Association Between Childhood Trauma and Osteoporosis in the United Kingdom: A Retrospective Cohort Study

Yangyang He[1,2*], Karin Wuertz-Kozak [3,4] and Pia-Maria Wippert[1,2]

1. Medical Sociology and Psychobiology, University of Potsdam, Potsdam, Germany
2. Faculty of Health Sciences Brandenburg [joint Faculty of the University of Potsdam, the Brandenburg Medical School Theodor Fontane and the Brandenburg University of Technology Cottbus – Senftenberg], University of Potsdam, Potsdam, Germany
3. Department of Biomedical Engineering, Rochester Institute of Technology, Rochester, NY, USA
4. Schoen Clinic Munich Harlaching, Spine Center, Academic Teaching Hospital and Spine Research Institute of the Paracelsus Medical University Salzburg, Munich, Germany

BACKGROUND

- Bone metabolism is a dynamic process involving continuous remodeling through osteoclastic bone resorption and osteoblastic bone formation[1].
- Emerging research suggests that psychological stress, including early-life stress such as childhood trauma, may also influence bone metabolism via the hypothalamic-pituitary-adrenal axis and autonomic nervous system, which potentially leads to osteoporosis[2-4].
- However, large-scale cohort data on childhood trauma and osteoporosis risk remain scarce.

AIM

- The aim of this study was to examine associations between childhood trauma and osteoporosis risk.

METHODS

- A retrospective cohort analysis was conducted using UK Biobank data. The assessment of childhood trauma was driven by the Childhood Trauma Screener. The diagnostic criteria for osteoporosis are based on ICD-10.
- Cox proportional hazards regression models examined associations (HR [95% CI]) between childhood trauma and osteoporosis risk. Lifestyle factors (smoking status, alcohol intake frequency, body mass index, maternal smoking, physical activity, oily fish intake, and milk intake) were considered in the analysis.
- Additionally, a sensitivity analysis was conducted based on the postmenopausal subcohort to isolate the potential interference of estrogen.

RESULTS

- A total of 163,072 participants with a median follow-up time of 13.7 years were included in this analysis.
- The hazard ratios (HR) for osteoporosis were 1.173 (95% CI:1.099–1.253) for participants with childhood trauma in unadjusted model and 1.224 (95% CI:1.129–1.328) in lifestyle-adjusted model.
- In the postmenopausal cohort (n=52,470), participants with childhood trauma were also associated with increased osteoporosis risk in unadjusted model (HR, 1.107; 95% CI:1.020–1.202) and lifestyle-adjusted model (HR, 1.148; 95% CI:1.036–1.271).

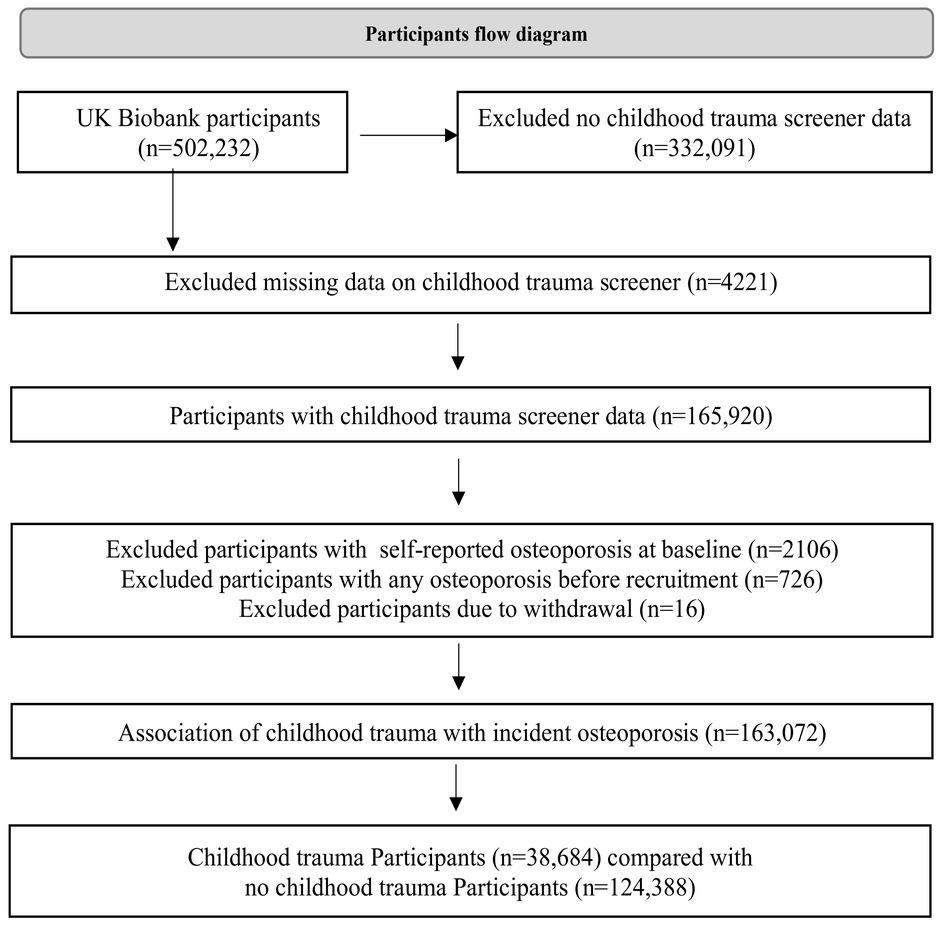

Figure 1. Participants flow diagram

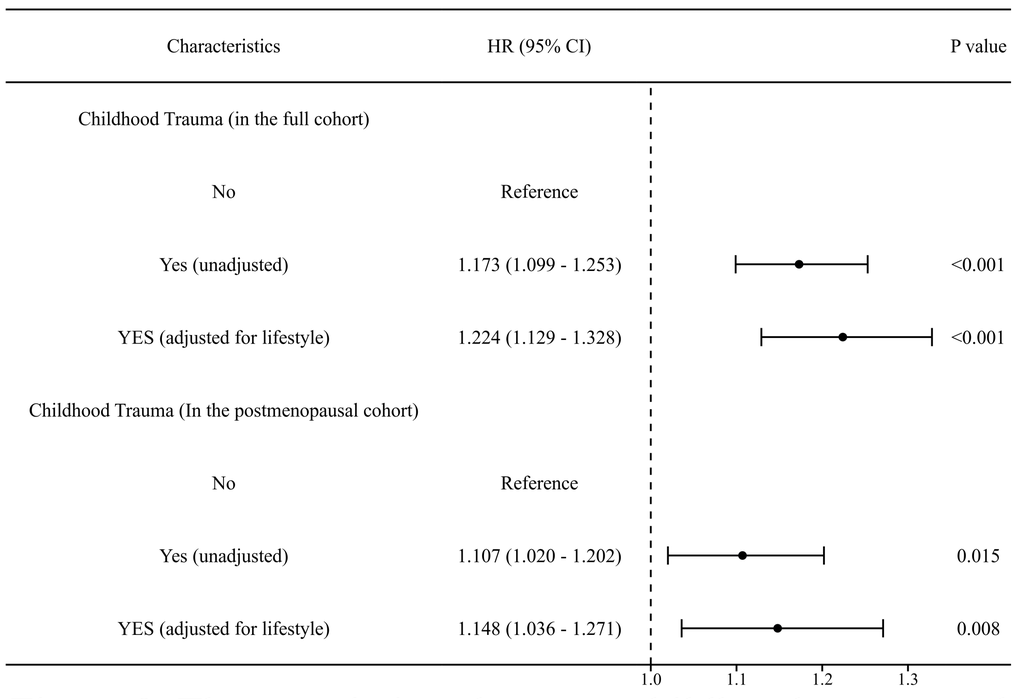

Figure 2. The associations between childhood trauma and osteoporosis risk

CONCLUSIONS

- This study revealed that childhood trauma may associated with an increased risk of osteoporosis in later life. These findings emphasize the importance of early-life stress management in promoting bone health.

REFERENCES

1. Shahi M, Peymani A, Sahmani M. Regulation of bone metabolism. Reports of biochemistry & molecular biology. 2017;5(2):73.
2. Agorastos A, Pervanidou P, Chrousos GP, Baker DG. Developmental Trajectories of Early Life Stress and Trauma: A Narrative Review on Neurobiological Aspects Beyond Stress System Dysregulation. Front Psychiatry. 2019;10:118.
3. Pappalardo XG, Testa G, Pellitteri R, Dell'Albani P, Rodolico M, Pavone V, et al. Early Life Stress (ELS) Effects on Fetal and Adult Bone Development. Children (Basel). 2023;10(1).
4. Wippert PM, Rector M, Kuhn G, Wuertz-Kozak K. Stress and Alterations in Bones: An Interdisciplinary Perspective. Front Endocrinol (Lausanne). 2017;8:96.

*Email: yangyang.he@uni-potsdam.de