

Grandparents Matter

Multigenerational transmission of health and health behaviors

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Motivation

- Globalization, technological, and cultural advancements contribute to health inequality.
- Health is a key indicator of human capital and economic well-being.
- Health inequalities impact on all socioeconomic statuses.

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What motivates economists to consider health inequalities?

- Health is one of the key indicators of human capital quality (Schultz, 1961).
- Health inequalities lead to increased public spending and wastage of public investments (Maria et al., 2017).
- Family background significantly influences adult human capital (Behrman et al., 1994).



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- Increasing body of research highlights the importance of the intergenerational transmission of health and health behaviors.
- Early life is significant in determining one's health in later years (Almond et al., 2018; Currie, 2009).
- Parental health and health behaviors affect offspring, but the exact mechanisms remain vague.



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- The exact mechanisms of health transmission across generations remain unclear.
- Further exploration needed on the impact of grandparent health on grandchildren.
- This thesis contributes to understanding the mechanisms underlying the transmission of health and health behaviors across generations.



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Multigenerational Health Perspectives: The Role of Grandparents' Influence in Grandchildren's Wellbeing

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Keywords: grandparental investment, intergenerational health, public health policy, multigenerational transmission, demographic

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Chapter I

Social Inequalities in Health

Social Inequalities in Health

- Social inequalities in health: Measurable disparities in health outcomes of individuals and groups due to various socioeconomic factors, indicating moral responsibility towards social justice (Kawachi & Subramanian, 2002).
- Defining health inequalities/disparities includes four elements:
 - Environmental effects
 - Access, utilization, and quality of treatment
 - Health status
 - Measurable health outcomes



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Chapter II

Health Across Generations

Generational Transmission of Health

Key Question: How do health outcomes pass from parents to children and to their grandchildren?

- Beyond just biology, deeply intertwined with socioeconomic factors.
- Research insights:
 - Extensive studies on intergenerational transmission of health outcomes, from parents to children.
 - Emphasis on longevity and anthropometric outcomes.



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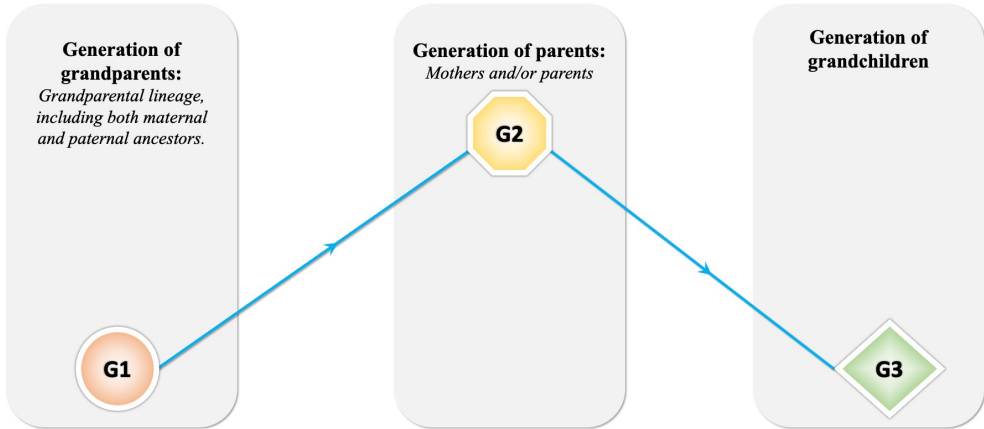


Generational Transmission of Health: *Key Differences*

- Health is transmitted across generations through two primary mechanisms.
 - **Intergenerational:** Direct effects from one generation to the next adjacent generation.
 - **Transgenerational:** Direct effects from one generation on a non-adjacent generation, skipping at least one generation in between.
 - **Multigenerational transmission** refers to effects that span more than two generations without necessarily skipping any.



Generational Transmission of Health: *Intergenerational (Indirect Effects)*

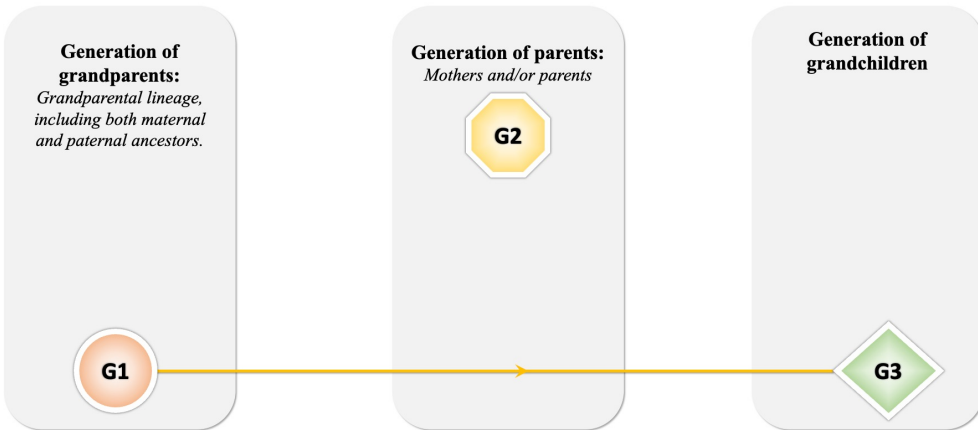


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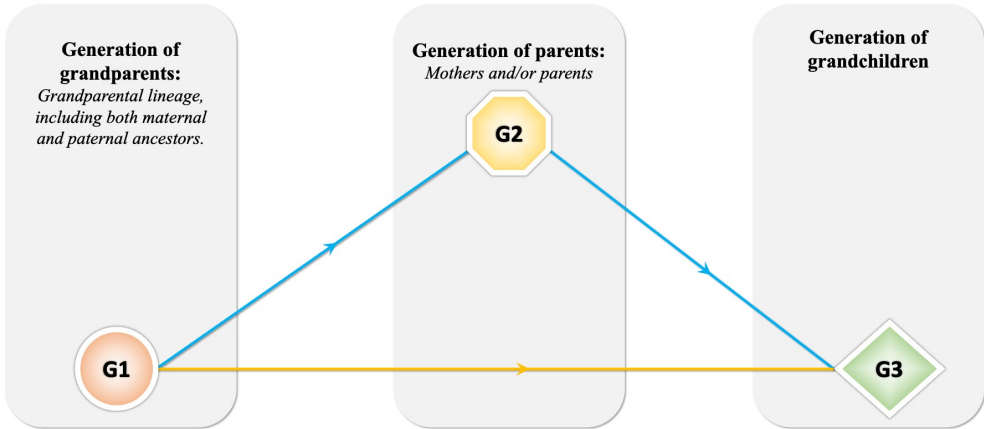


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Generational Transmission of Health: *Multigenerational transmission*



Economic Perspective of Health Status

- Health status is central to human capital and plays a pivotal role in shaping social inequality.
- *Health as Human Capital (Becker, 2007)*
- Grossman's Health Production Function (1972): $H_t = H_{t-1}(1 - \delta) + I_t$.
Key components:
 - H_t : Current health stock.
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 - δ : Health depreciation factors.
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Health Inequality in Norway: *An Intergenerational Perspective*

Despite Norway's reputation as a "welfare state," considerable health inequalities persist (Mackenbach, 2012, 2019).

- Municipalities play a critical role in service provision, with disparities seen across regions (Helgesen et al., 2017; Fosse, 2022).
- Health outcomes, including risks for cardiovascular diseases, differ significantly across different neighborhoods in Tromsø (Tiwari et al., 2022; Sari et al., 2021a).
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Chapter III

Overview of the Thesis

Papers in Thesis

Paper	Title	Year
I	Transgenerational health effects of <i>in utero</i> exposure to economic hardship: Evidence from preindustrial Southern Norway.	2020
II	Role of grandparents in risky health behavior transmission: A study on smoking behavior in Norway.	2023
III	Long-term effects of grandparental child neglect on grandchildren's mental health: A three-generation study.	2023

Health Transmission Across Generations in the Preindustrial Era - Paper I

- Before the Industrial Revolution.
- Before the development of the Norwegian welfare state.

Proactive Public Health Initiatives in Norway and Tobacco Smoking - Paper II

- Norway initiated health efforts in the late 19th century.
- Major health challenges: tobacco smoking, poor diet, alcohol, and inactivity.

Mental Health Problems in the Chronic Disease Era - Paper III

- Noncommunicable diseases dominate the disease landscape in the 21st century.
- Mental health issues can have a lasting impact on one's human capital.



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Paper I

Transgenerational health effects of in utero exposure to economic hardship: Evidence from preindustrial Southern Norway



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Transgenerational health effects of in utero exposure to economic hardship: Evidence from preindustrial Southern Norway

Emre Sari ^{a,*}, Mikko Moilanen ^a, Hilde Leikny Sommerseth ^b^a School of Business and Economics, Faculty of Biosciences Fisheries and Economics, UiT The Arctic University of Norway, Tromsø, Norway^b Department of Archaeology, History, Religious Studies and Theology, Faculty of Humanities Social Sciences and Education, UiT The Arctic University of Norway, Tromsø, Norway

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ABSTRACT

We studied whether *in utero* exposure to economic hardship during a grandmother's pregnancy has a trans-generational effect on her grandchildren's health condition. We used an individual-level three-generation data set covering people born between 1734 and 1840 in the municipality of Rendalen in Norway. We found a culling effect in which grandchildren whose grandmothers gave birth in years of economic hardship lived approximately ten years longer than grandchildren whose mothers were born in years of economic well-being. This impact was only observed among the grandmothers who belong to the lowest social classes. Our results also showed that in higher social classes, economic hardship during a grandmother's pregnancy deteriorated her grandchildren's health by "scarring" the mother's health.

Introduction

What are the underlying mechanisms behind **the transgenerational persistence in health?**

- **Motivation:** Understanding of relationship between economic hardship during pregnancy and grandchildren's health condition.
- **Aim:** To provide a historical overview of health transfer through three consecutive generations, based on the evidence from Rendalen over 1734-1840.
- **Hypothesis:** In this study, we hypothesize two main mechanisms by which economic hardship during the grandmother's pregnancy to her daughter can be associated with a grandchild's life span:
 - Positive culling effect
 - Negative scarring effect through the mother's health condition



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- Only a limited number of studies have addressed how *in utero* exposure to external shock can affect subsequent generations:
 - **Lee (2014)** - the Kwangju uprising in South Korea
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Effect Types

Effect Type	Description
Positive Selection	Fetal mortality tends to eliminate the fetuses that are in poor health (Bruckner & Catalano, 2018). This is often referred to as a culling effect.
Scarring (Negative) Effect	Those who were exposed to exogenous shocks <i>in utero</i> but survived. This is often referred to as a transgenerational scarring effect.

The fetal origins hypothesis coincide with the scarring effect and similarly assume that *in utero* suggest that prenatal exposure to maternal stress can lead to health issues later in life (Bruckner & Catalano, 2018).



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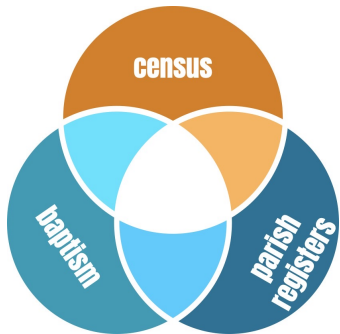
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Data Variable Description and Summary Statistics



The Norwegian Historical Data Centre (NHDC)

The dataset was created by linking the censuses (1801, 1865, 1875, 1900 and 1910), parish registers, baptism and cadastral records (1733-1925).

Three-generation linked dataset that includes 798 children with parents and grandparents.

Data - Economic Hardship

The annual inflation rates (Grytten, 2018) determined in this study help us to define economic hardship over the period under examination.

- Grytten (2018, p. 50) characterizes the period between 1700 and 1820 as “turbulent economy- and inflationary-wise”.
- Our method Qvigstad (2005):
 - No static cutoff point.
 - Used inflation rates beyond interquartile range.
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Data - Variables

- **Dependent variable:** Grandchild's Health: Age at death (proxy for health status).
- **Main explanatory variable:** Economic Hardship: Based on annual inflation rates (1734-1840).
- **Control variables:**
 - Disease environment during pregnancies (Annual Childhood Mortality Rate).
 - Parental Social Class.
 - Mother and Grandchild's Illegitimacy.
 - Smallpox Vaccination Status.
 - Gender.



Method - Structural Equation Model

- Two models were fitted:
 - The first model regresses the mother's health condition on economic hardship during the grandmother's pregnancy (**a-path**).

$$M = i_3 + aX + e_3$$

- The second model regresses the grandchild's health condition on economic hardship during the grandmother's pregnancy (**c'-path**) and the mother's health condition (**b-path**).

$$Y = i_2 + c'X + bM + e_2$$



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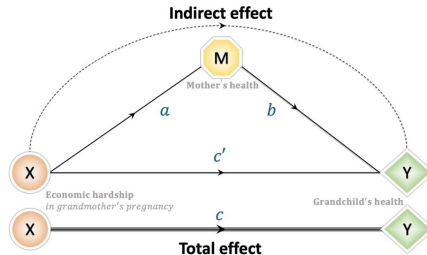


Mediation Analysis

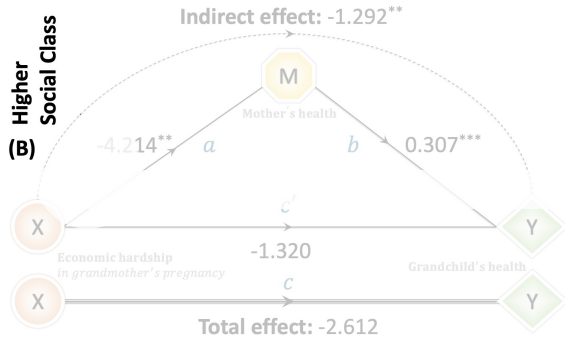
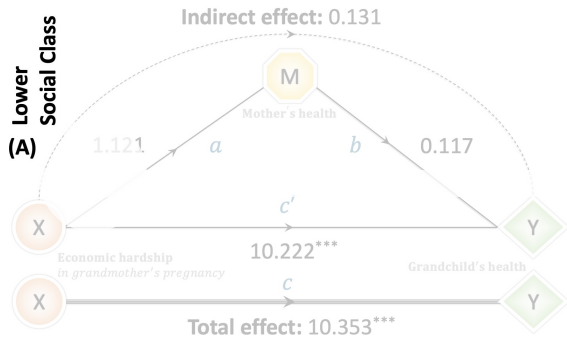
- The product coefficient of ab is a denotation of an average mediation effect. We calculated the total effect by multiplying the **a-path** coefficient by the b-path coefficient and adding the **c'-path** coefficient ($c' + ab$).

$$\text{Indirect effect} = ab$$

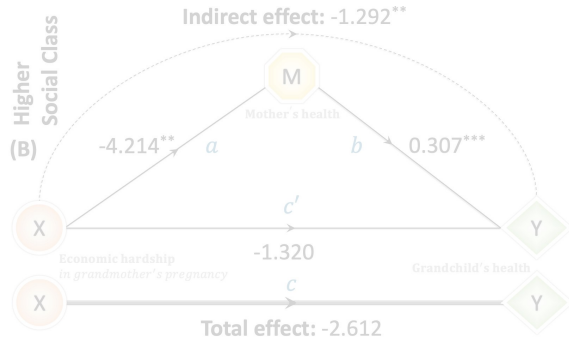
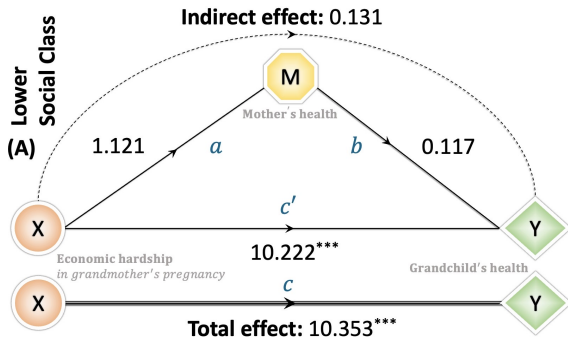
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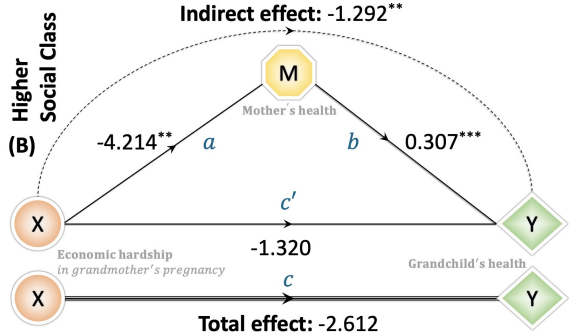
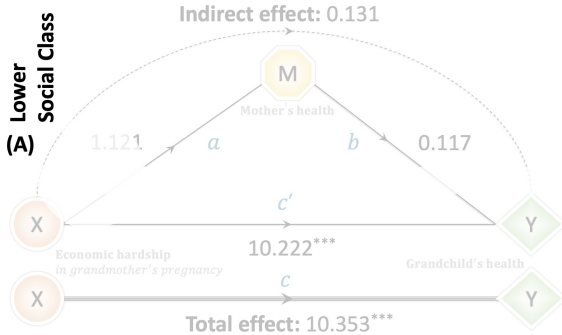
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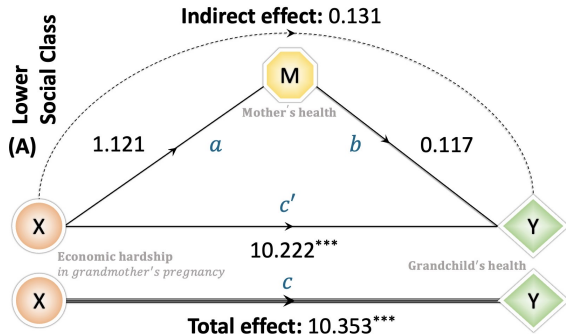
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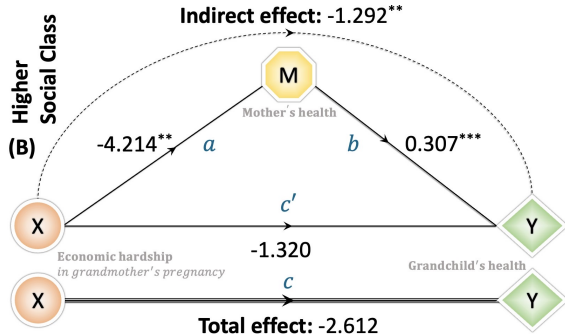
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Positive selection/Culling effect



Negative scaring effect

Discussion

■ Grandchild's Health in Lower Social Class:

- Positive relation with economic hardship during grandmother's pregnancy (Lindeboom et al., 2015).
- Potential explanations: positive selection in birth outcomes or nonbiological consequences (Almond & Currie, 2011; Van Den Ber & Pinger, 2016).

■ Grandchild's Health in Higher Social Class:

- Negative effect of economic hardship during grandmother's pregnancy (Almond et al., 2018; Serpeloni et al., 2017; Classen and Thompson, 2016)

- Mediation models show associations rather than causality. **Coffman2011;**
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Conclusion

- Results give insights into how *in utero* economic hardship influenced consecutive generations' health conditions.
- Future research with broader and more recent data can provide new evidence about the impact of previous generations' environmental exposure on their descendants.



Conclusion

- Results give insights into how *in utero* economic hardship influenced consecutive generations' health conditions.
- Future research with broader and more recent data can provide new evidence about the impact of previous generations' environmental exposure on their descendants.



Paper II

Role of grandparents in risky health behavior transmission: A Study on smoking behavior in Norway



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Role of grandparents in risky health behavior transmission: A study on smoking behavior in Norway

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ABSTRACT

Exploring the role of grandparents in the intergenerational transmission of risky health behaviors, specifically smoking, this study aims to examine the differential influence of maternal and paternal grandparents on their grandchildren's smoking behavior in adulthood. Utilizing the Tromsø Study's unique three-generational dataset from Tromsø, Norway, we employ a control function approach. The findings show a matrilineal bias, revealing that maternal grandparents' smoking behavior has a notable negative direct effect on the probability of their grandchildren's smoking. No such influence is observed in the case of paternal grandparents. Moreover, an indirect transmission of grandparental smoking behavior from grandparents to grandchildren through parents is identified, increasing on grandchildren's smoking probability. These results underscore the necessity of incorporating the influential role of grandparents in crafting public health policies and family-centered interventions

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This study investigates the multigenerational transmission of risky health behaviors, specifically smoking, within the Norwegian context.

- **Motivation:** Literature shows parent-offspring smoking links, but clarity on direct grandparent-offspring connections is missing.
- **Aim:** To investigate whether tobacco smoking is correlated with earlier generations' smoking behavior and, if it is, whether maternal versus paternal grandparents affect grandchildren differently.
- **Hypothesis:** Adult smoking behavior of grandchildren may be directly influenced by their grandparents' past smoking behavior, independent of their parents' smoking behavior.



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Only a limited number of studies have addressed how smoking behavior can affect subsequent generations:

- **Vandewater et al. (2014)** — U.S. - *Indirect effect*
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- **El-Amin et al. (2016)** — Finland - *Indirect effect*
 - Grandparents' smoking habits significantly influence their grandchildren's tobacco use, with this effect being primarily mediated through the parents' smoking behaviors.
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Introduction - Theoretical Foundations

The existing literature mostly focuses on indirect effect and parent-child transmission, with less attention given to the direct influence of grandparents.

- The study is grounded in **Social Learning Theory** and **Health Behavior Models**.
- These theories offer a robust and comprehensive understanding of how observational learning, personal health beliefs, and social norms contribute to the transmission and prevention of smoking behaviors across generations.



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Data - The Tromsø Study

- Conducted from 1974-2016 in 7 waves.
- Covers health-related data of adults in Tromsø. First time establishing family connections.
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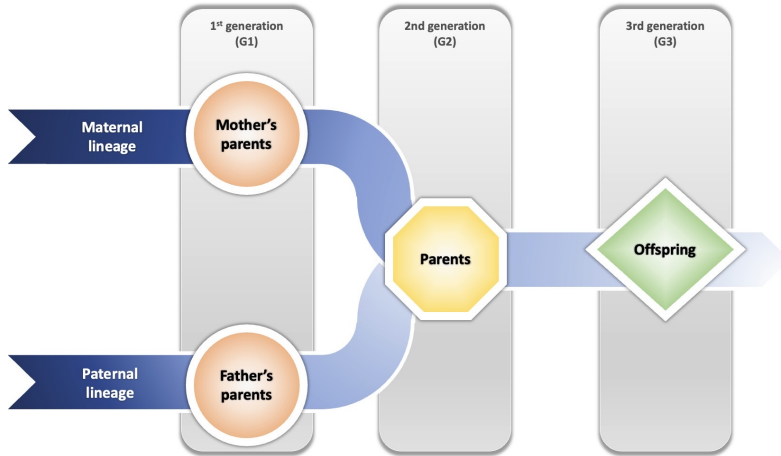


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Data - Variables

Dependent Variable: Smoking Behavior

- G3 Smoking: Whether G3 smokes as an adult (Yes, in 65% of cases for the maternal lineage (subsequent figures for same lineage)).
- G2 Smoking: Whether G2 smoked during the G3's upbringing (Yes, 78%).
- G1 Smoking: Whether G1 smoked during the G2's upbringing (Yes, 65%).

Control Variables: G3 and G2's childhood economic conditions, recent smoking behavior of G2, gender and year of birth of G3.

Instrumental Variables:

- *Z1 - The Consumer Price Index (CPI) for beverages and tobacco*
- *Z2 - The 1964 official statement*

N = 5725 for maternal lineage & 4057 for paternal lineage



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Empirical Methodology

- Utilizing the Control Function (CF) method within a structural equation modeling framework: Distinct models are designed for maternal and paternal G1 smoking patterns.
- Probit regressions with average marginal effects.
- **First Stage:** $P(S_1) = \Phi(Z_1)$
 - Instrument: CPI for beverages/tobacco in G2's birth year. Derived inverse Mills ratio (IMR) for second stage.
- **Second Stage:** $P(S_2) = \Phi(S_1, X, Z_2, \lambda_1)$
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- **Third Stage:** $P(S_3) = \Phi(S_1, S_2, W, \lambda_1, \lambda_2)$
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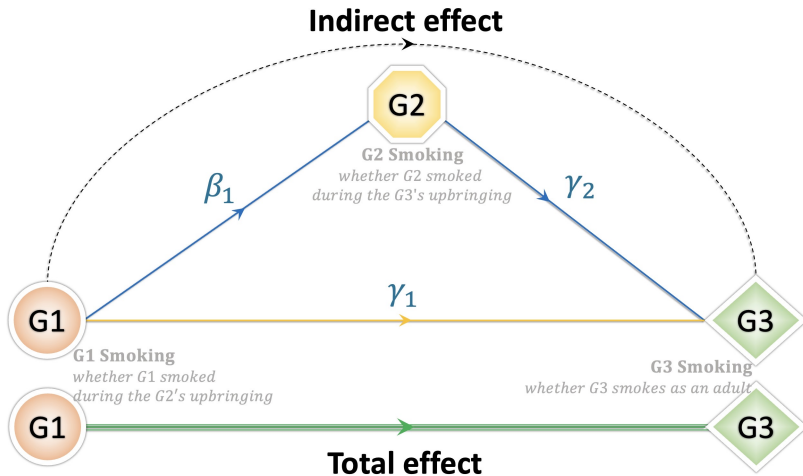


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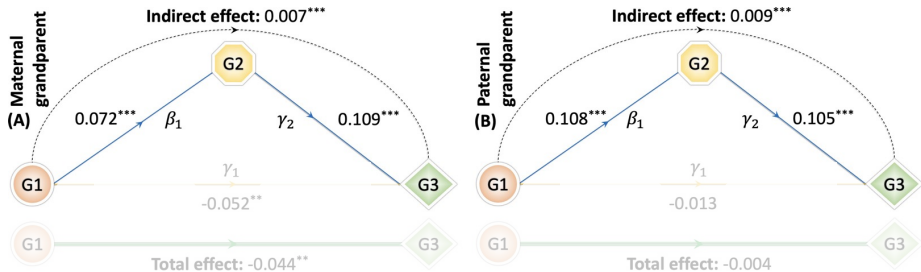
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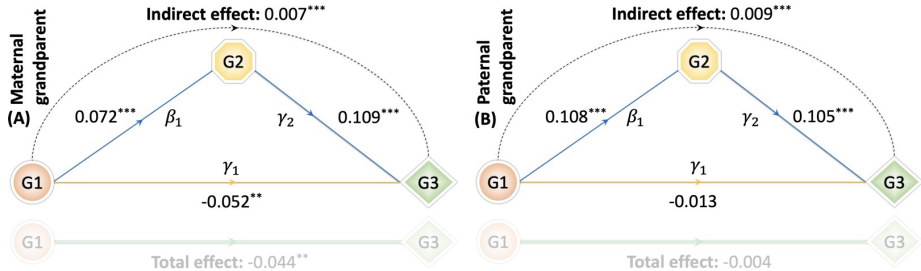
Sobel's Product of Coefficients Approach



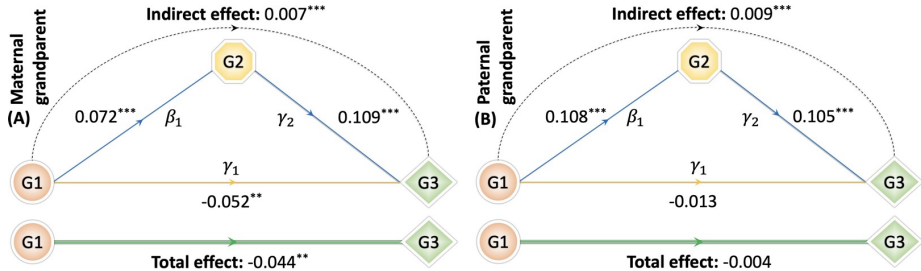
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- Smoking behavior of maternal grandparents has a significant negative direct effect on their offspring.
 - **Notable difference** between maternal and paternal lineage.
- Prior studies (Duarte et al., 2016; El-Amin et al., 2015; Vandewater et al., 2014) only considered indirect influence of grandparents.
- **Social learning theory** and **health belief model** interplay.
- Evolutionary and socio-cultural contexts influence the findings.
- Grandparents play a pivotal role in health behaviors' transmission.



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Discussion - Limitations

- Geographical Specificity:
 - Focused on Northern Norway, Tromsø.
 - Limits the generalizability of findings.
- Cohabitation Data:
 - Data on parents' cohabitation with offspring during childhood.
 - No info on grandparents' cohabitation (Potential influencer of smoking behavior) (Duarte et al., 2016).



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Conclusion

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Paper III

Long-term effects of grandparental child neglect on grandchildren's mental Health: A three-generation study

Long-term Effects of Grandparental Child Neglect on Grandchildren's Mental Health: A Three-Generation Study

By EMRE SARI, MIKKO MOILANEN, AND MAARTEN LINDEBOOM*

Child neglect is a significant social problem with severe consequences for individuals and society. This study explores how intergenerational transmission of grandparental child neglect affects grandchildren's mental health in adulthood. Using a linear probability model, we analyze the nationally representative three-generation individual data set from the Tromsø Study, examining the role of maternal and paternal grandparents and highlighting the multigenerational long-term effects of child neglect. The results suggest that neglectful parenting behavior during a child's upbringing can lead to an increased risk of depression in adulthood. Moreover, our findings show that only maternal grand-

Introduction

- Child neglect is a global issue impacting the mental and physical well-being.
- It not only harms individuals' immediate well-being but also hampers their ability to function as adults.

Child neglect:

- Form of child maltreatment (Fallon et al, 2020; Yang et al., 2018).
- Results from failure to meet basic child needs (Fallon et al, 2020; Yang et al., 2018).
- Intentional or unintentional.
- Impact manifests in adulthood: *depression and anxiety* (Slack et al., 2004)
- In Norway, termed as *omsorgssvikt* (Stoltenborgh et al., 2013)



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Introduction - Research Questions

- This study aims to extend upon current research by considering the impact of maternal and paternal grandparents separately.
- We seek to answer the following questions:
 - ① To what extent does grandparental child neglect in the first generation predict the probability of mental health problems in the third generation?
 - ② Do neglectful maternal and paternal grandparents have differential relations to their grandchildren's mental health?



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Introduction - Intergenerational Transmission

- **Neglectful behavior impacts generations.**
- Intergenerational cycle of violence hypothesis (Alink et al., 2019; Abramovaite et al., 2015).
- Grandparents' neglect may lead to mental issues in grandchildren (Langevin et al., 2023; Widom, 2017).
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Introduction - Understanding the Transmission

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Data

Tromsø7

- First time establishing family connections.
- Two generations: G3 (grandchildren) and G2 (parents). G1 data gathered from G2 responses.

Measures

- **Dependent variable:** Depression in G3.
 - Self-report measures; 29.7% indicated depression.
- **Covariates:** Child neglect, demographic and socioeconomic variables, gender, year of birth, marital status, household income.
 - Household economic status for G3, G2, and G1.



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Empirical Methodology

- Linear probability model with OLS regression.
- Equation: $YG_3 = \beta_0 + \beta_1SG_1 + \beta_2SG_2 + \beta_3SG_1 \times SG_2 + \beta_4C + \epsilon$.
 - SG_1 , SG_2 : Binary variables indicating neglect by G1 and G2. Interaction term: $SG_1 \times SG_2$.
 - β_3 : Measures change in G3 mental health due to combined neglect.
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Results

TABLE 3—RESULTS OF THE EFFECT OF CHILD NEGLECT FROM MATERNAL AND PATERNAL GRANDPARENTS AND PARENTS ON GRANDCHILDREN'S MENTAL HEALTH.

Variables	Dependent variable: <i>Mental health status of G3</i>			
	OLS		Probit (Marginal effects)	
	(1)	(2)	(3)	(4)
G2 Child-neglect	0.249*** (0.075)	0.199*** (0.083)	0.251*** (0.076)	0.201*** (0.084)
Maternal G1 Child-neglect	-0.004 (0.062)	-0.052 (0.065)	-0.009 (0.067)	-0.057 (0.068)
Paternal G1 Child-neglect	0.039 (0.070)	0.042 (0.072)	0.037 (0.073)	0.040 (0.075)
Maternal G1 Child-neglect x G2 Child-neglect		0.379** (0.180)		0.426* (0.222)
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Paternal G1 Child-neglect	0.039 (0.070)	0.042 (0.072)	0.037 (0.073)	0.040 (0.075)
Maternal G1 Child-neglect x G2 Child-neglect		0.379 ^{**} (0.180)		0.426 [*] (0.222)
Paternal G1 Child-neglect x G2 Child-neglect		-0.059 (0.324)		-0.053 (0.293)



Results

TABLE 3—RESULTS OF THE EFFECT OF CHILD NEGLECT FROM MATERNAL AND PATERNAL GRANDPARENTS AND PARENTS ON GRANDCHILDREN'S MENTAL HEALTH.

Variables	Dependent variable: <i>Mental health status of G3</i>			
	OLS		Probit (Marginal effects)	
	(1)	(2)	(3)	(4)
G2 Child-neglect	0.249 ^{***} (0.075)	0.199 ^{***} (0.083)	0.251 ^{***} (0.076)	0.201 ^{***} (0.084)
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Discussion

- Child neglect has severe implications on individual and societal well-being.
- Cumulative effect of childhood maltreatment by both grandparents and parents related to grandchild's mental health.
- Significant contribution in understanding intergenerational transmission mechanisms.
- Evidence supports the additive risk hypothesis, contradicting findings of Islam et al. (2023).
 - Previous research consistent with our findings on intergenerational transmission (Bartlett et al., 2017; Berlin et al., 2011; Madigan et al., 2022).
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Discussion - Limitations

- Reliance on self-reported data.
- Study context limited to Tromsø, Norway.
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Conclusions

- Investigated impact of grandparents on grandchild mental health.
- Risk of grandchild depression increases with neglect from both parents & maternal grandparents.
- Emphasizes need for interventions to halt this cycle.



Discussion

Discussion, conclusion, and further studies

Discussion

- **Health Inequalities in Norway:** Despite its renowned welfare-state, Norway grapples with health inequalities (Mackenbach, 2017, 2019).
- **Depth of Multigenerational Effects:** We observe an entrenched health inheritance beyond just parent-child interactions (Black et al., 2020). This builds upon the findings of (Black et al., 2019; Erten & Keskin, 2020; Halliday et al., 2020; Thompson et al., 2019)
- **Norway's Unique Position:** This thesis offers one of the most exhaustive economic analyses on Norway's multigenerational health effects, positioning Norway as a 'best-case' study model.



Conclusion

- Health outcomes are deeply rooted, arising from an intertwined inheritance of both parents and grandparents.
- Environmental influences over generations can be pivotal in shaping current health scenarios.
- Public health should target early-life interventions, considering both parental and grandparental influences.



Future Directions



Thank you!



References

- Abramovaite, J., Bandyopadhyay, S., & Dixon, L. (2015). Intergenerational Family Abuse: A Focus on Child Maltreatment and Violence and Abuse in Intimate Relationships. *Journal of Interdisciplinary Economics*, 27(2), 160–174. <https://doi.org/10.1177/0260107915582254>
- Aizer, A., Devereux, P., & Salvanes, K. (2022). Grandparents, Moms, or Dads? Why children of teen mothers do worse in life. *The Journal of Human Resources*, 57(6), 2012–2047. <https://doi.org/10.3368/jhr.58.2.1019-10524R2>
- Alink, L. R. A., Cyr, C., & Madigan, S. (2019). The effect of maltreatment experiences on maltreating and dysfunctional parenting: A search for mechanisms. *Development and Psychopathology*, 31, 1–7. <https://doi.org/10.1017/S0954579418001517>
- Almond, D., & Currie, J. (2011). Killing me softly: The fetal origins hypothesis. *Journal of Economic Perspectives*, 25(3), 153–172. <https://doi.org/10.1257/jep.25.3.153>
- Almond, D., Currie, J., & Duque, V. (2018). Childhood circumstances and adult outcomes: Act II. *Journal of Economic Literature*, 56(4), 1360–1446. <https://doi.org/10.1257/jel.20171164>
- Bandura, A. (1973). *Aggression: A social learning analysis*. Prentice-Hall.
- Bartlett, J. D., Kotake, C., Fauth, R., & Easterbrooks, M. A. (2017). Intergenerational transmission of child abuse and neglect: Do maltreatment type, perpetrator, and substantiation status matter? *Child Abuse and Neglect*, 63, 84–94. <https://doi.org/10.1016/j.chiabu.2016.11.021>
- Becker, G. S. (2007). Health as human capital: Synthesis and extensions. *Oxford Economic Papers*, 59(3), 379–410. <https://doi.org/10.1093/oep/gpm020>
- Behrman, J. R., Rosenzweig, M. R., & Taubman, P. (1994). Endowments and the Allocation of Schooling in the Family and in the Marriage Market: The Twins Experiment. *Journal of Political Economy*, 102(6), 1131–1174. <https://doi.org/10.1086/261966>
- Berlin, L. J., Appleyard, K., & Dodge, K. A. (2011). Intergenerational Continuity in Child Maltreatment: Mediating Mechanisms and Implications for Prevention. *Child Development*, 82(1), 162–176. <https://doi.org/10.1111/j.1467-8624.2010.01547.x>
- Black, S. E., Bütikofer, A., Devereux, P. J., & Salvanes, K. G. (2019). This Is Only a Test? Long-Run and Intergenerational Impacts of Prenatal Exposure to Radioactive Fallout. *The Review of Economics and Statistics*, 101(3), 531–546. https://doi.org/10.1162/rest_a_00815



References

- Black, S. E., Devereux, P. J., Lundborg, P., & Majlesi, K. (2020). Poor Little Rich Kids? The Role of Nature versus Nurture in Wealth and Other Economic Outcomes and Behaviours. *Review of Economic Studies*, 87(4), 1683–1725. <https://doi.org/10.1093/restud/rdz038>
- Bruckner, T. A., & Catalano, R. (2018). Selection in utero and population health: Theory and typology of research. *SSM - Population Health*, 5(May), 101–113. <https://doi.org/10.1016/j.ssmph.2018.05.010>
- Case, A., & Paxson, C. (2002). Parental behavior and child health. *Health Affairs*, 21(2), 164–178. <https://doi.org/10.1377/hlthaff.21.2.164>
- Classen, T. J., & Thompson, O. (2016). Genes and the intergenerational transmission of BMI and obesity. *Economics and Human Biology*, 23, 121–133. <https://doi.org/10.1016/j.ehb.2016.08.001>
- Coffman, D. L. (2011). Estimating Causal Effects in Mediation Analysis Using Propensity Scores. *Structural Equation Modeling: A Multidisciplinary Journal*, 18(3), 357–369. <https://doi.org/10.1080/10705511.2011.582001>
- Cook, C. J., Fletcher, J. M., & Forgues, A. (2019). Multigenerational Effects of Early-Life Health Shocks. *Demography*, 56(5), 1855–1874. <https://doi.org/10.1007/s13524-019-00804-3>
- Crocetto, J. (2019). The Unique Contribution of Attachment Theory in Understanding the Role of Nonoffending Fathers in the Care of Children Who Have Been Sexually Abused: A Historical Lens. *Families in Society*, 100(4), 381–391. <https://doi.org/10.1177/1044389419852022>
- Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of Economic Literature*, 47(1), 87–122. <https://doi.org/10.1257/jel.47.1.87>
- Duarte, R., Escario, J. J., & Molina, J. A. (2016). Smoking transmission in-home across three generations. *Journal of Substance Use*, 21(3), 268–272. <https://doi.org/10.3109/14659891.2015.1018970>
- El-Amin, S. E. T., Kinnunen, J. M., Ollila, H., Helminen, M., Alves, J., Lindfors, P., & Rimpelä, A. H. (2015). Transmission of smoking across three generations in Finland. *International Journal of Environmental Research and Public Health*, 13(1), 1–15. <https://doi.org/10.3390/ijerph13010074>
- Erten, B., & Keskin, P. (2020). Breaking the cycle? Education and the intergenerational transmission of violence. *Review of Economics and Statistics*, 102(2), 252–268. https://doi.org/10.1162/rest_a_00824



References

- Fallon, B., Trocme, N., & Wert, M. V. (2020). Child Maltreatment: Neglect. In *Encyclopedia of Quality of Life and Well-Being Research* (pp. 1–5). Cham: Springer International Publishing.
- Fosse, E. (2022). Norwegian policies to reduce social inequalities in health: Developments from 1987 to 2021. *Scandinavian Journal of Public Health, 50*(7), 882–886. <https://doi.org/10.1177/14034948221129685>
- Grossman, M. (1972). On the Concept of Health Capital and the Demand for Health. *The Journal of Political Economy, 80*(2), 223–255.
- Grytten, O. H. (2018). A Continuous Consumer Price Index for Norway 1492–2017. *SSRN Electronic Journal, November*. <https://doi.org/10.2139/ssrn.3292798>
- Halliday, T. J., Mazumder, B., & Wong, A. (2020). The intergenerational transmission of health in the United States: A latent variables analysis. *Health Economics, 29*(3), 367–381. <https://doi.org/10.1002/hec.3988>
- Helgesen, M. K., Fosse, E., & Hagen, S. (2017). Capacity to reduce inequities in health in Norwegian municipalities. *Scandinavian Journal of Public Health, 45*(18_suppl), 77–82. <https://doi.org/10.1177/1403494817709412>
- Islam, S., Jaffee, S. R., & Widom, C. S. (2023). Breaking the Cycle of Intergenerational Childhood Maltreatment: Effects on Offspring Mental Health. *Child Maltreatment, 28*(1), 119–129. <https://doi.org/10.1177/10775595211067205>
- Kaati, G., Bygren, L. O., & Edvinsson, S. (2002). Cardiovascular and diabetes mortality determined by nutrition during parents' and grandparents' slow growth period. *European Journal of Human Genetics, 10*(11), 682–688. <https://doi.org/10.1038/sj.ejhg.5200859>
- Kawachi, I., & Subramanian, S. V. (2002). A glossary for health inequalities. *Journal of Epidemiology & Community Health, 64*7–652. <https://doi.org/10.1136/jech.56.9.647>
- Kong, J., Lee, H., Slack, K. S., & Lee, E. (2021). The moderating role of three-generation households in the intergenerational transmission of violence. *Child Abuse and Neglect, 117*(May), 105117. <https://doi.org/10.1016/j.chiabu.2021.105117>
- Langevin, R., Gagné, M., Brassard, A., & Fernet, M. (2023). Intergenerational Continuity of Child Maltreatment: The Role of Maternal Emotional Dysregulation and Mother–Child Attachment. *Psychology of Violence, 13*(1), 1–12. <https://doi.org/10.1037/vio0000409>

References

- Lee, C. (2014). Intergenerational health consequences of in utero exposure to maternal stress: Evidence from the 1980 Kwangju uprising. *Social Science and Medicine*, 119, 284–291. <https://doi.org/10.1016/j.socscimed.2014.07.001>
- Lindeboom, M., & van Ewijk, R. (2015). Babies of the War: The Effect of War Exposure Early in Life on Mortality Throughout Life. *Biodemography and Social Biology*, 61(2), 167–186. <https://doi.org/10.1080/19485565.2015.1047489>
- Mackenbach, J. P. (2012). The persistence of health inequalities in modern welfare states: The explanation of a paradox. *Social Science and Medicine*, 75(4), 761–769. <https://doi.org/10.1016/j.socscimed.2012.02.031>
- Mackenbach, J. P. (2017). Nordic paradox, Southern miracle, Eastern disaster: Persistence of inequalities in mortality in Europe. *European Journal of Public Health*, 27(Supplement 4), 14–17. <https://doi.org/10.1093/eurpub/ckx160>
- Mackenbach, J. P. (2019). Health inequalities in Europe. How does Norway compare? *Scandinavian Journal of Public Health*, 47(6), 666–671. <https://doi.org/10.1177/1403494819857036>
- Madigan, S., Cyr, C., Eirich, R., Fearon, R. M. P., Ly, A., Rash, C., Poole, J. C., & Alink, L. R. A. (2019). Testing the cycle of maltreatment hypothesis: Meta-analytic evidence of the intergenerational transmission of child maltreatment. *Development and Psychopathology*, 31, 23–51. <https://doi.org/10.1017/S0954579418001700>
- Mare, R. D. (2014). Multigenerational aspects of social stratification: Issues for further research. *Research in Social Stratification and Mobility*, 35(1), 121–128. <https://doi.org/10.1016/j.rssm.2014.01.004>. MULTIGENERATIONAL
- Maria, O., Michelsen, K., Watson, J., Dowdeswell, B., & Brand, H. (2017). Addressing health inequalities by using Structural Funds. A question of opportunities. *Health Policy*, 121(3), 300–306. <https://doi.org/10.1016/j.healthpol.2017.01.001>
- Marshall, C., Langevin, R., & Cabecinha-Alati, S. (2022). Victim-to-Victim Intergenerational Cycles of Child Maltreatment: A Systematic Scoping Review of Theoretical Frameworks. *International Journal of Child and Adolescent Resilience*, 9(1), 1–22. <https://doi.org/10.54488/ijcar.2022.283>
- Naess, O., Stoltenberg, C., Hoff, D. A., Nystad, W., Magnus, P., Tverdal, A., & Smith, G. D. (2013). Cardiovascular mortality in relation to birth weight of children and grandchildren in 500 000 Norwegian families. *European Heart Journal*, 34(44), 3427–3436. <https://doi.org/10.1093/eurheartj/ehs298>



References

- Qvigstad, J. F. (2005). 500 years of price history: Price stability is the norm. What distinguishes the abnormal? In *Norges Bank*. Norges Bank.
- Sari, E. (2021). *Neighbourhood Health Behavior Effects on Body-Mass Index Evidence from The Tromsø Study*.
- Sari, E. (2023). Multigenerational Health Perspectives: The Role of Grandparents' Influence in Grandchildren's Wellbeing. *International Journal of Public Health*, 68, 1606292. <https://doi.org/10.3389/ijph.2023.1606292>
- Sari, E., Moilanen, M., & Lindeboom, M. (2023). Role of Grandparents in Risky Health Behavior Transmission: A Study on Smoking Behavior in Norway. *Social Science & Medicine*, 116339.
- Sari, E., Moilanen, M., & Sommerseth, H. L. (2021). Transgenerational health effects of in utero exposure to economic hardship: Evidence from preindustrial Southern Norway. *Economics & Human Biology*, 43, 101060. <https://doi.org/10.1016/j.ehb.2021.101060>
- Schultz, T. W. (1961). Investment in Human Capital. *The American Economic Review*, 51(1), 1–17.
- Serpeloni, F., Radtke, K., de Assis, S. G., Henning, F., Nätt, D., & Elbert, T. (2017). Grandmaternal stress during pregnancy and DNA methylation of the third generation: An epigenome-wide association study. *Translational Psychiatry*, 7(8), e1202. <https://doi.org/10.1038/tp.2017.153>
- Slack, K. S., Holl, J. L., & Mcdaniel, M. (2004). Understanding the Risks of Child Neglect: An Exploration of Poverty and Parenting Characteristics. *Child Maltreatment*, 9, 395–408. <https://doi.org/10.1177/1077559504269193>
- Song, X., & Mare, R. D. (2019). Shared Lifetimes, Multigenerational Exposure, and Educational Mobility. *Demography*, 56(3), 891–916. <https://doi.org/10.1007/s13524-019-00772-8>
- Stoltenborgh, M., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2013). The neglect of child neglect: A meta-analytic review of the prevalence of neglect. *Social Psychiatry and Psychiatric Epidemiology*, 48(3), 345–355. <https://doi.org/10.1007/s00127-012-0549-y>
- Thompson, K., Lindeboom, M., & Portrait, F. (2019). Adult body height as a mediator between early-life conditions and socio-economic status: The case of the Dutch Potato Famine, 1846–1847. *Economics and Human Biology*, 34, 103–114. <https://doi.org/10.1016/j.ehb.2019.04.006>
- Tiwari, S., Cerin, E., Wilsgaard, T., Løvsletten, O., Njølstad, I., Grimsgaard, S., Hopstock, L. A., Schirmer, H., Rosengren, A., Kristoffersen, K., & Løchen, M. L. (2022). Lifestyle factors as mediators of area-level socio-economic differentials in cardiovascular disease risk factors. The Tromsø Study. *SSM - Population Health*, 19(September). <https://doi.org/10.1016/j.ssmph.2022.101241>

References

- van den Berg, G. J., & Pinger, P. R. (2016). Transgenerational effects of childhood conditions on third generation health and education outcomes. *Economics and Human Biology*, 23, 103–120. <https://doi.org/10.1016/j.ehb.2016.07.001>
- Vandewater, E. A., Park, S. E., Carey, F. R., & Wilkinson, A. V. (2014). Intergenerational transfer of smoking across three generations and forty-five years. *Nicotine and Tobacco Research*, 16(1), 11–17. <https://doi.org/10.1093/ntr/ntt112>
- Widom, C. S. (2017). Long-Term Impact of Childhood Abuse and Neglect on Crime and Violence. *Clinical Psychology: Science and Practice*, 24(2), 186–202. <https://doi.org/10.1111/cpsp.12194>
- World Health Organization. (2017). What are the determinants of health? In *Determinants of health*.
- World Health Organization. (2020). Global status report on preventing violence against children 2020. In *World Health Organization*. <https://apps.who.int/iris/bitstream/handle/10665/332394/9789240004191-eng.pdf%0Ahttps://www.who.int/publications-detail-redirect/9789240004191>
- Yang, X., Lu, X., Wang, L., Chen, S., Li, J., Cao, J., Chen, J., Hao, Y., Li, Y., Zhao, L., Li, H., Liu, D., Wang, L., Lu, F., Shen, C., Yu, L., Wu, X., Zhao, Q., Ji, X., ... Gu, D. (2013). Common variants at 12q24 are associated with drinking behavior in Han Chinese1-3. *American Journal of Clinical Nutrition*, 97(3), 545–551. <https://doi.org/10.3945/ajcn.112.046482>
- Yehuda, R., & Lehrner, A. (2018). Intergenerational transmission of trauma effects: Putative role of epigenetic mechanisms. *World Psychiatry*, 17(3), 243–257. <https://doi.org/10.1002/wps.20568>
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