

Season of Birth Effects on Early Child Language Development: The Role of Maternal Vitamin Supplementation

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Season-of-birth can affect health outcomes, yet little is known on whether it extends to language skills. Across two studies, we evaluate the impact of season-of-birth on infant language development. First, we collected CDIs of monolingual infants, born throughout the year in the Oslo region, measured at 12 (comprehension and production, $n=448$) and 24 (production, $n=724$) months. We ran beta regressions on vocabulary percentiles, modelling season-of-birth with birth dates in radians (sine and cosine), controlling for maternal education. We found significant effects of season-of-birth on 12-month-olds' production ($\chi^2(2)=7.67$, $p=.022$), October births exhibited larger vocabulary sizes, while April births showed smaller sizes. In a second, preregistered study ([hCps://osf.io/qn97c](https://osf.io/qn97c)), we investigated whether prenatal vitamin supplementation, which protects against vitamin D deficiency and viral aggressions in expecting mothers, influences associations between season-of-birth and language and cognitive skills. We analyzed longitudinal data from the Little in Norway cohort ($n=816$), which included information on vitamin supplementation during pregnancy and language and cognitive skills of infants assessed on the Bayley-III at 6-, 12- and 18-months. We entered latitude of residence in the models, since extreme latitudes coincide with limited sun exposure during winter, potentially translating into reduced vitamin D levels during pregnancy. We tested for the presence of season-of-birth effects on language and cognitive scores, interacting with latitude and child's age. We found a significant main effect of season-of-birth ($p=.019$) for cognitive scores, but not for language scores. Yet, prenatal vitamin supplementation improved the model for expressive language ($p=.010$), with a significant 3-way interaction season-of-birth*latitude*supplementation ($p=0.38$): season-of-birth effects were significantly reduced when using prenatal supplementation. In sum, we provide evidence that the lack of maternal vitamin supplementation during pregnancy translates into season-of-birth effects on infant expressive language, potentially via vitamin D deficiency and/or reduced protection against viral aggressions to the fetus CNS during winter months.