, an evaluation of multiple positive factors having a cumulative preventative impact on delay, is not readily apparent in the literature. Similarly, there is extensive research evaluating the individual acts of reading to children, engaging in storytelling or singing, and eating meals together as a family, and their positive association with a child's cognitive, social, and behavioral development, however this research has not been focused specifically on an association between daily rates of parental interactions in these three areas and their individual and the potential for a positive collective impact on children's risk of being diagnosed with developmental, social, or behavioral delays [3–5, 8, 15, 18–23]. Of

particular importance is a focus on children ranging in age from 1 to 5 years. The first 5 years of life are extremely important for cognitive development and data from this age group can be used in conjunction with other assessments to evaluate kindergarten readiness [2, 4, 11].

Therefore, the purpose of this study was to investigate the relationship between three specific positive parenting practices (PPP)—reading to children, engaging in storytelling or singing, and eating meals together as a family— and parent-reported risk of developmental, behavioral, or social delays among children between the ages of 1–5 years in the US. A secondary purpose of this study was to determine if the combination of these parenting practices had a greater effect on the outcome. We hypothesize a positive correlation between engagement in these three PPP and reported risk of delay. Further, we expect to find that as reports of PPP increase, fewer parents will report behaviors consistent with risk of delay. By finding a positive correlation between these three PPP and children's decreased risk of diagnosed delays, this initial research may aid in the future development of interventions, strategies, or practices that will reduce the risk of delays before children enter into the educational system.

Methods

Design and Study Sample

The 2011/2012 NSCH was a cross-sectional, nationally-representative survey conducted by phone interview between February 2011 and June 2012 [24, 25]. The survey, which was funded by the Maternal and Child Health Bureau of the Health Resources and Services Administration, was designed to provide an estimation of national and state level prevalence of physical, emotional, and behavioral health indicators in children ages 0–18 years. These health indicators are evaluated in combination with information on the child's family context and neighborhood environment [6, 26]. The NSCH was conducted using the State and Local Area Integrated Telephone Survey Program with the National Immunization Survey sampling frame. Random digit dialing selected by the Computer-Assisted Telephone Interview program was used to contact interview households [24, 25]. A total of 847,881 households were contacted via landline and cell phones for the survey. Of those households, 187,422 reported age-eligible children living in the home, which yielded 95,677 child-level interviews across the US, resulting in 1811–2200 interviews in each state [25]. The survey respondents were adults who were knowledgeable about the child's health; 68.6 % of surveys administered were completed by the child's mother, 24.2 % by fathers, and 7.2 % by another relative or guardian [1, 25]. The participation rate for the survey was 54.1 % for participants surveyed on a landline and 41.2 % for those surveyed on a cell phone [25]. The survey data was weighted in order to reflect all children ages 0–18 years in the US.

After determining if the household was eligible for participation, one child was randomly chosen from the household, and an attempt was made to conduct a full interview about that child. On average, the survey took between 30 and 35 min to complete; a detailed incentive plan was used in order to increase survey participation [1, 25].

The population of interest for this study included all 1–5 years old children in the 2011/2012 NSCH. Of the original 95,677 individuals, the following exclusions were made: (1) children <1 year and >5 years of age, (2) cases with missing data for the dependent variable: being at risk for developmental, social, or behavioral delays, (3) cases with missing data for the independent variables, daily rates of reading to children, engaging in storytelling or singing, or engaging in family meals, and (4) cases with missing data for the control variables, poverty and parent's education. The resulting population of interest included 21,527 study participants. As shown in Table 1, the sample population was comprised of children between the ages of 1–5, with the children's ages distributed as follows: 19.9 % were 1 year of age, 16.8 % were 2 years, 20.6 % were 3 years, 21.5 % were 4 years, and 21.2 % were 5 years of age. The population was evenly distributed between male and female participants and 67.4 % of the population was white. One quarter of the population reported living below the national poverty level (23.6 %). The Institutional Review Board at the University of Kentucky waived review of this study because of the use of publically available de-identified secondary data.

Measures

Dependent Variable—Questions and scoring methods for the portions of the NSCH evaluating “Children at Risk for Developmental, Behavioral, or Social Delays : ages 4 months to 5 years” were adapted from the Parents’ Evaluation of Developmental Status (PEDS). PEDS is a standardized child development screening tool completed by parents and designed to identify young children who are at risk for developmental, social, or behavioral delays [25–27]. The PEDS test has shown high content validity levels and reports sensitivity of 84 % and specificity of 74 % [27]. Within the NSCH, nine survey questions from PEDS were used to compile delay risks based on parental concern on a scale of 0–3 for children ages 4 months to 5 years. The dependent variable of a child being at risk for developmental, social, or behavioral delays was determined using PEDS scoring results performed by the NSCH [25]. If the PEDS score found no or low risk of delay, then the child was combined into a no/low risk group. If PEDS score found moderate to high risk of delay, then the child was coded as being at-risk. A sample of the nine questions used to calculate PEDS score can be found in Table 2.

Independent Variables—The independent variables of (1) reading to child, (2) engaging in storytelling or singing, and (3) having family meals were all coded so that: if parents reported 0 days per week of a specific exposure then they were coded as no exposure (0); if they reported 1–3 days of the exposure, they were coded as low exposure (1); if they reported 4–6 days of the exposure, they were coded as moderate exposure (2), and if they reported 7 days of the exposure they were coded as high exposure (3).

These three independent variables were analyzed individually with the dependent variable, and were also combined to evaluate any additive effect of the three PPP. The combined PPP score was produced as a sum of the three independent variable scores, resulting in a total score ranging from 0 to 9. The score was then stratified into three categories: No/low rates of PPP (total PPP score of 0–5); moderate rates of PPP (total PPP score of 6–7), and high rates of PPP (total PPP score of 8–9). The survey questions used to evaluate rates of (1)

reading to child,(2) engaging in storytelling or singing, and (3) having family meals can be found in Table 2.

Control Variables—Three potential confounding variables were identified through an extensive review of literature: poverty, parental education level, and race [2, 3, 12–14, 17, 23, 28]. Poverty was divided into four categories: (1) households at or below poverty level, (2) households between 100 and 200 % of poverty level, (3) households between 200 and 300 % of poverty level, and (4) households over 300 % of poverty level. Parental education was separated into three categories: (1) parents with less than a high school education, (2) parents with a high school education, and (3) parents with more than a high school education. Race was separated into three categories: (1) White, (2) Black, and (3) Other.

Data Analysis

Chi square analysis was performed between all independent, dependent and control variables (poverty, parental education level, and race). Multiple logistic regression was used to analyze the relationship between (1) reading to children, (2) participating in storytelling or singing, (3) engaging in family meals, and (4) total PPP score and the child's risk of being developmentally, socially, or behaviorally delayed. These analyses included the control variables of poverty, race, and parental education. After running multiple logistic regression analysis on these potential confounders, it was determined that collinearity existed between them, therefore only poverty and parent's education were used in the final statistical analysis. All analyses were conducted using SAS Version 9.3 and were weighted to reflect the national representativeness of the NSCH survey using SAS PROC SURVEY commands.

Results

Of the 21,527 study participants, over one-fourth (27.5 %) were found to be at moderate to high risk of being developmentally, socially or behaviorally delayed, according to the PEDS questionnaire results (Table 1). Chi square analysis found that sex, age, race, income, and parental education were all significantly associated with the risk of delay. Boys, older children, racial/ethnic minorities, and those whose parents had incomes below poverty level and had less than a high school education were more likely to be at moderate or high risk of a delay (Table 1).

Slightly more than half of the parents surveyed reported reading to children daily (52.6 %) compared to 3.4 % of parents who reported 0 days per week (Table 3). Similar rates were found with storytelling or singing, with 55.9 % of parents reporting it as a daily practice compared to 3.7 % reporting 0 days per week. In regards to family meals, three out of every five parents (60.1 %) reported eating a meal together as a family daily. Less than one-quarter (20.9 %) of the population was engaging in no/low levels of all three PPP, 33.4 % were engaging in moderate levels, and 43.9 % reported high levels of PPP activities. All three PPP, as well as the total PPP Score, were significantly associated with risk of delay (Table 3).

A multiple logistic regression was used to produce adjusted odds ratios (aOR) to determine an association between children being at risk for developmental, social, or behavioral delays

and the three individual PPP as well as for the total PPP Score, adjusting for poverty level and parent's education in all analyses. As presented in Table 4, children who were never read to were significantly more likely (aOR 1.86, 95 % CI 1.23–2.83) to be at risk of developmental, social, or behavioral delay compared to children who were read to daily. A significant association was also found when comparing children read to 1–3 days per week (aOR 1.56, 95 % CI 1.29–1.88) and 4–6 days per week (aOR 1.25, 95 % CI 1.06–1.48) with children read to daily. Daily rates of storytelling or singing also had a significant relationship with a child's decreased risk for delays (Table 4), finding that children with parents reporting no activity were 1.51 times as likely to be at risk for delays when compared to parents reporting daily activity (95 % CI 1.05–2.18). Significant association was also found when comparing 1–3 days per week versus daily reporting of storytelling/singing (aOR 1.61, 95 % CI 1.32–1.96), but no significance was found between reports of the 4–6 days per week and daily activity (aOR 1.11, 95 % CI 0.94–1.30). As shown in Table 4, all other levels of family meals were found to be significantly different than engaging in the activity daily. Comparing those who reported zero family meals per week to those reporting daily meals, children were found to be 1.62 times as likely to be at risk for delays (95 % CI 1.06–2.46), whereas parents reporting 1–3 days per week versus daily meals, children were 1.51 times as likely (95 % CI 1.24–1.85), and 4–6 days per week versus daily meals were 1.20 times as likely to be found at risk of delay (95 % CI 1.02–1.42). Finally, when comparing total PPP scores with risk of developmental, social, or behavioral delays, it was found that participants with no/low rates of PPP when compared with those who reported high rates were 1.85 times as likely to be at risk for developmental, social, or behavioral delays (95 % CI 1.51–2.20), and when comparing those who reported moderate rates of PPP, there was still significant association with PPP and all delays. (aOR 1.32, 95 % CI 1.13–1.54). In all analyses, poverty was found to be significantly associated with risk of being delayed for those below 300 % of the poverty level. Both poverty and parent's education were found to have a dose–response relationship with risk of being delayed, with their impact reducing with increased income and education (Table 4).

Discussion

To the best of our knowledge, this is the first national study to find a correlation between daily rates of parents engaging in PPP and rates of children (ages 1–5) being at risk for developmental, social, or behavioral delays, according to PEDS data. Specifically, we found that parents who report engaging in daily storytelling or singing, reading to children, or family meals were found to also report reduced concerns related to risk of delay. Furthermore, we found that engaging in all three PPP daily is more beneficial in reducing parental reports associated with delays than was found when parents reported any of the practices individually, with a strong relationship between overall PPP score and risk of delay. These findings are supported by previous studies that have found correlations between PPP and cognitive and social development [2, 4, 6, 11, 14]. A dose–response relationship was found between all independent and control variables in relation to risk of delays, with increased rates resulting in decreased PEDS scores. Reading, family meals, overall PPP score, poverty, and parent's education were all found to have a dose–response across all levels of exposure. Engaging in 0 or 1–3 days of storytelling or singing was found

be associated with a decreased PEDS score in a dose–response manner. However, the measures of association for storytelling or singing 4–6 days and 7 days per week and being at risk for delay were equivalent.

As a nationally-representative study with a large sample size, the results of this cross-sectional study are informative. Studies have shown that reading test scores from as early as 3rd grade can be used as indicators for eventual dropout rates, suggesting reductions in the rates of these early diagnosed delays have the potential to influence children's academic futures [29]. Further, it has been found that children who do not complete high school are more likely to become adults with employment problems, have higher rates of illness, and experience premature mortality [30–32]. Additionally, research has suggested that public health interventions focused on improving graduation rates would be more cost effective than later medical interventions targeted at health disparities [30, 33]. Therefore, the finding of a statistically significant correlation between parent's daily rates of these PPP and children's reduced PEDS scores can be used by public health practitioners, physicians, churches, community reading groups, educational systems, and many others to provide evidence to parents that taking the time to engage in these practices is beneficial. Specifically, given the large investment in Maternal, Infant, and Early Childhood Home Visiting (MIECHV) from the Maternal and Child Health division of the Health Resources and Services Administration (HRSA) that has led to the expansion of home visitation programs, we believe that these programs (e.g., HANDS, First Steps) would be able to use the results from this and other studies to effectively encourage parent involvement in these areas as they see firsthand what support is needed in the homes and develop a personal connection with parents. Further, this study provides some evidence of the critical nature of parental actions and behaviors and children's development. This is important in the context of several federally funded programs (e.g. WIC, Head-Start, HANDS, First Steps) that are designed to give “at-risk” children a healthy start [34–36]. Parents who are burdened with the stressors of managing and coping with a myriad of social and economic realities may not possess the efficacy needed to provide specific interactions that are found to have long term cognitive benefits [37, 38]. This study provides support of the positive effect that PPP can have, which may help practitioners encourage parents to understand their importance. However, while these PPP are non-financially dependent, these programs will have to work with specific families who may have limited resources of time and energy to engage in them on a daily basis, as well as addressing parental literacy, which may affect an individual's ability and willingness to read to their children. Through home visitation and other federally funded programs practitioners may be able to encourage parents to engage in these daily PPP, resulting in a potential positive impact on children's educational direction.

There are several limitations to this study, including both recall and social desirability biases. Studies have shown that parents will commonly misrepresent how frequently they read to their children due to social pressure to engage in the practice [39]. We believe that this could be a factor for all three of the positive parenting practices with parents reporting higher rates than may be accurate. There is also the concern of parents not correctly recalling the rates of practice, considering this is a cross-sectional study based completely on recall of past events. The study's cross-sectional design also prevents us from drawing causality from our findings. Additionally, while PEDS results have been found to have a

correlation with later diagnosed delay, the fact that scores are calculated based on parent concerns of delay rather than diagnosed delay is a limitation of the study findings [40]. Further, while the association between these practices and parental concern for delay has been shown, there are likely many other PPP parents are engaging in which were not measured and could have resulted in confounding variables. Further limitations of the study include the wording of some survey questions, which may not have fully captured the desired result. Specifically, the question related to family meals (Table 2) does not specify whether or not the meal was eaten as a family with no distractions from television or electronic devices. We believe that this detail could decrease the statistical benefit seen from the practice, compared to what we may have observed if the question was more specific. In addition, no information is available on why parents do or do not engage in these PPP; this might help to explain the observed socioeconomic gradients. An additional limitation of the study includes any potential bias created from the transformation of variables. For both dependent and independent variables, data was collapsed into categories in order to simplify our outcomes and to gain an overall picture of the potential benefit of these PPP. This collapsing of data, both with the grouping of days and the grouping of levels of delay risk could have resulted in lost information in regards to the overall study results. Further, our large sample size could also have led to statistically significant results that may not maintain significance in smaller populations.

Further study is suggested in order to define causality between these PPP and children's risk of being developmentally, socially, or behaviorally delayed, with the ideal longitudinal study following children through adolescence and young adulthood in order to determine any potential correlation with dropout rates, employment outcomes, and overall health status. A comparative effectiveness study is also suggested to see if adding emphasis to these practices in addition to current interventions results in a significant change in diagnosed delay. Investigation of parent's literacy rates in relation to rates of reported reading at home, as well as the potential impact of early learning centers and daycare reading to children are also suggested for future studies. Additionally, study is suggested on the impact of late onset of these positive parenting practices and their potential impact on delays.

Overall, our results indicate that parents may have the ability to influence a child's risk of being developmentally, socially, or behaviorally delayed by engaging with their child(ren) daily in several key positive ways. Taking the time to read, tell stories and sing, and eat meals together as a family may influence a child's future success in the educational system as well as more generally.

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Significance

There is extensive research evaluating the individual acts of reading to children, engaging in storytelling or singing, and eating meals together as a family, and their positive association with a child's cognitive, social, and behavioral development. However, this research has not been focused specifically on an association between daily rates of parental interactions in these three areas and their association with children's risk of being diagnosed with delays. The study results contribute to the body of knowledge in the area and support further research evaluating the importance of positive parenting interactions during early childhood.

Table 1

Overall sample characteristics and bivariate associations of all covariates 2011/2012 National Survey of Children's Health respondents, ages 1–5 (N = 21,527)

Variable	Overall (n, weighted %)	Risk of delay	
		No/low risk (n, weighted %)	Moderate/high risk (n, weighted %)
Total	21,527	16,144 (72.5)	5383 (27.5)
Sex **			
Male	10,903 (50.7)	7758 (69.4)	3145 (30.6)
Female	106,011 (49.2)	8375 (75.7)	2236 (24.3)
Unreported	13 (0.0)	11 (84.6)	2 (15.4)
Age (years) **			
1	4259 (19.9)	3303 (75.8)	956 (24.2)
2	3458 (16.8)	2718 (75.9)	740 (24.1)
3	4656 (20.6)	3559 (76.5)	1097 (23.5)
4	4628 (21.5)	3473 (70.9)	1155 (29.1)
5	4526 (21.2)	3091 (64.4)	1435 (35.6)
Race ***			
White	15,646 (67.4)	12,094 (74.5)	6885 (25.5)
Black	2108 (13.0)	1435 (68.5)	673 (31.5)
Other	3773 (19.6)	2615 (68.3)	1158 (31.7)
Income **			
Below poverty level	3695 (23.6)	2430 (61.9)	1265 (38.1)
Above 100–200 % poverty level	4073 (21.9)	2943 (72.7)	1130 (27.3)
Above 200–300 % poverty level	3540 (16.8)	2674 (75.9)	866 (24.1)
Over 300 % poverty level	10,219 (37.7)	8097 (77.5)	2122 (22.5)
Parent's education **			
Less than high school education	2534 (17.6)	1690 (63.5)	844 (36.5)
High school education	6661 (30.5)	4917 (72.4)	1744 (27.6)
More than high school education	12,332 (51.9)	9537 (75.6)	2795 (24.4)
Income by parent's education **			
Less than high school education **			
Below poverty level	1112 (51.5)	691 (57.0)	421 (43.0)
Above 100–200 % poverty level	690 (28.4)	459 (68.6)	231 (31.4)
Above 200–300 % poverty level	323 (10.8)	230 (71.7)	93 (28.3)
Over 300 % poverty level	409 (9.2)	310 (75.2)	99 (24.8)
High school education **			
Below poverty level	1328 (25.5)	879 (64.8)	449 (35.2)
Above 100–200 % poverty level	1427 (24.2)	1014 (71.0)	413 (29.0)
Above 200–300 % poverty level	11,625 (17.7)	869 (77.6)	293 (22.4)
Over 300 % poverty level	2774 (32.6)	2155 (76.6)	589 (23.4)

Variable	Overall (n, weighted %)	Risk of delay	
		No/low risk (n, weighted %)	Moderate/high risk (n, weighted %)
More than high school education **			
Below poverty level	1255 (13.1)	860 (65.2)	395 (34.8)
Above 100–200 % poverty level	1956 (18.3)	1470 (76.2)	486 (23.8)
Above 200–300 % poverty level	2055 (18.2)	1575 (75.8)	480 (24.2)
Over 300 % poverty level	7066 (50.4)	5632 (77.9)	1434 (22.1)
Gender by race			
White **			
Male	7953 (50.6)	5838 (71.7)	2115 (28.3)
Female	7685 (49.3)	6248 (77.3)	1437 (22.7)
Black			
Male	1063 (50.1)	678 (65.2)	385 (34.8)
Female	1042 (49.7)	756 (72.0)	286 (28.0)
Other *			
Male	2200 (51.9)	1809 (80.1)	391 (19.9)
Female	2094 (48.1)	1790 (85.6)	304 (14.4)

* $p < 0.05$

** $p < 0.001$

*** $p < 0.0001$ (Chi square analyses)

Table 2

Questions from National Survey of Children's Health used to created dependent and independent variables

PEDS questionnaire ^a	Response options
Dependent variables	
Do you have any concerns about [S.C.]'s learning, development, or behavior?	Yes, no, don't know, or refused to answer
Are you concerned a lot, a little, or not at all about how [S.C.] talks and makes speech sounds?	A lot, a little, not at all, or don't know/refuse to answer
Independent variables	
During the past week, how many days did you or other family members read to [S.C.]?	Number of days per week (0–7), I don't know, or refuse to answer
During the past week, how many days did you or other family members tell stories or sing songs to [S.C.]?	
During the past week, on how many days did all the family members who live in the household eat a meal together?	

^aExample questions from PEDS questionnaire (2 of 9)

Table 3

Response rates and bivariate associations for all covariates for independent and dependent positive parenting practice (N = 21,527)

Variable	Overall (n, weighted %)	Risk of delay	
		No/low risk (n, weighted %)	Moderate/high risk (n, weighted %)
Total	21,527 (100)	16,144 (72.5)	5383 (27.5)
Days per week parents/guardian read to child ** (days)			
0	478 (3.4)	287 (58.2)	191 (41.8)
1–3	3025 (19.1)	2038 (64.3)	987 (35.7)
4–6	5041 (24.9)	3640 (71.5)	1401 (28.5)
7	12,983 (52.6)	10,179 (76.8)	2804 (23.1)
Days per week parents/guardian engaged in story telling or singing with child ** (days)			
0	621 (3.7)	424 (64.2)	197 (35.8)
1–3	3284 (16.8)	2236 (63.2)	1048 (36.8)
4–6	4750 (23.6)	3500 (72.8)	1250 (27.2)
7	12,872 (55.9)	9984 (75.7)	2888 (24.3)
Days per week parents/guardian had a family meal with child * (days)			
0	497 (2.4)	332 (64.8)	165 (35.2)
1–3	2614 (12.5)	1862 (65.8)	752 (34.2)
4–6	5716 (25.1)	4277 (72.4)	1439 (27.6)
7	12,700 (60.1)	9673 (74.2)	3027 (25.8)
Positive parenting practice score ** (days)			
0–5	3572 (20.9)	2368 (62.4)	1204 (37.6)
6–7	6947 (33.3)	5081 (71.6)	1866 (28.4)
8–9	11,008 (45.9)	8695 (77.7)	2313 (22.3)

* $p < 0.01$

** $p < 0.0001$ (Chi square analyses)

Table 4

Odds of child being at risk of developmental, social or behavioral delays compared to positive parenting practices (N = 21,527)

	Daily reading	Daily storytelling or singing	Daily family meals	Positive parenting practice score
	Adjusted odds ratio ⁺ (95 % CI)	Adjusted odds ratio ⁺ (95 % CI)	Adjusted odds ratio ⁺ (95 % CI)	Adjusted odds ratio ⁺ (95 % CI)
Rate of activity (days per week)				
0 versus 7	1.86 (1.23–2.83)**	1.51 (1.05–2.18)*	1.62 (1.06–2.46)*	—
1–3 versus 7	1.56 (1.29–1.88)****	1.61 (1.32–1.96)****	1.51 (1.24–1.85)****	—
4–6 versus 7	1.25 (1.06–1.48)**	1.11 (0.94–1.30)	1.20 (1.02–1.42)*	—
Positive parenting practice score				
0–5 versus 8–9	—	—	—	1.85 (1.51–2.20)****
6–7 versus 8–9	—	—	—	1.32 (1.13–1.54)***
Poverty				
Below poverty level versus over 300 %	1.73 (1.44–2.09)****	1.83 (1.53–2.12)****	1.93 (1.63–2.35)****	1.78 (1.49–2.14)****
100–200 % versus over 300 %	1.16 (0.97–1.39)	1.21 (1.01–1.45)*	1.27 (1.61–2.32)***	1.19 (0.99–1.43)
200–300 % versus over 300 %	1.03 (0.84–1.26)	1.05 (0.86–1.29)	1.07 (0.87–1.31)	1.04 (0.84–1.28)
Parent's education				
Less than HS degree versus more than HS degree	1.23 (0.99–1.53)	1.26 (1.01–1.56)*	1.37 (1.11–1.64)**	1.22 (0.98–1.51)
HS graduate versus more than HS degree	1.03 (0.89–1.20)	1.05 (0.90–1.21)	1.08 (0.93–1.26)	1.03 (0.89–1.19)

⁺ Adjusted for poverty and parent's education

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

**** $p < 0.0001$