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Intergenerational transmission of health inequalities: research agenda for a life course approach to socioeconomic inequalities in health

Tanja A J Houweling ,¹ Ilona Grünberger ²

¹Department of Public Health, Erasmus MC, University Medical Center Rotterdam, Rotterdam, The Netherlands

²Department of Public Health Sciences, Stockholm University, Stockholm, Sweden

Correspondence to

Dr Tanja A J Houweling, Department of Public Health, Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands; a.j.houweling@erasmusmc.nl

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ABSTRACT

Explanations for socioeconomic inequalities in adult health are usually sought in behaviours and environments in adulthood. Yet, there is compelling evidence that the first two decades of life contribute substantially to both adult socioeconomic position (SEP) and adult health. This has implications for explanatory health inequalities research.

We propose an analytical framework to advance research on the intergenerational transmission of health inequalities, that is, on intergenerational transmission of socioeconomic and associated health (dis)advantages at the family level, and its contribution to health inequalities at the population level. The framework distinguishes three transmission pathways: (1) intergenerational transmission of SEP, with effects on offspring health fully mediated by offspring SEP; (2) intergenerational transmission of health problems affecting SEP and (3) intergenerational transmission of both SEP and health, without a causal relationship between offspring adult SEP and health. We describe areas for future research along this framework and discuss the challenges and opportunities to advance this field.

A FRAMEWORK FOR RESEARCH

Traditionally, explanations for socioeconomic inequalities in adult health are sought in behaviours and environments in adulthood.¹ Figure 1 visualises this relationship between adult socioeconomic position (SEP) and adult health. In this framework, SEP is causally related to proximal health determinants, such as smoking, and health outcomes in adulthood; and there is some reverse causation between health (determinants) and SEP (also called ‘selection’).

Yet, from a broad range of disciplines, there is evidence that the early years of life contribute substantially to both adult SEP and adult health. In a companion paper, we have described how socioeconomic and health (dis)advantages are intergenerationally transmitted at the family level, and contribute to the persistence of socioeconomic health inequalities at the population level.² We found evidence that broadly the same mechanisms, in the fetal and postnatal environment, shape both adult SEP and adult health. This has implications for explanatory research on socioeconomic inequalities in health.

Figure 2 provides a framework for studying socioeconomic health inequalities from an intergenerational perspective. The pathways through which

health inequalities are intergenerationally transmitted, can be grouped into three models.

In the first model (socioeconomic transmission, red arrows), the SEP-health link is transmitted across generations as a result of intergenerational transmission of SEP.³ Intergenerational transmission of SEP occurs through (in)direct transfers (eg, of wealth), and via the fetal and postnatal environment—through the influence of parental SEP, parental proximal health determinants and parental health outcomes associated with SEP. As long as offspring adult SEP influences health, there needs to be no direct causal relationship between parental SEP and offspring health (determinants) for health inequalities to be intergenerationally transmitted. In this model, the relationship between parental SEP and offspring health, is fully mediated by offspring SEP. Consequently, statistical adjustment for offspring SEP would lead to severe underestimation of the contribution of intergenerational transmission to adult health inequalities.

In the second model (health transmission, blue arrows), the SEP-health link is transmitted across generations through intergenerational transmission of health problems that affect SEP, such as mental health problems. There is substantial evidence that such parental problems affect child development and well-being, but there is a paucity of evidence about their role in explaining offspring adult health inequalities.

The third model (sociobiological transmission, green arrows) consists of a purely intergenerational causal effect of SEP on adult health. Here, parental SEP influences both offspring SEP and offspring health (determinants), without a causal relationship between offspring adult SEP and health.³ This is sometimes called indirect selection. The fetal environment, the learning and psychosocial environment, and childhood and adolescent socialisation, affect offspring adult SEP and health by influencing child and adolescent cognitive, socialemotional, and physical health and development, and patterns of beliefs, values and behavioural habits.

In practice, SEP and health are causally related within and across generations—their contributions varying with the health outcome studied—such that the three above models reinforce each other. The relative importance of the three models, and how this varies over historical time and across societal contexts, remains largely unknown. Yet, this is crucial information for designing interventions and determining the appropriate timing of policies to reduce health inequalities.⁴



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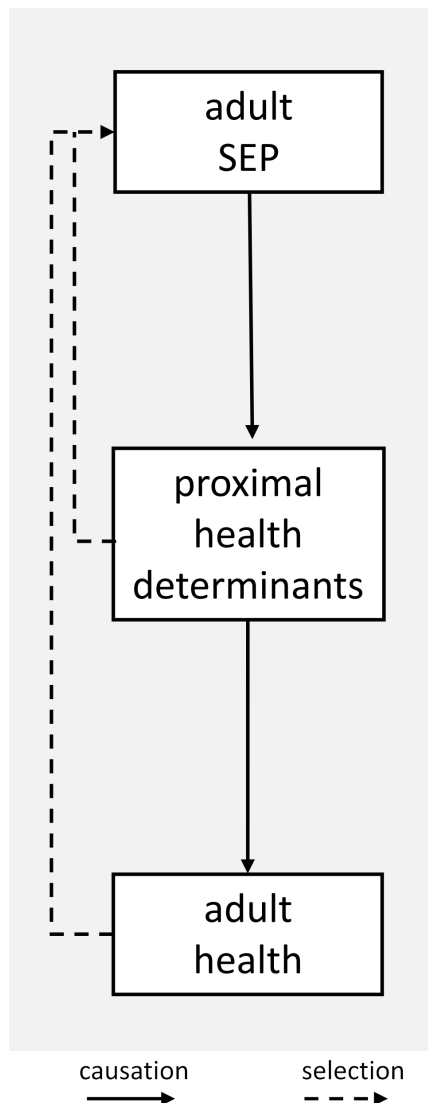


Figure 1 Traditional framework for explaining socioeconomic health inequalities. SEP, socioeconomic position.

Research agenda based on the framework

Our framework can be used as basis for asking relevant questions to advance this field, including questions around how policies and other societal conditions affect the different pathways in this framework.

Intergenerational transmission of SEP

A first set of questions relates to the intergenerational transmission of SEP. What proportion of adult health inequalities is attributable to the effect of parental SEP on offspring SEP? A rough calculation can be analogous to that of population attributable fractions. So, with what percentage would health inequalities reduce if offspring of low SEP parents had the same educational (wealth, income) distribution as offspring of high SEP parents? Next, what is the impact of structural determinants of intergenerational social mobility, for example, social protection policies and education systems, on adult health inequalities? Intergenerational social mobility is larger in some cohorts and countries than in others,⁵ arguably affecting the proportion of health inequalities attributable to intergenerational SEP persistence. This suggests room for policy-making, by ensuring that all children can develop to their full potential, irrespective of parental

SEP. It also suggests the need to better understand these structural factors and their political and historical determinants.

The effect of parental and offspring SEP on offspring health

A second set of questions relates to the effect of parental and offspring SEP on offspring health. Does parental SEP have an independent effect on offspring adult health, that is, not mediated by offspring adult SEP?^{6–8} To what extent is the health effect of offspring adult SEP explained by parental SEP? What is the relative importance of the independent effects of offspring and parental SEP? Three methodological problems complicate answering these questions. The first is intermediate confounding. Important determinants of both offspring SEP and offspring health—including cognitive ability, socioemotional well-being and habits—are strongly influenced by parental SEP. When examining the independent health effects of offspring SEP, these factors, shaped in early life, could be important confounders.⁹ The second problem is mediator-outcome confounding (collider bias). Independent effects of parental and offspring SEP are mostly examined in discordant parent-offspring pairs, that is, in cases of intergenerational upward or downward mobility.^{6–8} But these may be selective groups. Analyses should, therefore, be adjusted for factors influencing both intergenerational mobility and offspring adult health. Third, intergenerational social mobility may have health effects itself, requiring the inclusion of interaction terms between parental SEP and offspring adult SEP. Modern causal mediation analyses can partly address these problems and be used to decompose the effect of parental SEP on offspring health into direct effects, and indirect effects via offspring SEP, even in the presence of interaction.¹⁰ Also, structured approaches to compare life course models have been applied to these questions.^{4 11} Howe *et al* have linked causal mediation analysis to a structured life course approach.³ A next step would be to address intermediate confounding and mediator-outcome confounding in such models.

While the above models and mechanisms could be seen as acting within relatively stable social and policy contexts, another way forward would be through research on the health effects of exogenous changes in parental and offspring adult SEP, for example, income changes due to new social security policies. A possible strategy would be to focus on determinants of adult health that are largely shaped in early life—including cognitive ability, executive functions, social-emotional well-being, habits and beliefs^{12 13}—and examine to which extent these explain adult health inequalities.¹⁴ Such a strategy could also include research on (1) stability of the association between SEP on the one hand, and cognitive ability, executive functions, behavioural habits and beliefs on the other, throughout childhood, adolescence and beyond¹⁵; (2) their contribution to inequalities in health behaviours in adulthood and (3) and their interaction with the environment in both childhood and adulthood (eg, Are changes in school policies affecting children from disadvantaged backgrounds disproportionately? Is a health promoting environment more important for individuals with lower executive functions?)

Intergenerational transmission of health problems associated with SEP

A third set of questions relate to the intergenerational transmission of health problems that are associated with SEP. What is the contribution of parental health problems, such as mental health problems, which affect both parental SEP and their offspring's development and life course outcomes, to the intergenerational transmission of health inequalities? And what is the relative

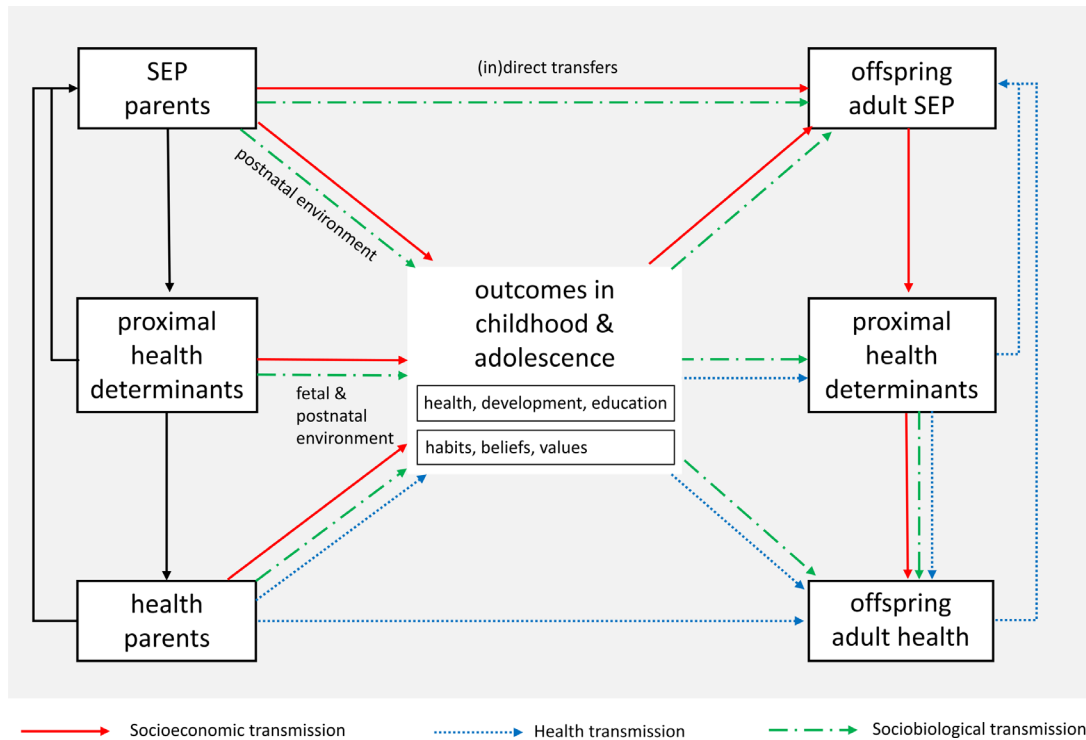


Figure 2 Conceptual framework for the intergenerational transmission of health inequalities. Three models of intergenerational transmission of socioeconomic health inequalities: (1) socioeconomic transmission: intergenerational transmission of SEP, combined with an effect of offspring adult SEP on health; (2) health transmission: intergenerational transmission of parental health problems that affect SEP; (3) sociobiological transmission: parental SEP influences both offspring SEP and offspring health (determinants). SEP, socioeconomic position.

importance of fetal and postnatal environmental pathways to this transmission? A first step would be to describe what proportion of parents with low SEP suffer from such health problems. In social epidemiological research, low SEP tends to be treated as a uniform category.¹⁶ Unpacking this to understand the complex set of problems underlying low SEP, and how these problems cluster and interact, and are transmitted intergenerationally in different societal and policy contexts, is important, also for policy-making.

CONCLUSION

The first two decades of life, from the prenatal period to early adulthood, play an important role in the development of socioeconomic inequalities in adult health and help explain the persistence of these inequalities in welfare states. It is time to give more attention to these early years in research on and policies to tackle adult health inequalities. It is important to recognise that SEP, and many determinants of health and health behaviour, are formed early in life. SEP and health determinants that are shaped in these early years—including cognitive development, executive functions, beliefs and habits—should not be taken as a given. Rather, understanding their development and intergenerational transmission should be squarely rooted within health inequalities research, thereby providing a basis for preventive policies.

Methodological advances and the coming of age of many birth cohorts provide opportunities for empirical research across multiple generations. We have provided a framework to advance this research field. It will require interdisciplinary research to not only understand the complexities of the physiological processes that lead to intergenerational transmission of health inequalities, but also the social complexities that often remain hidden behind

the term ‘SEP’. Importantly, our framework also describes new opportunities for action. There is a lot to be gained.

X Tanja A J Houweling @TanjaHouweling

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ORCID iDs

Tanja A J Houweling <http://orcid.org/0000-0001-6090-4376>

Ilona Grünberger <http://orcid.org/0000-0002-7034-1922>

REFERENCES

- Mackenbach JP. *Health Inequalities: persistence and change in European welfare states*. Oxford: Oxford University Press, 29 August 2019.
- Houweling TAJ, Grünberger I. Intergenerational transmission of health inequalities: towards a life course approach to socioeconomic inequalities in health – a review. *J Epidemiol Community Health* 2024;78:641–9.
- Howe LD, Smith AD, Macdonald-Wallis C, et al. Relationship between mediation analysis and the structured life course approach. *Int J Epidemiol* 2016;45:1280–94.
- Mishra GD, Chiesa F, Goodman A, et al. Socio-economic position over the life course and all-cause, and circulatory diseases mortality at age 50–87 years: results from a Swedish birth cohort. *Eur J Epidemiol* 2013;28:139–47.
- Stuhler J. A review of Intergenerational mobility and its drivers. Luxembourg: Publications Office of the European Union; 2018. Available: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC112247/jrc112247_ec_educational_mobility_report_final.pdf
- Galobardes B, Smith GD, Lynch JW. Systematic review of the influence of childhood socioeconomic circumstances on risk for cardiovascular disease in adulthood. *Ann Epidemiol* 2006;16:91–104.
- Galobardes B, Lynch JW, Smith GD. Is the association between childhood socioeconomic circumstances and cause-specific mortality established? update of a systematic review. *J Epidemiol Community Health* 2008;62:387–90.
- Hossin MZ, Koupil I, Falkstedt D. Early life socioeconomic position and mortality from cardiovascular diseases: an application of causal mediation analysis in the Stockholm public health cohort. *BMJ Open* 2019;9:e026258.
- Loucks EB, Buka SL, Rogers ML, et al. Education and coronary heart disease risk associations may be affected by early-life common prior causes: a propensity matching analysis. *Ann Epidemiol* 2012;22:221–32.
- VanderWeele TJ. A unification of mediation and interaction: a 4-way decomposition. *Epidemiology* 2014;25:749–61.
- Mishra G, Nitsch D, Black S, et al. A structured approach to Modelling the effects of binary exposure variables over the life course. *Int J Epidemiol* 2009;38:528–37.
- Early Child Development Knowledge Network of the Commission on the Social Determinants of Health. *Total environment assessment model for early child development. Evidence report for the World Health Organisation's Commission on the Social Determinants of Health*. Geneva: World Health Organization, 2007. Available: <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=4f74596004bf49362d36ab97e4e7388b9222bf66c>
- Schoon I, Nasim B, Sehmi R, et al. *The impact of early life skills on later outcomes: report for the OECD (Early Childhood Education and Care)*. London: UCL Institute of Education, 2015. Available: https://discovery.ucl.ac.uk/10051902/1/Schoon_2015%20The%20Impact%20of%20Early%20Life%20Skills%20on%20Later%20Outcomes_%20Sept%20fin2015.pdf
- Hemmingson T, v Essen J, Melin B, et al. The association between cognitive ability measured at ages 18–20 and coronary heart disease in middle age among men: a prospective study using the Swedish 1969 conscription cohort. *Soc Sci Med* 2007;65:1410–9.
- Hackman DA, Gallop R, Evans GW, et al. Socioeconomic status and executive function: developmental Trajectories and mediation. *Dev Sci* 2015;18:686–702.
- Galobardes B, Lynch J, Smith GD. Measuring socioeconomic position in health research. *Br Med Bull* 2007;81–82:21–37.