Short-Term and Long-Term Educational Outcomes of Infants Born Moderately and Late Preterm

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Objective To assess the relationship of moderate and late preterm birth ($32^{0/7}$-$36^{6/7}$ weeks) to long-term educational outcomes.

Study design We hypothesized that moderate and late preterm birth would be associated with adverse outcomes in elementary school. To test this, we linked vital statistics patient discharge data from the Office of Statewide Health Planning and Development including birth outcomes, to the 2015-2016 school year administrative data of a large, urban school district (n = 72 316). We compared the relative risk of moderate and late preterm and term infants for later adverse neurocognitive and behavioral outcomes in kindergarten through the 12th grade.

Results After adjusting for socioeconomic status, compared with term birth, moderate and late preterm birth was associated with an increased risk of low performance in mathematics and English language arts, chronic absenteeism, and suspension. These risks emerged in kindergarten through grade 2 and remained in grades 3-5, but seemed to wash out in later grades, with the exception of suspension, which remained through grades 9-12.

Conclusions Confirming our hypothesis, moderate and late preterm birth was associated with adverse educational outcomes in late elementary school, indicating that it is a significant risk factor that school districts could leverage when targeting early intervention. Future studies will need to test these relations in geographically and socioeconomically diverse school districts, include a wider variety of outcomes, and consider how early interventions moderate associations between birth outcomes and educational outcomes. *(J Pediatr 2021;232:31-7)*.

Late and moderate preterm birth, or birth between 32 and 36 weeks of gestation, accounts for approximately 84% of preterm birth, including 8.0%-8.5% of all births. This percentage has been increasing in the US since 1990, decreasing slightly from 2007 to 2014, and increasing since 2014.[1-3] However, most research done on long-term neurocognitive and educational outcomes of preterm birth has focused on very preterm birth (<32 weeks).[4-6] Very preterm birth is associated with poorer educational outcomes compared with full term birth, including worse cognitive outcomes throughout kindergarten and greater needs for special education.[7-11] Very preterm birth is linked to stress related to socioeconomic deprivation and maternal health.[12-14] Moderate and late preterm birth is associated with developmental delays and suspension in kindergarten, reading skills in kindergarten through grade 5, attentional difficulties and increased internalizing behavior at age 8 years, but little is known about long-term risks of moderate and late preterm birth for education outcomes through grade 12.[15-17] The effects of early intervention programs before kindergarten entry for students born very preterm are significant and durable, and it is important to identify other signals of long-term risk early in the life course to direct early interventions.[18]

Using a novel dataset matching birth hospital data with individual school records in a community-based partnership with a large, high-risk school district, we constructed a virtual birth cohort to address whether moderate and late preterm birth was associated with lower kindergarten through 12th grade educational outcomes (eg, standardized test performance, absenteeism, suspension) compared with children born at term, and whether this association was independent of socioeconomic status.

Methods

For this study, we leveraged the vital statistics-patient discharge data (VS-PDD) from the Office of Statewide Health Planning and Development, which link birth certificates to the maternal and infant hospital discharge data for all California in-hospital deliveries to capture full birth histories.[19] The VS-PDD from the

aRR	Adjusted risk ratio
ELA	English language arts
RR	Risk ratio
VS-PDD	Vital statistics-patient discharge data

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entire state of California from 1995 to 2016 were combined with administrative data from a large, economically and socioeconomically diverse urban school district in the state. In this school district, all students receive free and reduced price lunch, 16% of students are chronically absent, 89% are economically disadvantaged, 22% are classified as English language learners, 10% receive special education services, and 1% are in foster care.[20]

The Office of Statewide Health Planning and Development VS-PDD files were linked to the school district administrative data for all children who were enrolled in this district from grades prekindergarten-12 in the 2015-2016 school year. The data were linked on the student's and parents' first and last names, student's and parents' dates of birth, and parents' education levels.

The VS-PDD birth record data matched at a rate of 98% with the records of students whose school records indicated they were born in California. The hospital birth record data also matched to 828 students whose school district administrative records did not have a birth state listed and 57 students who had a state other than California listed. Of the matched students, 81.56% were born in hospitals within the school district. This finding comports with the school district's reports that most of their students are not mobile.

To determine gestational age, the VS-PDD contains 3 potential data elements—gestational age, which is measured as days of gestation based on mother's last menstrual period; obstetric gestational age, estimated in weeks and based on obstetric measurements of the fetus; and birth weight, which can be used to estimate gestational age.[21] The obstetric estimate is the most reliable estimate, so whenever it was available, this figure was used.[22] The obstetric estimate was not available for children born before 2007. When the obstetric estimate was not available, gestational age based on mother's last menstrual period was used, and this was also rounded to weeks such that $32^{6/7}$ weeks would be rounded to 32 weeks, and so on. When neither the obstetric estimate nor gestational age based on mother's last menstrual period was available, or in the case that gestational age was deemed implausible for being estimated outside of the range of 17-42 weeks, gestational age was imputed based on birth weight (n = 8959).[21]

From 82 483 students in the district administrative data from 2015-2016 school year, 72 318 students born between 1998 and 2012 whose school records did not indicate they were born outside California matched with the California birth records. We dropped 2 students whose matched record indicated death in infancy. Our final analytic sample consisted of 72 316 students, as described in **Figure 1** (available at www.jpeds.com). Full descriptions of the analytic sample overall and by gestational age category are available in **Table I**.

Table I. Characteristics of California-born students in the school district

Characteristics	Full sample (n = 72 316)	Moderate and late preterm (n = 8991)	Term (n = 61 836)	*P* value*
Gestational age, weeks	38.6 ± 2.43	35.1 ± 1.2	39.3 ± 1.3	<.001
Birth weight, g	3284.9 ± 567.1	2775.7 ± 562.5	3390.2 ± 464.4	<.001
Student age	10.0 ± 3.8	10.6 ± 3.6	9.9 ± 3.9	<.001
Mother's age	25.5 ± 6.2	25.6 ± 6.5	25.4 ± 6.2	<.001
Student sex, female	35 248 (48.7)	4132 (46.0)	30 467 (49.3)	<.001
Student race/ethnicity				
Hispanic	48 734 (68.5)	5766 (65.2)	42 037 (69.1)	<.001
Missing	1152 (1.6)	145 (1.6)	986 (1.6)	.90
Native American	414 (0.6)	55 (0.6)	352 (0.6)	.62
Asian/Pacific Islander	7130 (10.0)	1014 (11.5)	5941 (9.8)	<.001
African American	6488 (9.1)	1058 (12.0)	5233 (8.6)	<.001
White	6920 (9.7)	772 (8.7)	6018 (9.9)	.001
Non-White Hispanic	31 717 (44.6)	3825 (43.3)	27 301 (44.9)	.004
Multiracial	18 314 (25.7)	2093 (23.7)	15 859 (26.1)	<.001
Missing	1176 (1.6)	151 (1.7)	1004 (1.6)	.70
English learner	24 398 (35.3)	2948 (34.0)	21 008 (35.6)	.004
Missing	3262 (4.5)	328 (3.6)	2880 (4.7)	.001
Disability status	7250 (10.3)	1124 (12.8)	5813 (9.7)	<.001
Missing	1879 (2.6)	226 (2.5)	1617 (2.6)	.57
Mother's age				
<20	13 187 (18.2)	1725 (19.2)	11 172 (18.1)	.01
20-34	51 901 (71.8)	6239 (69.4)	44 649 (72.2)	<.001
>34	7228 (10.0)	1027 (11.4)	6015 (9.7)	<.001
Mother's education				
<High school	32 902 (46.2)	4434 (49.9)	27 740 (45.5)	<.001
High school diploma	21 540 (30.2)	2656 (29.9)	18 426 (30.2)	.47
<4 years college	12 676 (17.8)	1389 (15.6)	11 042 (18.1)	<.001
4 years college	2621 (3.7)	240 (2.7)	2354 (3.9)	<.001
>4 years college	1535 (2.2)	171 (1.9)	1351 (2.2)	.08
Missing	1042 (1.4)	101 (1.1)	923 (1.5)	.01

Values are mean ± SD or number (%).
Missingness is 0 if not listed.
**P* value indicates significant difference from late preterm based on a χ^2 test.

Table II. Definitions of educational outcomes

Educational outcomes	Grade level	Description
Chronic absence	Pre-K-12	Defined as missing 10% of school days in a single school year. Chronic absence is a major risk factor for lower learning and non-completion of high school.
Suspension	Pre-K-12	Defined as suspended at least once during the 2015-2016 academic school year.
Below full proficiency Kindergarten ELA	K	Assessed using Language Arts items on the KAIG. The KAIG assesses early print concepts, phonics, word recognition, phonological awareness. The maximum score was 100, and this was the score that was needed to be considered fully proficient in Kindergarten literacy. Students scoring <100 were considered below full proficiency.
Below full proficiency Kindergarten math	K	Assessed using the KAIG for early mathematical and numeracy skills such as counting, number-writing, representing addition and subtraction with objects, and adding and subtracting small numbers. The maximum score was 100, and this was the score that was needed to be considered fully proficient in Kindergarten mathematics. Students scoring <100 were considered below full proficiency.
Below proficiency ELA, SBAC	3-8, 11	Students were assessed on Common Core standards on the SBAC) claims of reading, writing, speaking and listening, and research/inquiry. Student performance is rated as having met the standards or not having met the standards. Students who received the rating *Standard Not Met* were considered below ELA proficiency.
Below proficiency mathematics, SBAC	3-8, 11	Students were assessed on Common Core standards on the SBAC claims of concepts and procedures, problem solving, modeling, data analysis, and communicating reasoning. Student performance is rated as having met the standards or not having met the standards. Students who received the rating *Standard Not Met* were considered below Math proficiency.
Below proficiency ELA	1-12	Students were assessed on an Interim assessment that was based on SBAC and scored the same way.
Below proficiency mathematics	1-6	Students were assessed on an Interim assessment that was based on SBAC and scored the same way.

K, kindergarten; *KAIG*, Kindergarten Assessment of Individual Growth; *SBAC*, Smarter Balanced Assessment Consortium.

Outcome Measures

We analyzed the relative risk (RR) for 4 educational outcomes: proficiency in English language arts (ELA) and literacy skills in grades kindergarten to 12, proficiency in mathematics in grades kindergarten to 12, chronic absence in grades prekindergarten to 12, and suspension in grades prekindergarten to 12. **Table II** provides the definitions and rationales for each of these outcomes.

Control Variables

Information on 4 maternal and student variables was obtained from the VS-PDD and from school district administrative data: mother's education (less than high school, high school, some college, bachelor's degree, college beyond a bachelor's degree), mother's age, student's sex, student's race/ethnicity (Hispanic, African-American, Asian/Pacific Islander, Native American, non-White Hispanic, White, and multiracial), and student's English learner status (defined as ever having received English learner status by the school).

Statistical Analyses

To determine the associations among moderate and late preterm birth and educational outcomes, we performed a series of relative risk analyses. First, we compared outcomes across the entire sample of students in prekindergarten to grade 12 for a range of outcomes including suspension, math proficiency, ELA proficiency, and chronic absence (**Table II**). We also adjusted for mother's education, mother's age at child's birth, sex, and English learner status. We examined relative risk and adjusted risk scores at kindergarten entry. Then, we stratified students by grade level and performed relative risk analyses for early elementary (grades kindergarten to 2), mid to late elementary (grades 3-5), middle school (grades 6-8), and high school students (grades 9-12). We adjusted grade-level risks for mother's education and mother's age. Across grade levels, we also adjusted grade-level risks separately for each of English learner status, sex, and African American racial status. Each of these factors is a good control because the subgroups vary significantly across mother's education, African American racial status, and English learner status, and these analyses relate to our research questions. Mother's age has been associated with preterm birth, and mother's education is a proxy of children's socioeconomic status.[23]

Results

Of the 82 483 students in the school district, we matched 72 316 (87.7%) with birth data including gestational age or birth weight, from which gestational age could be computed (**Figure 1**). Compared with those born at term, students born moderate and late preterm were somewhat more likely to be female, African-American or Asian/Pacific Islander, and born to a mother <20 or >34 years of age, with less than a high school education. They were also more likely to be labeled by the school as disabled and less likely to be labeled as an English language learner (**Table I**).

In unadjusted bivariate analyses, students born moderate and late preterm were more likely to perform below proficiency compared with students born at full term on standardized tests of mathematics skills in kindergarten (52.4% vs 46.7%; $P = .01$), mathematics in grades 3-8 and 11 (82.2% vs 77.5%; $P < .001$), and ELA skills in grades 3-8 and 11 (73.8% vs 68.1%; $P < .001$), and were more likely to be suspended (23.9% vs 19.3%; $P < .001$) or experience chronic absenteeism (18.0% vs 16.1%; $P < .001$) (**Table III**). The risk for poor performance increased with decreased

Table III. Main results of relative risk analysis, moderate and late preterm vs term

Binary educational outcomes	Moderate and late preterm, No. (%)	Term, No. (%)	Unadjusted relative risk (95% CI)	*P* value*	Adjusted relative risk (95% CI)†	*P* value*
Full sample (grades‡)						
<Prof. ELA (K)	291 (60.6)	2848 (57.6)	1.05 (0.98-1.14)	.19	1.05 (0.97-1.13)	.25
<Prof. math (K)	252 (52.4)	2317 (46.7)	1.12 (1.02-1.23)	.01	1.12 (1.02-1.22)	.01
< Prof. ELA (1-12)	4929 (77.0)	30 502 (72.8)	1.06 (1.04-1.07)	<.001	1.04 (1.02-1.05)	<.001
<Prof. math (1-6)	4087 (69.4)	26 299 (66.7)	1.04 (1.02-1.06)	<.001	1.05 (1.03-1.07)	<.001
<Prof. SBAC ELA (3-8, 11)	3404 (73.8)	18 593 (68.1)	1.08 (1.06-1.11)	<.001	1.05 (1.03-1.07)	<.001
<Prof. SBAC math (3-8, 11)	3777 (82.2)	21 061 (77.5)	1.06 (1.04-1.08)	<.001	1.04 (1.03-1.05)	<.001
Chronic absence (pre-K-12)	1613 (18.0)	9897 (16.1)	1.12 (1.07-1.17)	<.001	1.09 (1.04-1.15)	<.001
Suspension (pre-K-12)	2152 (23.9)	11 907 (19.3)	1.24 (1.19-1.29)	<.001	1.19 (1.14-1.24)	<.001
Grades K-2						
<Prof. ELA (1-2)	707 (75.5)	6596 (73.1)	1.03 (0.99-1.07)	.10	1.02 (0.98-1.06)	.29
<Prof. math (1-2)	669 (71.8)	6202 (69.0)	1.04 (1.00-1.09)	.07	1.03 (0.99-1.08)	.13
Chronic absence	339 (20.2)	2672 (16.2)	1.25 (1.13-1.38)	<.001	1.26 (1.14-1.39)	<.001
Suspension	150 (8.9)	1291 (7.8)	1.14 (0.97-1.34)	.11	1.15 (0.98-1.36)	.08
Grades 3-5						
<Prof. SBAC ELA	1585 (77.5)	9246 (70.3)	1.10 (1.07-1.13)	<.001	1.08 (1.06-1.11)	<.001
<Prof. SBAC math	1629 (79.9)	9736 (74.1)	1.08 (1.05-1.10)	<.001	1.06 (1.03-1.08)	<.001
Chronic absence	314 (13.8)	1524 (10.6)	1.30 (1.16-1.46)	<.001	1.28 (1.14-1.43)	<.001
Suspension	470 (20.6)	2388 (16.6)	1.24 (1.14-1.36)	<.001	1.23 (1.13-1.35)	<.001
Grades 6-8						
<Prof. SBAC ELA	1567 (73.5)	7821 (68.4)	1.07 (1.04-1.11)	<.001	1.04 (1.02-1.07)	.001
<Prof. SBAC math	1793 (84.3)	9185 (80.5)	1.05 (1.03-1.07)	<.001	1.02 (1.01-1.04)	.01
Chronic absence	370 (15.4)	1860 (14.6)	1.05 (0.95-1.16)	.36	1.02 (0.92-1.13)	.76
Suspension	759 (31.5)	3752 (29.5)	1.07 (1.00-1.14)	.05	1.04 (0.98-1.11)	.22
Grades 9-12						
<Prof. SBAC ELA (11)	252 (58.1)	1525 (6.0)	1.04 (0.95-1.13)	.41	1.03 (0.95-1.11)	.53
<Prof. SBAC math (11)	355 (83.5)	2139 (82.0)	1.02 (0.97-1.07)	.43	1.01 (0.97-1.06)	.48
Chronic absence	472 (21.5)	2774 (20.2)	1.07 (0.98-1.16)	.14	1.04 (0.95-1.13)	.38
Suspension	755 (34.4)	4363 (31.7)	1.09 (1.02-1.16)	.01	1.07 (1.01-1.14)	.03

K, kindergarten; <*Prof.*, below proficiency; *SBAC*, Smarter Balanced Assessment Consortium.
**P* value indicates significant difference from late preterm based on a χ^2 test.
†In the full sample, relative risk adjusted for mother's education, mother's age at childbirth, sex, and English learner status. In grade-level samples, relative risk adjusted for mother's education and mother's age at childbirth.
‡Grades are listed in parentheses if they differ from grades listed in subgroup heading.

gestational age (**Figures 2** and **3** [both available at www.jpeds.com], and **Figure 4**).

Unadjusted and adjusted risk ratios (RRs) for educational outcomes—in aggregate and by grade-level group—are shown in **Table III**. After adjusting for maternal age, maternal education, sex, and English learner status, moderate and late preterm students were more likely to perform below proficiency on standardized tests of math skills in kindergarten (adjusted RR [aRR], 1.12; 95% CI, 1.02-1.22), math skills in grades 3-8 and 11 (aRR, 1.04; 95% CI, 1.03-1.05), and ELA skills in grades 3-8 and 11 (aRR, 1.045; 95% CI, 1.03-1.07), and were more likely to be suspended (aRR, 1.19; 95% CI, 1.14-1.24) or experience chronic absenteeism (aRR, 1.09; 95% CI, 1.04-1.15). The strongest associations were found in grades 3-5, when students born moderate or late preterm demonstrated a 6%-10% increased risk for below proficiency skills, a 28% increased risk for chronic absenteeism, and a 23% increased risk for suspension when compared with students born at term. In grades 6-8, students born moderate or late preterm demonstrated 2%-7% increased risk for below proficiency math and ELA skills and, in grades 9-12, a 7% increased risk for suspension. In each grade level, reported math and ELA risks are based on the Smarter Balanced Assessment Consortium when available, and the interim assessment when not available. Relative risks for math and ELA skills were similar across the 2 assessments. The significance of reported grade level relative risks did not change when adjusted separately for each of English learner status, sex, or African American racial status. The results of all relative risk and adjusted relative risk analyses are available upon request.

Discussion

In this unique virtual birth cohort linking birth hospitalization data with academic outcomes data for more than 70 000 students in a high-risk school district, we found evidence for long-term vulnerability associated with moderate and late preterm birth. Students born moderate and late preterm were more likely than those born at term to experience intellectual and physical disability (**Table I**). After adjusting for family socioeconomic and demographic factors, including mother's education, mother's age, sex, and English learner status, moderate and late preterm birth was associated with a significantly increased risk of poor academic performance, chronic absenteeism, and suspension. The association with chronic absenteeism and suspension may

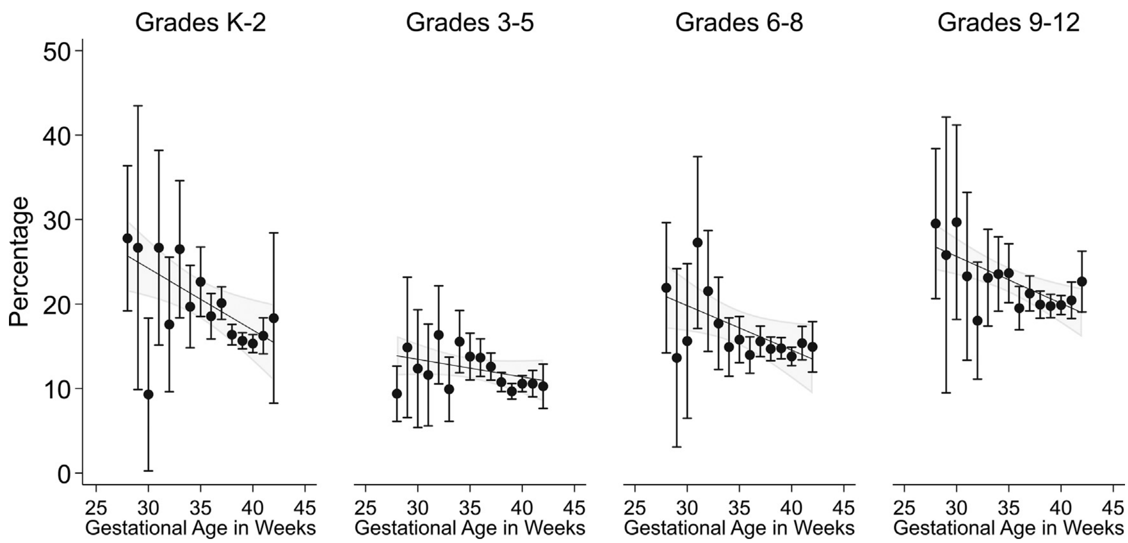

Figure 4. Chronic absence by gestational week. Error bars represent 95% CIs (*P*s < .001-.01). Gestational age truncated at 28 weeks.

indicate long-term behavioral implications of preterm birth. Our results indicated that moderate and late preterm students were more likely to score below proficiency levels for ELA as late as middle school. We found that the associated increased risks emerged in grades kindergarten to 2, increased in prominence in grades 3-5, tapered in grades 6-8, and seemed to wash out in the later grades, with the exception of suspension, which was a higher risk as late as grades 9-12, indicating associations between moderate and late preterm birth and long-term behavioral outcomes spanning childhood and adolescence.

This study examined the long-term effects of moderate and late preterm birth on educational and behavioral outcomes in a large US population through the high school years. Several other studies have examined the short-term outcomes of moderate and late preterm birth, but few have considered outcomes across the kindergarten to grade 12 trajectory.[24-26] Although the risks of very preterm birth are well-documented and are already the focuses of intervention, moderate and late preterm birth has received less attention as an indicator of risk. Consistent with the literature, our results indicated that moderate and late preterm birth may be a significant indicator of risk for decreased cognitive and behavioral outcomes, especially through elementary school. Several hypotheses may explain these associations. Infants with moderate and late preterm birth are at risk of developing lower executive function, which may explain the increased association in grades 3-5, when achievement tests are most sensitive to differences in certain aspects of executive functioning skills.[27,28] Increased risk for inflammatory chronic conditions (eg, asthma) may explain increased school absences among moderate and late preterm students.[29] Moderate and late preterm students are also at risk for having attention deficits, which predict school suspension rates and may explain the link between prematurity and suspension through high school.[27,30]

This study was subject to limitations and biases common to cross-sectional studies using administrative data. These limitations include generalizability bias, because we were limited to data from a single school district. The sample reflected the sociodemographic make-up of the surrounding county, including the rate of moderate and late preterm birth (12.4%), which is a higher percentage than in the general US population, so it will be important to replicate these findings in other settings.[2] A limitation of our study is reporting bias because, beyond standardized test scores, we had no independent assessments or observations of child skills (eg, psychoeducational testing). We were unable to adjust for other potential sources of unmeasured confounding, including family structure, neighborhood factors, and environmental exposures. Although almost all of the students in our sample were economically disadvantaged, we did not have a measure of household income to account for variability in socioeconomic status beyond mother's education. Although this factor is a useful indicator of disadvantage, it masks variability at the low end of the income scale, which could potentially bias our results owing to the association between poverty and preterm birth.[31] Furthermore, the mean age of students born moderate and late preterm was higher than that of term students, which would also attenuate our findings. Nonetheless, we found a high probability match between student's school records and the birth certificates and birth hospitalization data. Given this fact and the high population-level rates of some outcomes (including below-grade level performance and suspension), we would expect study findings to be biased toward the null.

Our findings may carry important implications for health care providers, educators, and policymakers. Prior studies suggest that poor academic performance and chronic absenteeism in elementary school predicts later high school noncompletion, which is a risk for unemployment and poor health beyond high school.[32-34] Chronic absenteeism and behaviors associated with suspension from school may themselves impact academic performance, so the mechanisms through which preterm birth impact later life outcomes may cascade and accumulate. Our findings linking moderate and late preterm birth to academic, suspension, and absenteeism risks in elementary school indicate that moderate and late preterm birth is an important early warning indicator of long-term risks that may be underused in health care and education settings. Educators should consider working with local health care providers to establish more comprehensive educational and behavior plans (eg, individual education plans) earlier in time (eg, prekindergarten, kindergarten) and with more integrated, multidisciplinary teams. Although school districts will need to carefully consider the financial implications of screening and providing services, identifying students as preterm may help to target students for interventions earlier, which may have benefits for their physical, cognitive, and behavioral development.

Future research is necessary to extend and understand these findings. This work may include expanding the analysis to include data over sequential academic years, as well as data across multiple school districts, to expand the generalizability of these findings across diverse environmental and socioeconomic settings. Such expanded analysis, for example, may allow us to examine the differential impact of resources or early intervention programs. Future studies should also include more robust treatment of independent and instrumental variables, for example, to examine the mediating effects of English-learner status or disability status. Finally, as with the present study, such life-course analyses should be informed by qualitative studies, amplifying the voices of parents, family members, teachers, and the youth themselves to explain key findings and to suggest implications for improving the health and educational well-being of all children. ■

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Data Statement

Data sharing statement available at www.jpeds.com.

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50 Years Ago in *The Journal of Pediatrics*

The Australia Antigen: A Path to Remarkable Discoveries

Krugman S. Viral hepatitis and Australia antigen. J Pediatr 1971;78:887-91.

The Australia antigen was discovered in 1961 by Dr Baruch Blumberg when he observed precipitating antibodies in the sera of patients who had received multiple transfusions. Little did he know that over the next decade this discovery would revolutionize the field of viral hepatitis.

The name "Australia antigen" was given because Blumberg discovered the reacting sera in high numbers in the Australian aborigine. Later, he reported findings of this antigen in high rates in patients with leukemia, Hodgkin's disease, institutionalized children with Down syndrome, and patients with presumed viral hepatitis. This association with viral hepatitis lead to an eruption of research and literature including the breakthrough discovery that the Australian antigen is, in fact, the hepatitis B surface antigen.[1]

A series of events in the 1970s signaled the beginning of a new era in viral hepatology. Dr Irving Millman with Dr Blumberg developed a method of purifying the antigen for use in a vaccine, patented in 1972. Dr Harvey Alter and colleagues called for Australia antigen screening of blood products; this, along with the change to a volunteer only blood bank system, led to a 70% decrease in blood transfusion-transmitted hepatitis.[2] Further research in this decade described the chronic state of hepatitis B, the significant global impact of chronic hepatitis B and the link of hepatitis B to hepatocellular carcinoma.[1]

Despite continued academic progress with a highly effective vaccine available and viral suppressive therapy, hepatitis B remains an uncurable disease, with a significant global disease burden with more than 290 million people estimated to have chronic hepatitis B.[3] Although we are still searching for a cure, we must continue to spread awareness and fight for improved public health policy on a global perspective, especially in our most vulnerable pediatric population where vaccination is highly effective against perinatal transmission, with a target to eliminate viral hepatitis as a public health threat.[3]

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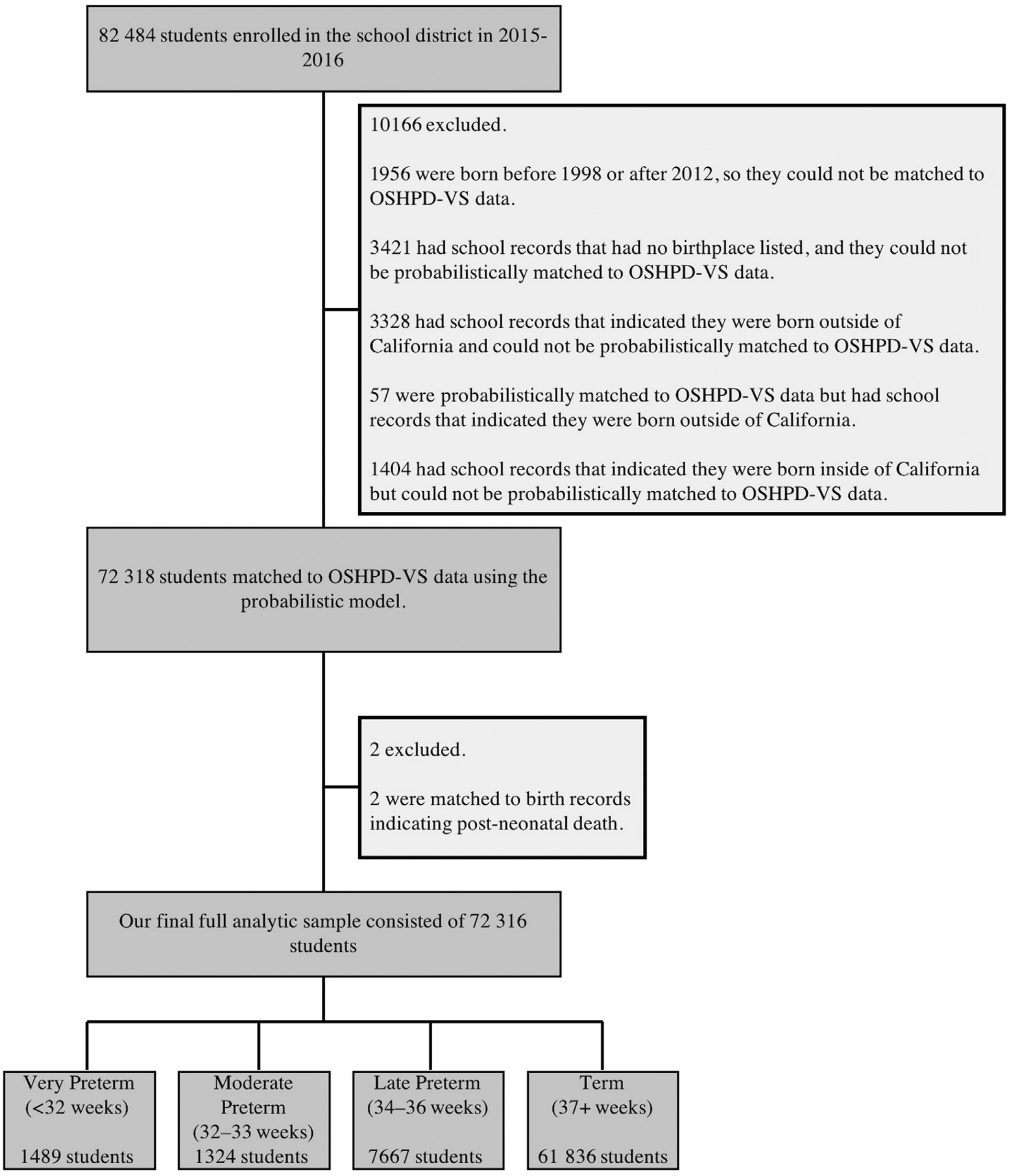

Figure 1. CONSORT diagram. *OSHPD-VS*, Office of Statewide Health Planning and Development - Vital Statistics.

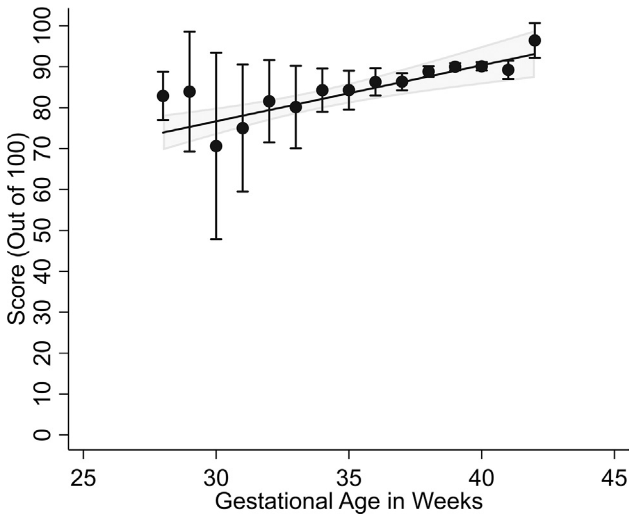

Figure 2. Kindergarten mathematics readiness by gestational age. Error bars represent 95% CIs ($P < .001$). Gestational age truncated at 28 weeks. Results were similar for ELA.

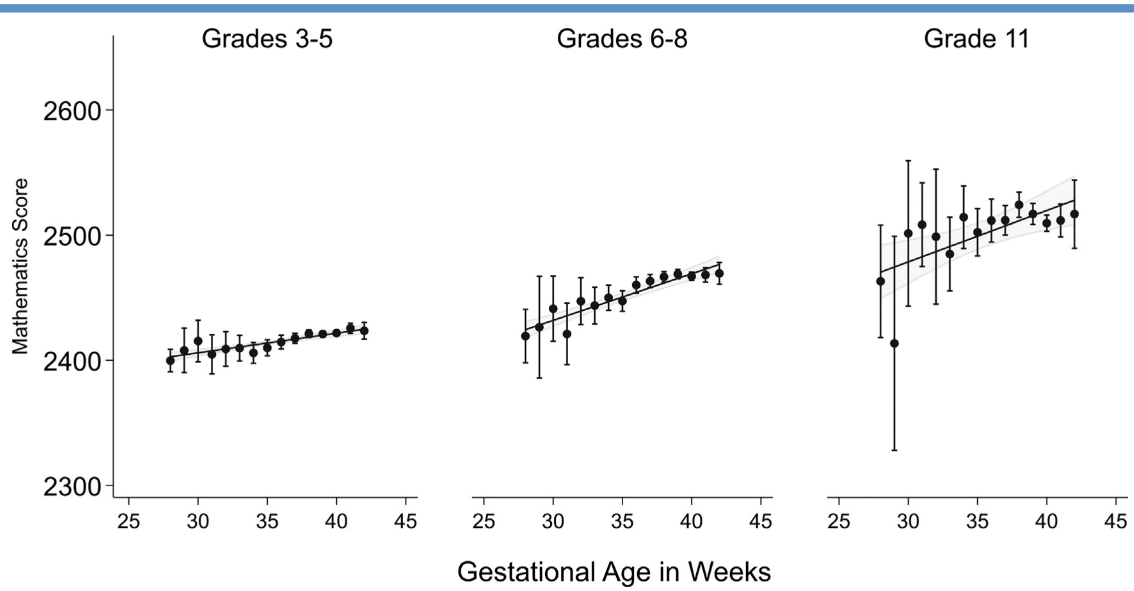

Figure 3. SBAC mathematics scores by gestational age. Error bars represent 95% CIs (*P*s < .001-.04). Gestational age truncated at 28 weeks. Results were similar for ELA. *SBAC*, Smarter Balanced Assessment Consortium.