

# Association between bone lead levels and aggression in the Birth to Twenty Plus Cohort

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**Background:** Blood lead levels, partly a reflection of recent exposure, have been associated with increased aggression in the youth of South Africa. There are, however, limited studies on health outcomes associated with cumulative lead exposure. The objective of this study was to assess the association between bone lead levels and aggressive behaviour among the youth in Johannesburg, South Africa.

**Methods:** The study was a secondary analysis from the Birth to Twenty Plus Cohort. Bone lead levels were measured using K-Shell X-ray Fluorescence (KXRF). The Buss Perry Aggression questionnaire was administered to quantify aggression as a score. Demographic, socio-economic, and psychosocial characteristics were obtained using a structured questionnaire. Linear regression models were fitted to quantify the association between continuous bone lead levels and the four scales of aggression adjusting for known study confounders. Structural equation modelling (SEM) was used for path analysis to assess direct and indirect pathways in the association between bone lead and aggression.

**Results:** The linear regression models showed that bone lead levels were associated with the aggression score for anger ( $p=0.017$ ), but not associated with physical aggression, verbal aggression and hostility. Nonetheless, the positive coefficient in the multivariable model indicated that an increase in bone lead levels increased the score for aggression. A history of family violence and exposure to crime were found to be significant predictors for aggression. Path analysis showed a significant direct effect between maternal education and bone lead levels ( $p<0.001$ ), where a higher level of maternal education was found to decrease bone lead levels.

**Conclusion:** This study showed that bone lead levels was associated with the aggression score for anger. The findings provide a preliminary overview on the relationship between bone lead concentration and behaviour outcome. This information may be helpful in the drafting of policies designed to combat crime associated with youth aggression in South Africa.