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Research Article

The Influence of Diet, Exercise and Education Level During Pregnancy on Child Cavities and Tooth Eruption

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ABSTRACT

Objectives: This study's objective was to evaluate if exercise during pregnancy, a healthy diet rich in polyunsaturated fatty acids and calcium, and the mother's educational level influenced the dental health measures of caries risk and tooth eruption of their offspring.

Methods: Women with children 6 years and younger completed questionnaires regarding PA and diet (PUFA-rich, calcium-rich (Ca) dairy foods) during pregnancy and education level prior to their child's dental examination. T-tests were used to compare exercisers and non-exercisers; correlation and regression analyses were conducted to determine relationships and predictors of child dental health, respectively.

Results: Eighty-two mother-child pairs were analysed. Exercisers had trends of increased PUFA ($p=0.07$) and Ca-rich dairy foods ($p=0.12$) to non-exercisers during pregnancy. Ca-rich dairy foods during pregnancy had positive associations with primary tooth count ($p=0.004$), mixed surface count ($p=0.02$), and tooth eruption ($p=0.04$). Controlling for maternal education and exercise, tooth eruption was predicted by PUFA summary and cheese consumption while dairy summary predicted primary tooth count; caries risk was predicted by maternal education; primary surface caries was associated with exercise duration.

Conclusion: During pregnancy, calcium-rich dairy and PUFA-rich foods influenced child tooth eruption and thus tooth count, while exercise duration was associated with primary surface caries. Maternal education was associated with lower caries risk. Our findings support educating women on calcium intake and appropriate exercise levels during pregnancy, plus oral health counseling for their child.

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Introduction

The most common chronic disease of childhood, five times more prevalent than asthma and seven times more than allergic rhinitis, is Early Childhood Caries [1]. Primary teeth begin developing during pregnancy and rely on maternal nutrition and environment. This may make them more vulnerable to early caries than permanent teeth [2].

Anatomically, primary teeth have thinner enamel than permanent teeth. [3] Dzidziul *et al.* and Wang *et al.* studies found similar results that deciduous teeth were more susceptible to acid dissolution than permanent teeth [4, 5]. Growing evidence suggests maternal health behaviour (e.g., diet, physical activity, health knowledge) during pregnancy influences fetal organ development, which can have a long-term impact on child health or disease status [6]. For example, polyunsaturated fatty acids (PUFA) have an anti-inflammatory role and

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their consumption is associated with decreased odds of periodontitis or more severe periodontal disease [7]. In a prospective randomized trial, PUFA supplementation intervention in children had 93% of 3-year-old Spanish children caries free as compared to the non-intervention group [8]. During pregnancy, calcium is essential for peak bone formation and tooth mineralization *in utero* and the first decades of life; relatedly, one Japanese study found an inverse association between maternal cheese intake during pregnancy and caries risk in 4-year-olds [9, 10]. Thus, maternal nutrition during pregnancy may affect primary tooth development and mineralization *in utero* and, thus, dental caries susceptibility in children after birth.

Besides dietary factors, maternal education and physical activity are other health behaviours associated with positive oral health scores [11]. Regular physical activity in all phases of life, including pregnancy, promotes health benefits, such as decreased periodontal disease and caries [12, 13]. Specifically, an Italian study noted 9-year-olds involved in physical activity have better oral hygiene, less halitosis, and less gingivitis than inactive counterparts [14]. According to Davenport *et al.*, prenatal exercise is safe and beneficial for the fetus. She states maternal exercise was associated with reduced odds of macrosomia, abnormally large babies and was not associated with neonatal complication or adverse childhood outcomes [15]. Hopkins *et al.*, found while studying exercise during pregnancy, offspring size, and maternal insulin that regular exercise was associated with lower birth weights [16]. From there, Garmash evaluated oral health abnormalities in children born with macrosomia during the mixed dentition period. Their study found that the highest values of caries intensity were recorded in macrosomia-at-birth children born with well-balanced intrauterine development.

Also, the children born with macrosomia have significantly a higher percentage (100% vs 73%) of dentoalveolar abnormalities in comparison to normosomia-at-birth children. It was concluded that the processes causing fetal macrosomia have a great impact on the dental status of children in the period of mixed dentition, setting the foundation for the association of exercise during pregnancy on children's oral health status [17]. Lastly, a systematic review demonstrates that oral health promotion during pregnancy increases maternal knowledge related to oral health practices for themselves and their child; however, these studies failed to evaluate child oral health [18]. Therefore, to our knowledge, a study has not evaluated the influence of health behaviours and knowledge of these behaviours during pregnancy on the influence of child caries risk and tooth eruption after birth, especially in a diverse US population of women of low socioeconomic status (SES).

The earliest time to promote health, and decrease disease, is pregnancy; however, it is not known if health behaviours during pregnancy influence the caries risk and tooth eruption of the child after birth. Therefore, the purpose of this study is to evaluate the influence of specific nutrients (calcium-rich dairy foods, PUFA-rich foods), exercise, and education level during pregnancy on child dental health (e.g., caries risk, caries experience, tooth eruption) in a low SES, diverse US population of women. We hypothesize that pregnant women who were active throughout pregnancy, consumed a diet high in calcium-rich dairy and PUFA-rich foods, with more education will have children with fewer cavities, lower caries risk, and appropriate tooth eruption relative to children of women who are inactive during pregnancy, consume low amounts of calcium-rich and PUFA-rich foods and are less educated.

Methods

I Study Design

This was a cross-sectional study design, using data from a convenience sample. Women with children six years of age or younger seen as a patient at East Carolina University School of Dental Medicine Pediatric Dental Clinic were asked to participate in this study. Participants were recruited in the waiting room of the clinic and assessed for study eligibility. The inclusion criteria included women with children six years old or younger, children were free of medical or congenital conditions, and the mother could read and speak English. The mother's ability to read was determined by the interviewer directly asking the mother. This study was approved by the East Carolina University Institutional Review Board. Women were informed that the study participation had no effect on their child's oral health treatment. All women completed an informed consent for themselves and their children. All women were asked to complete the Modifiable Physical Activity Questionnaire (MPAQ), the Food Frequency Questionnaire (FFQ), and the grant permission to access their child's dental health records. All treatments were performed under HIPPA compliance for both mother and child. Questionnaires were completed the day consent was obtained prior to the child's dental examination.

II Maternal Physical Activity Questionnaire

The Modifiable Physical Activity Questionnaire (MPAQ) is a self-reported questionnaire used to assess measures of physical activity (PA) while pregnant with her child and has been validated for pregnancy up to 6 years postpartum [19-22]. The MPAQ obtained information on frequency (days/week), duration (minutes/session), and intensity for all leisure-time physical activities in the three months prior to pregnancy and during each month of pregnancy. For each month of pregnancy, frequency multiplied by the duration of moderate to vigorous activities provided minutes/month of PA; this value was divided by 4 to determine the minutes/week of PA for each month. The average minutes/week was calculated by adding the minutes/week of PA for each month of all pregnancy months and dividing by the number of months to determine the average exercise volume (minutes/week) of moderate to vigorous PA while pregnant. Women were classified as exercisers if they engaged in moderate to vigorous aerobic exercise for a minimum of 90 minutes per week throughout pregnancy according to guidelines from the American College of Obstetricians and Gynecologists (ACOG) [23]. Women that did not meet these criteria were classified as the non-exercising (control) group. The questionnaire also inquired about maternal characteristics including age, number of previous pregnancies, education (years), race/ethnicity, pre-pregnancy height (meters) and weight (kg). Maternal pre-pregnancy height and weight were utilized to calculate pre-pregnancy body mass index (BMI) ($\text{weight (kg)} \div \text{height (m)}^2$).

III Food Frequency Questionnaire

For this study, the Food Frequency Questionnaire (FFQ) asked women to specifically report foods, such as polyunsaturated fatty acid-rich (PUFA) and calcium-rich dairy (Ca), consumed during pregnancy [24]. The women were asked to report the frequency of consumption of foods based on the scale: 1-rarely or never eat the food, 2-eat the food once every 2 weeks, 3-eat the food 1-3 times/week, 4-eat the food 4-7

times/week, or 5 eat the food more than once per day. The individual PUFA-rich foods (white-flesh fish, other fish (e.g., salmon), almonds) were rated on the 5-point Likert scale, except the polyunsaturated margarine (No/Yes); Sunflower/Soy/Corn, Olive oils (No/Yes); which were converted to No=0 and Yes=1. These individual PUFA numerical values were then summed for a PUFA Summary score for each participant during pregnancy. Similarly, calcium-rich dairy foods (cheese, whole milk, 2% or 1% milk, skim milk, milk in tea, milk in coffee, milk in cereal) were scored on the same 5-point Likert scale. These individuals' Ca numerical values were then totaled for a dairy summary score for each participant during pregnancy.

IV Independent Variable (Education Classification)

Women were classified into five groups based on the last level of education completed. Women who completed some primary educations were in the "Less than High School," while women who completed high school or GED were in the "GED/High School" group. The "Some College" group was comprised of women who completed an associate's degree or spent some time in college classes but did not complete a four-year degree. Women who had a four-year college degree were classified as "Undergraduate Degree" group, while those with advanced degrees were grouped in the "Master's Degree" group. Those with no response were in the "Unknown" category.

V Independent Variable (Child Dental Health Data)

All child dental health data were acquired as a part of routine patient care in the pediatric dental clinic. Treatment providers in the pediatric dental clinic were blinded to study participation, therefore alleviating any potential bias. Demographic data collected for each child included age, height, and weight at the time of examination. Dental providers were blinded to study participation and performed height and weight measures in the same manner for a dental visit regardless of study participation. The child's body mass index (BMI) was calculated with the standard formula.

VI Data Collection Procedure

During the dental visit, a comprehensive oral examination was conducted that evaluated and identified the child's overall dental health including caries, periodontal health, caries risk, and tooth eruption. The dental providers were blinded to study participation and performed measures in the same manner for a dental visit regardless of study

participation. The child's decayed, missing, and filled teeth (DMFT) for permanent teeth and primary teeth (dmft) were recorded according to the World Health Organization (WHO). The child's decayed, missing, and filled surfaces (DMFS) for permanent teeth and (dmfs) for primary teeth were also documented as a part of the routine examination. Using DMFT, dmft, DMFS, and dmfs provides a depiction of the status of decay present in the study population. The caries risk of the child was determined and recorded according to the age-appropriate American Academy of Pediatric Dentistry (AAPD) Caries Risk Assessment [25]. Patients were diagnosed as low, moderate or high risk based on the AAPD's biological, protective, and clinical findings; these categories were converted to low=0, moderate=1, high=2 for some analyses. In our study, we defined and measured tooth maturation as the number of teeth erupted into the oral cavity.

VII Statistical Analyses

Multiple T-tests were performed to determine differences between exercisers and non-exercisers in child dental health measures. Correlations and regression analyses were also conducted to determine the association and relationships between child tooth development, maternal PA levels, Ca-rich food and PUFA-rich food levels, and maternal education levels in order to find predictors of appropriate tooth eruption. For regression analysis, Model 1 controlled for exercise duration (minutes), dairy summary, and PUFA summary; Model 2 controlled for exercise duration (minutes), cheese consumption, PUFA summary, pre-pregnancy BMI and number of pregnancies; Model 3 controlled for exercise duration, dairy summary, maternal education (years), pre-pregnancy BMI, and the number of pregnancies. The significance level was set *a priori* at 0.05 and SPSS was used for all analyses (SPSS 25.0 Chicago, IL).

Results

We enrolled 89 mother-child pairs. However, seven women had not completed both questionnaires; therefore, we analysed 82 mother-child pairs.

I Maternal and Child Descriptors

Besides maternal pre-pregnancy BMI and exercise volume, there were no significant differences between groups regarding maternal and child descriptors (Table 1).

Table 1: Maternal and child descriptors.

	Control	Exercise	p-value
Maternal			
Age (years)	25.54 ± 6.13	23.03 ± 6.23	0.16
Pre-pregnancy BMI	29.93 ± 8.88	24.78 ± 5.57	0.049
Number of pregnancies†	2 (1,6)	2 (1,4)	0.12
Race/Ethnicity			0.63
Black	37 (56.1%)	7 (43.8%)	
White	16 (24.2%)	6 (37.5%)	
Asian	1 (1.5%)	0 (0%)	
Hispanic/Latin	3 (4.5%)	2 (12.5%)	
Unknown	9 (13.6%)	1 (6.3%)	

Education level			0.88
Less than High School	7 (10.6%)	0 (0%)	
GED/High School	24 (36.4%)	7 (43.8%)	
Some College	7 (10.6%)	5 (31.3%)	
Undergraduate Degree	15 (22.7%)	2 (12.5%)	
Master's Degree	6 (9.1%)	1 (6.3%)	
Unknown	7 (10.6%)	1 (6.3%)	
Exercise Volume (minutes/week)	119.70 ± 34.4	185.00 ± 84.99	0.008
Child			
Age (years)	4.86 ± 1.36	4.47 ± 1.67	0.33
BMI	16.88 ± 3.48	15.70 ± 1.50	0.36

BMI: Body Mass Index, GED: General Education Diploma.

†-due to non-normal distribution, Mann Whitney U test was performed, and results reported as median (minimum, maximum).

II Maternal PUFA-rich and Ca-rich Foods during Pregnancy

Though there were trends of differences between groups regarding calcium-rich and PUFA-rich foods, there were no significant differences

between groups in maternal dietary intake during pregnancy (Table 2). The dairy summary is defined as total maternal consumption of all milk-based animal products including cheese, cream, milk, butter and yogurt.

Table 2: Maternal dietary characteristics.

	Control	Exercise	p-value
Cheese Consumption	3.47 ± 1.27	3.56 ± 1.46	0.80
Whole Milk Consumption	2.34 ± 1.49	2.53 ± 2.00	0.73
Dairy Summary	15.92 ± 4.63	18.00 ± 5.29	0.12
PUFA Summary	5.64 ± 2.40	6.94 ± 3.00	0.07

Dairy Summary: Summative score of calcium rich foods (milk, cheese, other dairy); PUFA Summary: Summative score of PUFA rich foods (PUFA-rich oils, walnuts/almonds, PUFA enriched foods).

III Child Dental Health Measures

There were no significant differences in child dental health measures between groups (Table 3). In (Table 3), mixed surface caries is defined as the combined total of surface caries of primary and permanent teeth, while primary surface caries is defined as the total carious surfaces of the deciduous teeth. Maternal dairy summary, cheese consumption, and PUFA summary during pregnancy were weakly associated with child dental health (Table 4). Maternal education had a negative but a weak association with caries risk (Table 4). Exercise duration and volume were also weakly associated with child dental health measures (Table 4). Having controlled for dairy and PUFA summaries, exercise duration was associated with primary surface decay (Table 5), (95% CI equals 0.015

to 0.077, $p=0.005$); this translates to one tooth with surface decay for every increase in 109 minutes/week during pregnancy. Controlled for exercise duration and PUFA summary, primary tooth count was associated with maternal dairy summary (Table 5), (95% CI equals 0.092 to 0.501, $p=0.005$). When exercise duration, pre-pregnancy BMI, and number of pregnancies were controlled, tooth eruption was associated with PUFA in model 1 (95% CI equals -0.038 to -0.005, $p=0.01$) also model 2 (95% CI equals -0.042 to -0.003, $p=0.03$) and cheese consumption (95% CI equals 0.001 to 0.080, $p=0.04$) during pregnancy (Table 5). After controlling for exercise duration (minutes), dairy summary, pre-pregnancy BMI, and number of pregnancies, child caries risk was significantly associated to maternal education level (Table 5), (95% CI equals -0.144 to -0.016, $p=0.02$).

Table 3: Child dental health measures between groups.

	Control	Exercise	p-value
dmft	2.42 ± 4.74	2.08 ± 4.10	0.82
dmfs	8.10 ± 16.86	7.08 ± 13.60	0.85
DMFT	3.82 ± 4.96	2.92 ± 4.44	0.56
DMFS	45.08 ± 39.17	50.17 ± 39.7	0.68
Mixed Tooth Count	19.98 ± 2.32	20.00 ± 1.65	0.98
Primary Tooth Count	15.98 ± 4.18	15.50 ± 4.19	0.72
Permanent Tooth Count	3.17 ± 9.76	1.42 ± 3.37	0.54
Tooth Eruption	0.97 ± 0.16	1.00 ± 0.00	0.62
Child Dental Age	1.08 ± 0.27	1.00 ± 0.00	0.38
Caries risk	2.00 ± 0.81	2.00 ± 0.71	1.00

dmft: decayed, missing, filled primary teeth; dmfs: decayed, missing, filled surfaces of primary teeth; DMFT: Decayed, Missing, Filled permanent Teeth; DMFS: Decayed, Missing, Filled Surfaces of permanent teeth.

Table 4: Correlations for maternal measures and child dental health.

Maternal Measures	ρ_{pearson}	p-value
Pregnancy Exercise Duration (min)		
Primary Tooth Caries	0.252	0.03
Primary Surface Caries	0.334	0.004
Pregnancy Exercise Volume (MET min/wk)		
Primary Surface Caries	0.286	0.02
Maternal Education		
Caries Risk	-0.264	0.04
Mixed Tooth Count	-0.357	0.02
Dairy Summary		
Mixed Tooth Missing	-0.284	0.02
Mixed DMFS	-0.289	0.01
Mixed Surface Count	0.277	0.02
Mixed Surface Caries	-0.259	0.03
Primary Tooth Count	0.340	0.004
Primary Tooth Missing	-0.276	0.02
Primary Tooth dmft	-0.266	0.02
Primary Surface Count	0.294	0.01
Tooth Eruption	0.295	0.04
Cheese Consumption		
Mixed Tooth Caries	0.238	0.04
Tooth Eruption	0.322	0.02
Mixed Tooth DMFT	0.272	0.02
PUFA Summary		
Pre-Pregnancy BMI	-0.279	0.02
Tooth Eruption	-0.380	0.007

METmin/wk: Metabolic Equivalent burned per minute each week, dmft: decayed, missing, filled primary teeth; DMFS Decayed, Missing, Filled Surfaces of permanent teeth, DMFT: Decayed, Missing, Filled permanent Teeth; BMI: Body Mass Index.

Table 5: Adjusted regression coefficients ($\beta \pm \text{SE}$; 95% confidence intervals) for the effects of exercise duration, dairy and PUFA summaries, and education on child oral health measures.

Model 1	Variable	$B \pm \text{SE}$	95% CI	p-value
Primary Surface Caries	Exercise Duration	0.046 ± 0.016	0.015, 0.077	0.005
Primary Tooth Count	Dairy Summary	0.296 ± 0.102	0.092, 0.501	0.005
Tooth Eruption	PUFA Summary	-0.021 ± 0.008	-0.038, -0.005	0.01
Model 2				
Tooth Eruption	PUFA Summary	-0.220 ± 0.010	-0.042, -0.003	0.03
	Cheese Consumption	0.041 ± 0.019	0.001, 0.080	0.04
Mixed Tooth DMFT	Cheese Consumption	1.409 ± 0.479	0.451, 2.367	0.005
Model 3				
Caries Risk	Education	-0.080 ± 0.032	-0.144, -0.016	0.02

Model 1: Duration, Dairy, PUFA-Tooth eruption, primary tooth count and primary surface caries are significant.

Model 2: Duration, Cheese, PUFA, Pre-Pregnancy BMI and # of pregnancies-Tooth eruption, and Mixed Tooth DMFT are significant.

Model 3: Duration, Dairy, Education, Pre-pregnancy BMI and # of pregnancies-Caries risk assessment is significant.

Discussion

We hypothesized that pregnant women with more formal education, who consumed a diet high in calcium-rich dairy and PUFA-rich foods and were active throughout pregnancy would have children with fewer cavities, lower caries experience and appropriate tooth eruption. Our main findings in this study showed that, i) increased dairy intake during pregnancy correlated to increased primary tooth count, normal tooth eruption, and improved dental measures such as caries risk assessment, ii) increased exercise duration resulted in increased primary tooth decay

and iii) higher maternal education level correlates to decreased prevalence of primary tooth caries for the child.

One of our main findings indicated that dairy intake during pregnancy was associated with increased primary tooth count and appropriate tooth eruption [26]. Since primary tooth formation and mineralization start during fetal development, the intrauterine environment, such as maternal nutritional status, can influence fetal tooth development, formation and mineralization [10]. In regard to tooth eruption, Schroth *et al.* found that maternal vitamin D supplementation, which increases calcium absorption at the gut and adequate calcium concentrations, associated

with eruption time of the first primary tooth, with those not receiving vitamin D during pregnancy having children with later tooth eruption [27].

Although Tanaka *et al.* found that higher maternal intake of cheese during pregnancy was associated with decreased risk of dental caries in children, we did not find a significant association with caries risk. Thus, a maternal diet high in dairy, other calcium-rich foods, and fortified with vitamin D may support normal tooth eruption, number of primary teeth, and decrease caries risk in children after birth. Further, Tanaka *et al.* suggested maternal calcium intake decreasing child caries risk could be due to the effect of calcium on decreasing blood lead levels [10]. In his study of children exposed to lead, Pradeep found the enamel and saliva of all the children have measurable amounts of lead and its level increased with increase in severity of dental caries proving the cariogenic potential of lead. Lead in the enamel and saliva of children is associated with increased dental caries [28]. Although we did not measure lead, lead levels are typically higher in a low SES population, such as in our study; potentially the differences in lead levels may explain the different results between the studies [29, 30]. Another potential reason for null findings in caries risk and calcium intake during pregnancy may be due to our smaller sample size and/or lower overall calcium intake in our low SES population. The influence of maternal dairy intake on child primary tooth development further supports the role of healthcare providers advising proper nutrition, emphasizing adequate calcium intake during pregnancy.

Surprisingly, physical activity for a longer duration during pregnancy was related to increased primary tooth surface caries of children in our study. This analysis suggests that for every increase in 109 minutes of exercise, one tooth will have surface decay. However, the American College of Obstetricians and Gynecologists (ACOG) currently recommends that pregnant women should participate in at least 150 minutes of moderate-intensity exercise on a weekly basis. Potentially women who exercised for longer time periods during pregnancy continued exercising at the same level after birth; therefore, if their physical activity was at least 109 minutes above the recommended level of activity in the postnatal period and dental caries peaks in 2-5-year-olds, then women may have less time available during a critical time in tooth development to practice proper oral hygiene with their children [31]. This further supports the need for anticipatory oral health education during and after pregnancy in a process that involves the whole family.

Higher levels of maternal education were associated with decreased incidence of primary tooth caries. Women who are more educated are more likely to make more informed decisions related to nutrition and oral hygiene for their children. This finding is consistent with other studies that have found an inverse relationship between parental education and caries incidence or risk [32]. Similar to our findings, previous studies have shown that measures of maternal or parental education are inversely related to child caries [33-36]. Although our study does not account for paternal educational achievements, Kato *et al.* suggests maternal factors likely have a greater impact on dental caries prevalence due to mothers providing a proportionally larger degree of childcare and hygiene [33]. Similarly, parents who are more educated are more likely to feed their children healthier food (e.g., less sugar, more fruits, higher fiber) in their diets [37]. Conversely, decreased maternal education is associated with reduced access to health resources, which

detrimentally influences child dental health [38, 39]. Therefore, taking a common risk factor approach to proactive counseling by including education during pregnancy to include more oral health and good dietary practices may be a way to effectively prevent caries in young children [36, 38].

To these points, there is an evidenced-based promising intervention to address these health behaviours during pregnancy which would subsequently promote the oral health of the child. Park and Lee's study found that their Interaction Model of Client Health Behavior (IMCHB)-based Oral Health Programme (OHP) and Walking Exercise Programme (WEP) were effective in improving periodontal disease, physical activity and psychological indicators [40]. These findings are unique; however, there are limitations of this study. There are many maternal and child factors impacting children's oral health such as child's oral hygiene practices and level of parental involvement, child nutrition, and mother's overall oral health status. Although we had a relatively small sample, we had a diverse population that makes these findings more generalizable to the US population, especially the low SES population. Though self-reporting of diet and PA behaviours is subject to bias, our calcium findings are similar to those reported in a Japanese population. Additionally, the PA questionnaire has been validated for up to six years postpartum, since pregnancy is a unique time in a woman's life, the recall is higher during this period of life [41]. Throughout the study, investigators reminded women while they were completing the study on which child the questionnaire was referring to, however, recall bias could possibly play a role in the mothers reporting their health behaviour for the particular child participation in the study if the mothers had more than one pregnancy within the time period being studied or ever. Although dental providers were not calibrated for these measures, they were blinded to study participation and performed measures in the same manner for a dental visit regardless of study participation.

Conclusion

To our knowledge, this study is the first to assess the influence of these health behaviours such as diet, PA during pregnancy in conjunction with mother's educational level on child caries risk and tooth eruption after birth, in a diverse US population of women of low socioeconomic status (SES). We found calcium-rich dairy food consumption during pregnancy is important for primary tooth eruption, thus primary tooth count and appropriate tooth eruption. We also found that excessive duration of exercise during pregnancy was associated with increased surface decay of a child's primary teeth. Lastly, we demonstrate that higher levels of maternal education were associated with decreased caries risk which can indicate a decreased incidence of primary tooth caries. Overall, our findings support the need for healthcare providers to educate women on calcium intake and appropriate levels of exercise during pregnancy, as well as oral hygiene counseling for their child.

Conflicts of Interest

None.

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