Evaluating associations between age at first birth, parity, and bone mineral density in premenopausal individuals

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Introduction

- Reproduction can have adverse effects on the skeleton (Yüce et al., 2015)
- Adolescent developmental period is essential to the accrual of total bone mineral density (BMD), which helps prevent skeletal degradation later in life (Xue et al., 2020)
- **Evaluate potential associations between age at first birth (AFB), parity, and BMD in premenopausal indiv**
  - Particularly in individuals whose AFB was prior to peak BMD accrual

Methods

- Data from Continuous NHANES 2007, 2009, 2013, and 2017 surveys
- Age of peak BMD accrual at 27 yrs (Rodrick et al., 2024)
- Multivariate linear regressions were performed (R) to understand potential relationships between the variables of interest
- Two-way ANOVA was performed to determine best fit (R)
- For full analysis, see below

Results

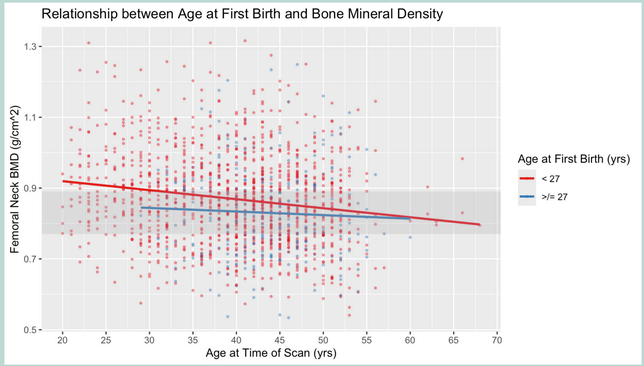

Fig. 1. Relationship between Participant Age at First Birth and Femoral Neck Bone Mineral Density; n = 1510

Fig. 3. Relationship between Parity & Participant Age at First Birth and Femoral Neck Bone Mineral Density; n = 1108

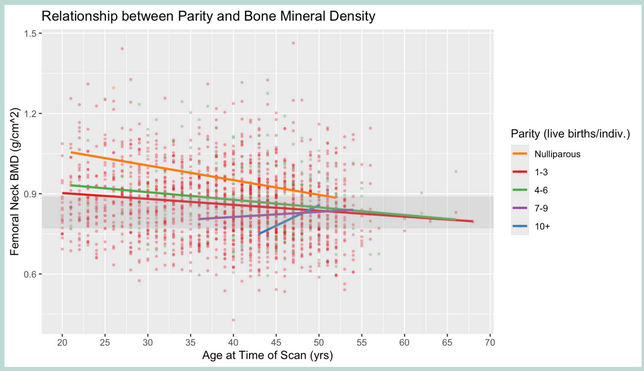

Fig. 2. Relationship between Parity (binned) and Femoral Neck Bone Mineral Density; n = 1964

- Fig. 1 and 2 are controlled for the participant's age at the time of DEXA scan, where all eligible premenopausal participants are represented
- Fig. 3 is contrained to participants ages 35-55 at time of scan, where only eligible premenopausal participants within that range are visually represented
- Grey rectangles in all figures represent the population average femoral neck BMD of individuals aged 20 and over (Looker et al., 1998)

Discussion

- Analyses show **no statistically significant relationships between BMD and AFB and/or parity**
- Evidence suggests a **quicker decrease in BMD prior to menopause in participants whose AFB was < 27 yrs** when compared to those whose AFB was >/= 27 yrs; although, **not statistically significant**
- Analyses also suggest an **inverse relationship** between **parity and BMD** for **nulliparious** and those with **1-6 offspring**, but a **direct relationship** between **parity and BMD** for those with **7+ offspring**; **neither relationship** is **statistically significant**

- Limitations include controlling age at time of data collection and differences in sample size between analysis groups
  - BMD is known to decrease with age after peak BMD; may have been a confounding factor
  - Not all participants had values for all variables of interest

References and Materials

- Yüce, T., Kalafat, E., & Koc, A. (2015). Adolescent pregnancy; a determinant of bone mineral density in peri-menopausal women?. Maturitas, 82(2), 203–207.
- Xue, Shanshan, Oumer Kemal, Meihan Lu, Lisa M. Lix, William D. Leslie, and Shuman Yang. "Age at Attainment of Peak Bone Mineral Density and Its Associated Factors: The National Health and Nutrition Examination Survey 2005–2014." Bone 131 (February 2020): 115163.
- Rodrick, E., & Kindler, J. M. (2024). Bone mass accrual in children. Current opinion in endocrinology, diabetes, and obesity, 31(1), 53–59.
- Looker, A. C., et al., "Updated Data on Proximal Femur Bone Mineral Levels of US Adults." Osteoporosis International 8, no. 5 (August 1, 1998): 468–90.

For complete list of references, scan below

Future Directions

- Study is an **analysis** of **potential associations between young motherhood and BMD prior to menopause**
- Future studies may consider analyzing longitudinal data to reduce indiv effects when modeling, as well as controlling for factors like socioeconomic status, ancestry, BMI, and others

Acknowledgments and Contact

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For more, see below:
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