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Lagged effects of income inequality during childhood on adolescent health and well-being

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Frank J. Elgar frank.elgar@mcgill.ca **and Candace Currie** cec53@st-andrews.ac.uk

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Numerous studies have observed that countries with smaller income differences between the rich and poor tend to have better health and fewer social problems. Discussion about this association suggests that income inequality impacts health through both increased anxiety about social status and diminished social and material resources available to support health. Whilst the idea that income inequality could influence population health draws considerable public interest, the existing evidence relies heavily on cross-sectional, ecological studies which involve small samples of countries and use aggregate health measures, making it difficult to establish causal pathways.

This brief[1] summarises a recent analysis that addresses this limitation using a quasi-longitudinal design. This approach allows for a unique investigation of the links between early life exposure to income inequality and subsequent health and well-being in adolescence. It exploits repeated cross-sectional, international surveys of adolescent health and retrospective data linkages to country income inequality.

Health Behaviour in School-aged Children

Health data for the study were collected between 1994 and 2014 in the World Health Organization's collaborative cross-national Health Behaviour in School-aged Children (HBSC) study. The HBSC survey has been carried out every four years in Europe and North America and includes nationally representative samples of 11-, 13-, and 15-year-olds. Its questionnaire measures various aspects of health, including an eight-item scale of psychological and physical health symptoms (ranging from 0 to 32) and life satisfaction (ranging from 0 to 10).

Data from six successive survey cycles were pooled in order to generate a sample of 888,841 adolescents from 180 country/survey year groups. The analysis of life satisfaction included a smaller sample of 678,031 adolescents from 137 country/survey year groups. The data were linked to records on national income inequality, covering the lifespan of HBSC participants back to 1979, which was the birth year of 15-year-olds in the 1994 survey cycle. Income inequality was averaged across two developmental periods in childhood (0-4 years and 5-9 years) to examine how early life exposure to inequality relates to the health and well-being of adolescents.

Study design

Societal growth curve modelling was used in order to combine the data from successive surveys whilst preserving individual-level data, thus allowing the effects age, time, and birth cohort to be identified. Three levels of variance were specified - individual, country, and country/year - with time (years since 1994) entered as a random effect at the country level. Multilevel linear regression was then used to test lagged and contemporaneous associations between income inequality (measured with country Gini indices) and health and well-being.

Findings

The results show evidence of lagged effects of income inequality in childhood (5-9 years) on both health symptoms and life satisfaction in adolescence (11-15 years). The theoretical range of the Gini index of inequality (from 0 to 1) corresponds to a 4.4-point (0.7 SD) increase in adolescent symptoms and 3.6-point (1.9 SD) decrease in adolescent life satisfaction.[2] The associations hold up to numerous controls including concurrent income inequality and gross national income per capita, cohort, time period, and

[1] For further details see Elgar, F.J. and C. Currie (2016). Early-life Exposure to Income Inequality and Adolescent Health and Well-being: Evidence from the Health Behaviour in School-aged Children Study, *Innocenti Working Paper* No.2016-07, UNICEF Office of Research, Florence. [http://www.unicef-irc.org/publications/826/]

[2] SD = Standard deviation.

individual gender, age, and family affluence. Income inequality in infancy (0-4 years) did not relate to symptoms and life satisfaction in adolescence.

Further analyses sought to identify a period of early childhood that was most sensitive to income inequality. The figure below summarises lagged effects of inequality from birth to age 10 on the adolescent outcomes. Lagged effects on health symptoms emerged at age 3, peaked at age 6, and remained significant through to age 10. Lagged effects on life satisfaction emerged at age 6, peaked at age 9, and remained significant through to age 10.

Discussion

Income inequality in childhood relates to self-reported health symptoms and life satisfaction in adolescence. The results establish temporality in the association between inequality and health – a fundamental criterion of causal inference. They also address the scarcity of developmental studies on the structural determinants of adolescent health. Growing up as a young child in a European or North American country with relatively high income inequality relates to increased health symptoms and reduced life satisfaction in adolescence.

The developmental period when inequality most strongly relates to adolescent outcomes coincides with the early school years, as children's social relationships extend from the family to school and community settings. It is also a formative stage of moral development when most children develop an awareness of inequality, fairness, and justice. The results are consistent with psychosocial interpretations of the divisive effects of inequality at a broad social level.

Conclusions

Improving health requires robust evidence on the upstream determinants of health early in life. These findings not only identify negative health consequences of income inequality during childhood, but also suggest that inequality alters formative developmental pathways to health and well-being later in life.

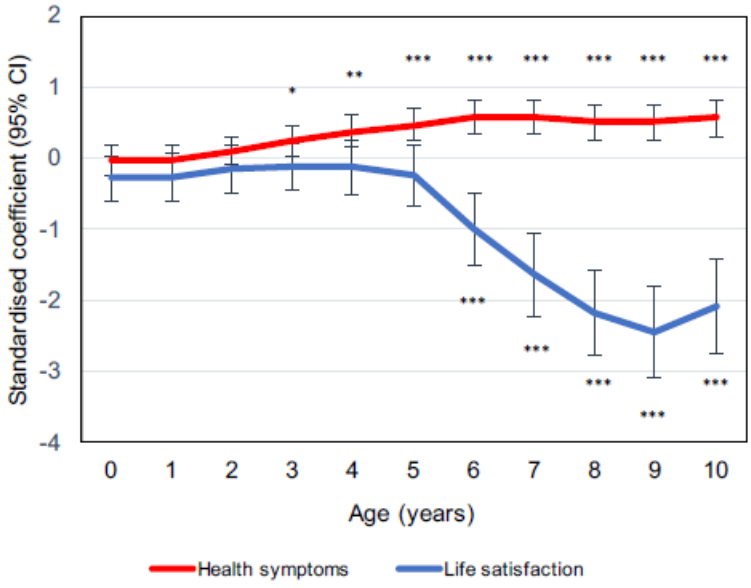

Figure: **Association between early life income inequality and adolescent health symptoms and life satisfaction.**

Shown are standardised coefficients (β) and 95% confidence intervals of lagged effects representing the effects in standard deviation units, adjusted for concurrent income inequality and per capita income, period (year), and individual differences in gender, age, family affluence, and birth cohort. *p<0.05. **p<0.01. ***p<0.001.