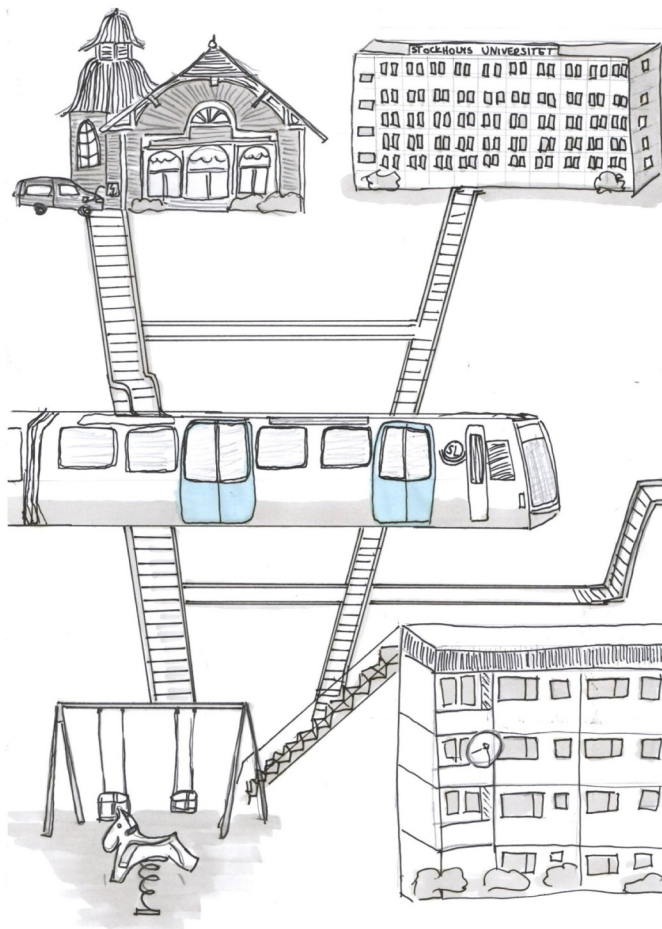


# Perspectives on income and health

Cohort change, intergenerational social mobility, and the role of personal attributes and childhood friends

Klara Gurzo





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## Cohort change, intergenerational social mobility, and the role of personal attributes and childhood friends

**Klara Gurzo**

Academic dissertation for the Degree of Doctor of Philosophy in Public Health Sciences at Stockholm University to be publicly defended on Friday 6 March 2026 at 13.00 in Auditorium 2, Albano House 2, Floor 2, Albanovägen 18.

### Abstract

This thesis examines how income and income mobility shape health over the life course and across generations in Sweden, with particular attention to how historical context, personal attributes, and childhood peer relations structure later-life opportunities and health outcomes. Drawing on nationwide register data and the Stockholm Birth Cohort Multigenerational Study (SBC Multigen), the thesis integrates perspectives from social determinants of health, life course epidemiology, and social mobility research to clarify how socioeconomic advantage and disadvantage are produced, transmitted, and embodied in health. Four empirical studies address complementary questions. **Study 1** compared two Swedish birth cohorts, 1922–1926 and 1951–1955, to assess how income inequalities in cohort temporary life expectancy between ages 50 and 61 changed before and after the establishment of the welfare state. Among men, income-related inequalities increased across cohorts, largely because life expectancy gains stagnated below roughly the 25th percentile of the income distribution, while gains were fairly stable above this point. Studies 2–4 were based on data from the SBC Multigen, comprising 14,608 individuals followed up to age 68. **Study 2** investigated whether childhood friendships can function as self-acquired social capital. Using sixth-grade sociometric data and classroom fixed effects, it found that friendships with classmates from higher-income families were associated with higher adult income and upward mobility, with the strongest associations among children from disadvantaged backgrounds. These patterns persisted after adjustment for parental resources and individual characteristics. Our results suggest that friendships across socioeconomic backgrounds matter beyond shared classroom context and observed selection. **Study 3** evaluated pathways linking childhood economic conditions to all-cause mortality in adulthood. Parental income showed only a modest association with adult mortality, which was substantially attenuated after accounting for cognitive ability and social skills in adolescence and later adult socioeconomic attainment, especially education and income. Intergenerational income mobility was not clearly associated with mortality in this study. **Study 4** examined mental health at ages 52–66, proxied by psychotropic drug dispensation, using diagonal reference models that separate mobility from origin and destination. Intergenerational income mobility was associated with psychotropic drug dispensation among men but not women, with downward mobility linked to higher dispensation and upward mobility to lower dispensation. These results remained robust to extensive confounder adjustment, with similar patterns observed in a national sample. Overall, the thesis shows that income-related health inequalities reflect both intergenerational transmission and intragenerational pathways. Social and historical context, as well as individual attributes, constrain and enable the ability to achieve income mobility and good health. Efforts to reduce these inequalities should address not only adult socioeconomic conditions but also earlier-life social environments and opportunities.

**Keywords:** *Social determinants of health, Life course epidemiology, Intergenerational social mobility, Life expectancy, Mortality, Cohort analysis, Income, Social inequalities, Welfare state, Gender, Mental health, Psychotropic drug use, Friendships, Cognitive ability, Social skills, Sweden.*

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PERSPECTIVES ON INCOME AND HEALTH

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"We learned to desire  
within bounds."

Annie Ernaux



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# Abstract

This thesis examines how income and income mobility shape health over the life course and across generations in Sweden, with particular attention to how historical context, personal attributes, and childhood peer relations structure later-life opportunities and health outcomes. Drawing on nationwide register data and the Stockholm Birth Cohort Multigenerational Study (SBC Multigen), the thesis integrates perspectives from social determinants of health, life course epidemiology, and social mobility research to clarify how socioeconomic advantage and disadvantage are produced, transmitted, and embodied in health.

Four empirical studies address complementary questions. Study 1 compared two Swedish birth cohorts, 1922–1926 and 1951–1955, to assess how income inequalities in cohort temporary life expectancy between ages 50 and 61 changed before and after the establishment of the welfare state. Among men, income-related inequalities increased across cohorts, largely because life expectancy gains stagnated below roughly the 25th percentile of the income distribution, while gains were fairly stable above this point.

Studies 2–4 were based on data from the SBC Multigen, comprising 14,608 individuals followed up to age 68. Study 2 investigated whether childhood friendships can function as self-acquired social capital. Using sixth-grade sociometric data and classroom fixed effects, it found that friendships with classmates from higher-income families were associated with higher adult income and upward mobility, with the strongest associations among children from disadvantaged backgrounds. These patterns persisted after adjustment for parental resources and individual characteristics. Our results suggest that friendships across socioeconomic backgrounds matter beyond shared classroom context and observed selection.

Study 3 evaluated pathways linking childhood economic conditions to all-cause mortality in adulthood. Parental income showed only a modest association with adult mortality, which was substantially attenuated after accounting for cognitive ability and social skills in adolescence and later adult socioeconomic attainment, especially education and income. Intergenerational income mobility was not clearly associated with mortality in this study.

Study 4 examined mental health at ages 52–66, proxied by psychotropic drug dispensation, using diagonal reference models that separate mobility from origin and destination. Intergenerational income mobility was associated

with psychotropic drug dispensation among men but not women, with downward mobility linked to higher dispensation and upward mobility to lower dispensation. These results remained robust to extensive confounder adjustment, with similar patterns observed in a national sample.

Overall, the thesis shows that income-related health inequalities reflect both intergenerational transmission and intragenerational pathways. Social and historical context, as well as individual attributes, constrain and enable the ability to achieve income mobility and good health. Efforts to reduce these inequalities should address not only adult socioeconomic conditions but also earlier-life social environments and opportunities.

# Sammanfattning

Denna avhandling undersöker hur inkomst och inkomströrlighet påverkar hälsan under livsloppet och över generationer i Sverige, med särskilt fokus på hur historiska sammanhang, individuella egenskaper och relationer till jämnåriga under barndomen formar möjligheter och hälsoutfall senare i livet. Genom att använda nationella registerdata och material från ”Född i Stockholm på femtiotalet”-studien integrerar avhandlingen perspektiv från hälsans sociala bestämningsfaktorer, epidemiologi över livsloppet och forskning om social rörlighet för att klargöra hur socioekonomiska för- och nackdelar skapas, överförs och förkroppsligas i hälsan.

Fyra empiriska studier behandlade kompletterande frågor. Studie 1 jämförde två svenska födelsekohorter, 1922–1926 och 1951–1955, för att undersöka förändringar i inkomstjämlighet i återstående livslängd mellan 50 och 61 års ålder före och efter välfärdsstatens framväxt. Bland män ökade inkomstrelaterade ojämlikheter mellan kohorterna, främst eftersom ökningen i förväntad livslängd stagnerade under ungefär den 25:e percentilen av inkomstfördelningen, medan ökningen var relativt stabil över denna nivå.

Studierna 2–4 baserades på data från ”Född i Stockholm på femtiotalet”-studien, som omfattar 14 608 individer med uppföljning upp till 68 års ålder. Studie 2 undersökte om vänskapsrelationer i barndomen kan fungera som självförvärvat socialt kapital. Med hjälp av sociometrisk data från sjätte klass och klassrumsfixerade effekter visade studien att vänskap med klasskamrater från familjer med högre inkomster var kopplat till högre inkomst i vuxen ålder och större uppåtgående social rörlighet, särskilt bland barn från socioekonomiskt svagare bakgrunder. Sambanden även kvarstod efter justering för föräldrarnas resurser och individuella egenskaper. Våra resultat indikerar att vänskapsrelationer mellan individer med olika socioekonomisk bakgrund kan ha betydelse utöver den gemensamma klassrumsmiljön och observerad selektion.

Studie 3 utvärderade mekanismer som länkar samman socioekonomiska förhållanden i barndomen och dödlighet oavsett orsak i vuxen ålder. Föräldrarnas inkomst visade endast ett svagt samband med dödlighet, vilket försvagades avsevärt efter justering för kognitiva förmågor och sociala färdigheter i tonåren samt socioekonomisk position i vuxen ålder, särskilt utbildning och inkomst. Inkomströrlighet över generationerna visade inget tydligt samband med dödlighet i denna studie.

Studie 4 undersökte psykisk hälsa i åldrarna 52–66, mätt genom uttag av psykofarmaka, med hjälp av diagonala referensmodeller som skiljer rörlighet från ursprung och destination. Inkomströrlighet mellan generationerna var associerad med uttag av psykofarmaka bland män men inte bland kvinnor; nedåtgående rörlighet var kopplad till högre uttag och uppåtgående rörlighet till lägre uttag. Resultaten var robusta även efter omfattande justering för stör-faktorer, med liknande mönster observerade i ett nationellt urval.

Sammantaget visar avhandlingen att inkomstrelaterade ojämlikheter i hälsa återspeglar både överföring mellan generationer och processer inom livsloppet. Detta tyder på att insatser för att minska sådana ojämlikheter bör rikta sig inte bara mot vuxnas socioekonomiska förhållanden, utan även mot sociala kontexter och möjligheter tidigt i livet, som formar långsiktiga utvecklingsbanor över generationer.

# List of scientific papers

## Study 1

Gurzo, K., Rehnberg, J., Martikainen, P., & Östergren, O. (2024). One generation apart: Individual income and life expectancy in two Swedish cohorts born before and after the expansion of the welfare state. *Scandinavian Journal of Public Health*, 53(4), 351–358.

## Study 2

Gurzo, K., Östergren, O., Martikainen, P., & Modin, B. (2024). The impact of privileged classroom friends on adult income and income mobility: A study of a Swedish cohort born in 1953. *Social Forces*, 102(3), 1068–1088.

## Study 3

Gurzo, K., Modin, B., Martikainen, P., & Östergren, O. (2022). Pathways from childhood economic conditions to adult mortality in a 1953 Stockholm cohort: The intermediate role of personal attributes and socioeconomic career. *International Journal of Environmental Research and Public Health*, 19(12):7279.

## Study 4

Gurzo, K., Oksuzyan, A., & Modin, B. Intergenerational income mobility and psychotropic drug dispensation: A diagonal reference model approach. *Submitted manuscript*.

# Abbreviations

|                     |   |
|---------------------|---|
| <b>ATC</b>          | Anatomical Therapeutic Chemical (classification system)   |
| <b>CPI</b>          | Consumer Price Index  |
| <b>CTLE</b>         | Cohort temporary life expectancy  |
| <b>DRM</b>          | Diagonal reference model  |
| <b>FOB</b>          | <i>Folk- och bostadsräkning</i> (The Population and Housing Census)   |
| <b>GGC</b>          | Great Gatsby Curve  |
| <b>ICD</b>          | International Classification of Diseases  |
| <b>ISCED</b>        | International Standard Classification of Education  |
| <b>LISA</b>         | <i>Longitudinell Integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier</i> (Longitudinal integrated database for health insurance and labour market studies) |
| <b>OECD</b>         | Organisation for Economic Co-operation and Development  |
| <b>RELINK</b>       | Reproduction of Inequality through Linked Lives Project   |
| <b>RELINK53</b>     | Data material for the RELINK project  |
| <b>SEI</b>          | Swedish Socio-Economic Index  |
| <b>SEK</b>          | Swedish krona   |
| <b>SBC</b>          | Stockholm Birth Cohort  |
| <b>SBC Multigen</b> | Stockholm Birth Cohort Multigenerational Study  |
| <b>SMS</b>          | Stockholm Metropolitan Study  |
| <b>STROBE</b>       | Strengthening the Reporting of Observational Studies in Epidemiology  |
| <b>TPR</b>          | Total Population Register ( <i>Registret över totalbefolkningen</i> )   |
| <b>WHO</b>          | World Health Organization   |
| <b>WMD</b>          | Swedish Work and Mortality Dataset  |

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# Introduction

Socioeconomic positions are not solely achieved by individuals but are shaped, constrained, and sustained through complex interactions between people and the societies they live in. Opportunities to move within the social hierarchy, whether upward or downward, are embedded in broader institutional arrangements and historical conditions. Changes in welfare policies, education systems, or labour markets can alter both social fluidity and the meaning of social positions. Access to these opportunities is not evenly distributed. The extent to which individuals can navigate or adapt to their circumstances depends on the resources available to them or their families, such as economic security or social capital. Early advantages and disadvantages thus provide differing degrees of a buffer against life's uncertainties, shaping not only material conditions but also perceptions of what is possible or expected (Breen & Jonsson, 2005; Bukodi & Goldthorpe, 2018).

Still, these structural and familial influences do not determine life trajectories entirely. Personal characteristics, such as cognitive ability and social skills, can reinforce or disrupt intergenerational patterns of advantage and disadvantage. Outside the family, relationships with peers and friends can provide access to resources and information that extends beyond an individual's immediate socioeconomic environment. These mechanisms operate in all directions: they can enable upward mobility, entrench stability, or contribute to downward mobility, fostering wellbeing in some cases while amplifying vulnerability in others. In each case, they intersect with health both as an outcome of social and economic conditions and as a factor influencing individuals' capacity to act within them (Bartley & Kelly-Irving, 2025; Mackenbach, 2019).

Research on health inequalities consistently demonstrates that socioeconomic position strongly shapes life chances, yet the pathways through which these inequalities unfold are complex and spread across the life course as well as family lineages. Health and socioeconomic position influence one another reciprocally, resulting in the well-documented socioeconomic gradient in morbidity and mortality (Link & Phelan, 1995; Marmot, 2004). This gradient reflects both the direct effects of material resources and the accumulation of advantages and disadvantages over time, shaped by education, labour-market participation, social relationships, and early-life conditions. Understanding health inequalities thus requires attention to how these layers of influence interact and accumulate across generations (Ben-Shlomo & Kuh, 2002).

Sweden provides an illustrative case for studying these dynamics. Despite its long-standing reputation for equality and its early expansion of the welfare state, social disparities in health and longevity persist and, in some respects, have widened (Hederos et al., 2018; Mackenbach et al., 2003). Studies that seek to explain this paradox have often relied on education and occupational class – the most established indicators of socioeconomic position in epidemiology. By contrast, income, although a central dimension of material living conditions, has been less frequently integrated into life-course frameworks, particularly in analyses that follow intergenerational processes and mobility (Barone et al., 2022; Sakamoto & Wang, 2020).

The four studies in this thesis contribute to this literature by examining how income and income mobility relate to health across generations and social contexts. They address inequality from complementary perspectives: cohort differences in income gradients in life expectancy under distinct welfare state conditions, the role of friendships across socioeconomic backgrounds in shaping adult income, life-course pathways linking childhood economic conditions to adult mortality via personal attributes and socioeconomic careers, and gender-specific associations between intergenerational income mobility and mental health in midlife. Jointly, they show how material resources, personal characteristics, and social relationships each play essential and interlinked roles in shaping socioeconomic and health inequalities. They also suggest that while the Swedish welfare state has mitigated absolute deprivation, it has not eliminated the intergenerational reproduction of relative inequality in life chances.

The empirical analyses of this thesis are primarily based on individuals born in 1953 and raised in the greater Stockholm metropolitan area, a cohort that came of age during a period of profound social transformation. The post-war decades were marked by rapid economic growth, the expansion of the welfare state, and the rise of female labour market participation. Individuals born in these years experienced comparatively high levels of intergenerational and income mobility relative to later cohorts (Ahrsjö et al., 2025; Bukodi et al., 2020; Engzell & Mood, 2023). As such, the Stockholm Multigenerational Study provides unique data materials for studying how structural opportunities, familial resources, and personal characteristics contribute to the production and maintenance of social and health inequalities in a society that has long aspired to social justice and equality.

# Background

## Health inequality, the gradient, and social determinants

In public health research, the concept of health inequalities refers to systematic differences in health outcomes between groups within a population. Such differences can be observed across multiple social dimensions, including gender, ethnicity, geography, and socioeconomic position (Graham, 2007). Socioeconomic differences are particularly well documented. On average, individuals with higher socioeconomic position experience better health and longer life expectancy (Bartley & Kelly-Irving, 2025; Marmot, 2004). Although not all health differences are necessarily avoidable or unjust, in public health the term health inequalities typically refers to socially produced and unfair disparities that could be reduced through policy and collective action (Krieger, 2011; Marmot, 2015).

A particular manifestation of these inequalities is the health gradient, which describes the graded relationship between socioeconomic position and health. The gradient shows that health outcomes not only differ between the most and least advantaged but follow a continuous pattern across the entire social hierarchy: at each step down in education, income, or occupational class, health tends to be worse and mortality higher (Adler et al., 1994; Marmot et al., 1984, 1991). This pattern underscores that health inequalities are not confined to marginal groups but affect the whole population.

Both health inequalities in general and the health gradient in particular are generated by what has come to be known as the social determinants of health. According to the World Health Organization (WHO), these determinants encompass the conditions in which people are born, grow, live, work, and age, and are shaped by the broader distribution of power, resources, and opportunities (Commission on Social Determinants of Health, 2008). They include material conditions, such as housing, nutrition, and working environments; psychosocial influences, such as stress and social support; and cultural-behavioural factors, such as lifestyle and health-related behaviours.

The unequal distribution of these determinants is a key factor in why health outcomes differ systematically between groups and why these differences form a gradient across the socioeconomic hierarchy. Together, the concepts of health inequalities, the health gradient, and the social determinants of health

provide a conceptual foundation for analysing how social structures and conditions shape population health and why systematic health differences persist across societies.

## Mechanisms underlying the health gradient

### **Health selection and indirect selection**

Several explanations have been developed to account for the health gradient. Health selection theory proposes that health itself influences social mobility: good health facilitates educational achievement and occupational success, while poor health limits opportunities and may lead to downward mobility (Mackenbach, 2019; West, 1991). Indirect selection points to stable traits such as cognitive ability, social skills, and personality that affect both health and socioeconomic position. These traits may be shaped by genetic predispositions and childhood health, but their effects extend into adulthood and influence long-term outcomes.

### **Social causation**

In contrast, social causation explanations emphasise that health is shaped by a broad set of social determinants. These include both structural conditions, such as political and economic arrangements, as well as more proximate factors linked to social position, including material resources, psychosocial experiences, and cultural-behavioural influences (Bartley & Kelly-Irving, 2025; Mackenbach, 2019; Maggi et al., 2010).

The material perspective highlights the unequal access to housing, nutrition, and safe work (Lynch et al., 2000; Townsend et al., 1986). The psychosocial perspective underscores the stress associated with low status, social comparison, discrimination, and lack of control (Lynch et al., 1997; Marmot et al., 1978; Pickett & Wilkinson, 2015). The cultural-behavioural pathway, finally, operates through socio-culturally defined norms and values that manifest in individuals' lifestyle, habits, social networks, and health-related behaviours (Cavelaars et al., 2000; Stringhini et al., 2010).

Broader macro-level perspectives, such as political economy models, highlight how political and economic power relations structure living conditions and thereby influence health (Doyal & Pennell, 1979; Krieger, 2005; Navarro & Shi, 2001). One example of such a perspective is Pickett and Wilkinson's (2015) framework, often described as the psychosocial model, which argues that the magnitude of income inequality affects population health through pathways such as social comparison and status-related stress, as these individual experiences accumulate to erode social cohesion and trust at the societal level.

## **Life course epidemiological approaches**

Life course perspectives integrate the above-mentioned mechanisms and pathways to health inequality, distinguishing between the processes through which exposures exert their effects and the specific trajectories those effects follow over time, with attention to timing, duration, and accumulation (Ben-Shlomo et al., 2014). Conventional life course research identifies three main models regarding the timing and accumulation of exposures: critical and sensitive period, accumulation, and the chain-of-risk models (Kuh et al., 2003). Glymour, Avendano, and Kawachi (2014) frame these models as ways of understanding how social exposures, including socioeconomic disadvantage, become biologically embedded and shape health outcomes over the long term. The critical period model claims that exposure during a specific window of development has lasting and often irreversible effects, whereas the sensitive period model allows for later modification, though exposures remain especially influential during certain stages. The accumulation model posits that repeated or prolonged exposures across the life course combine to exert a cumulative adverse effect on health. Finally, the trajectory, or chain-of-risk, model emphasises how disadvantage at one life stage increases the likelihood of subsequent exposures, thereby elevating the risk of poor health later in life.

## **Integrative frameworks of health inequality**

Many conceptual models have been developed to integrate the diverse mechanisms underlying health inequalities. Among the most influential are Dahlgren and Whitehead's (1991) "rainbow model" and the WHO Commission on Social Determinants of Health framework (2008). These models illustrate how health is shaped by multiple levels of influence, from broad socioeconomic and environmental conditions, through living and working environments and social networks, to individual lifestyle factors and health-related behaviours. Income plays a central role across these frameworks. It shapes material conditions, constrains or enables health-related behaviours, and contributes to psychosocial stress. By combining material, psychosocial, and cultural-behavioural pathways, integrative models emphasise the complexity and multi-layered nature of health inequalities.

However, while these frameworks aim to bridge competing explanations, they do not resolve the ongoing debate between selection and causation. The debate is also reflected in how scholars frame the available explanations. Mackenbach (2019), for instance, conceptualises explanations of health inequalities along a continuum, ranging from relatively benign accounts such as health selection to more conflictual perspectives emphasising structural causation. Bartley and Kelly-Irving (2025), by comparison, frame this contrast in terms of explanatory focus: selection theories highlight individual attributes, while political economy perspectives underscore structural constraints. In

Mackenbach’s view, selection mechanisms deflect blame by attributing inequalities to individual differences in health, whereas Bartley and Kelly-Irving argue that such perspectives implicitly place responsibility on the individual. In contrast, structural accounts direct attention to institutions and social structures, underscoring the need for systemic, policy-driven solutions.

### **Empirical patterns and design sensitivities**

Observational studies often highlight the importance of social causation, whereas causal studies more frequently find evidence of selection. This asymmetry partly reflects methodological differences. First, health shocks are by definition exogenous events, whereas attained socioeconomic position is rarely exogenous. Second, health in childhood necessarily precedes adult socioeconomic position, which makes evidence of selection easier to identify than evidence of causation. Observational studies across contexts consistently reveal robust social gradients in health (Claussen et al., 2003; Elstad, 2001; Van De Mheen et al., 1998), with more recent evidence pointing to persistent or widening inequalities in mortality (Decoster et al., 2021; Hagen et al., 2025; Rehnberg et al., 2022). Experimental and quasi-experimental designs, however, often find smaller effects of education or income on health compared to observational studies (Albouy & Lequien, 2009; Cesarini et al., 2016; Clark & Royer, 2013; Snyder & Evans, 2006), suggesting that selection or confounding plays some role.

Finally, genetic studies offer tools to address potential confounding by inherited liabilities when studying links between socioeconomic indicators and health. If genetic predisposition to ill health is more prevalent in lower socioeconomic groups, it can confound observed associations because genotype temporally precedes a person’s socioeconomic position (Federation of Academies of Sciences and Humanities, 2021). Polygenic approaches and related designs have documented links between genetic variation, education, and socioeconomic position (Krapohl & Plomin, 2016; Okbay et al., 2016). However, interpretation remains contested due to the complexity of gene–environment interplay and methodological challenges such as population stratification, assortative mating, and dynastic effects (Davies et al., 2018b; Koellinger & Harden, 2018).

## **The role of social mobility in shaping health inequalities**

### **Social mobility**

Social mobility describes the movement of individuals up or down the social hierarchy. This can occur within a person’s lifetime, known as intragenerational mobility, or across generations, from parents to their children, referred to as intergenerational mobility. Social mobility can arise from structural changes, such as occupational restructuring or educational expansion, which

create new opportunities for large groups, a process known as *absolute mobility*. By contrast, *relative mobility* (or social fluidity) refers to mobility net of these structural changes (Erikson & Goldthorpe, 1992; Featherman et al., 1975). Intergenerational mobility is commonly used as an indicator of equality of opportunity, reflecting the extent to which individuals' socioeconomic outcomes depend on their parents' socioeconomic position (Breen & Jonsson, 2005). Cross-nationally, this dimension of opportunity is often discussed alongside inequality of outcomes, typically measured by income inequality. The Great Gatsby Curve (GGC) illustrates an empirical association whereby countries with higher income inequality tend to exhibit lower intergenerational mobility. Evidence for this pattern is strongest in Northern Europe and the Anglo-Saxon countries, while findings are more mixed in Southern Europe (Blanden, 2013; Breen & Muller, 2020; Durlauf et al., 2022).

### **Social mobility and health inequalities**

The relationship between social mobility and health inequalities is more contested and leads us back to theories about the origins of health inequalities. According to the health selection perspective, individuals in good health are more likely to experience upward mobility, while those in poorer health face a higher risk of downward mobility (Blane et al., 1993; Illsley, 1986; Stern, 1983). Stern (1983) argued that health-selective mobility could amplify health inequalities: those who climb the social ladder would be healthier than both their class of origin and their new class, while those moving downward would be less healthy than either group. Evidence supporting this idea comes from studies showing, for example, that women from manual backgrounds who married men in higher occupational classes gave birth to healthier infants than women who married within their class, or even those who themselves originated from higher-class families (Illsley 1986, 1988).

In contrast, the social causation approach argues that the health of mobile individuals is influenced by social origin and destination and therefore will not necessarily increase existing health inequalities. Empirical studies have often found that the health of movers, both upward and downward, typically falls between the averages of their origin and destination classes. As a result, mobility functions as a “gradient constraint” and can dilute overall health inequalities (Bartley & Plewis, 1997, 2007; Elstad, 2001; Elstad & Krokstad, 2003; Manor et al., 2003). Social mobility has even been proposed as a policy tool to reduce health inequalities (Bartley & Plewis, 2007). According to this argument, the observation that health inequalities widened as intergenerational income mobility rates declined between the 1958 and 1970 British birth cohorts also supports this interpretation (Blanden et al., 2007). Later studies provided a more nuanced picture of the potential equalising effect of social mobility and emphasised the context in which social mobility occurs. Elstad (2001) proposed that mobility could reduce health inequalities in societies

with substantial pre-existing health inequalities, a high degree of social mobility, and where the association between health and mobility is weak, suggesting that social causation outweighs selection. He also stressed the importance of analysing both those entering and those leaving social positions. Claussen et al. (2005) found that social mobility was independently associated with mortality, suggesting that it can either constrain or amplify health inequalities. They concluded that both health selection and social causation are involved in the mobility–health inequality relationship, potentially operating in opposite directions and partly counterbalancing one another. Boyle, Norman, and Popham (2009) argued that while movers generally show intermediate health, consistent with the gradient-constraint model, overall class differences persist once the size of outgoer and incomer groups is considered. Extending this reasoning to geographical mobility (deprivation mobility), they showed that inequalities can widen, as healthier people tend to leave deprived areas, concentrating disadvantage among those who remain. In conclusion, mobility may contribute to health inequalities not only through individual health selection but also through the selective redistribution of health across social positions and places.

### **Methodological challenges and recent perspectives**

During the 2010s, the debate slowed due to serious methodological constraints in measuring the association between social mobility and health inequalities. Measuring the independent effect of social mobility is notoriously difficult, as holding both origin and destination constant renders mobility statistically unidentifiable, the counterfactual of “what would have happened without moving” is unobservable, and results are highly sensitive to measurement choices and social context (Wei & Xie, 2022). Recent syntheses (e.g., Mackenbach 2019) emphasise that social mobility mainly functions as a mechanism contributing to the persistence of health inequalities through compositional effects, reinforcing the clustering of health advantages and disadvantages. Extending this discussion, Wei and Xie (2022) argue that individual-level analyses may underestimate the influence of mobility and highlight the need to shift focus to the societal level by examining different mobility regimes and modelling their implications for population health. In short, whether and how social mobility contributes to health inequalities is complex and context-dependent, and the interpretation of these patterns is closely linked to the debate between health selection and social causation.

# Income

## Income in social mobility and health research

Education, occupation, and income are the three most common indicators of socioeconomic position in health research. Education is most frequently used in epidemiology (Galobardes et al., 2006), while occupational class has long dominated studies of social mobility (Barone et al., 2022; Sakamoto & Wang, 2020). This thesis, however, considers income as the primary indicator of socioeconomic position. In what follows, the advantages and limitations of education and occupational class are discussed, before turning to the rationale for focusing on income and income mobility.

## Education

There are strong reasons to consider education a fundamental determinant of health. Education is usually completed relatively early in life and is thus less affected by reverse causality from adult health problems. It provides skills, knowledge, and social networks that foster learned effectiveness, the capacity to make informed choices, and to exercise control over one's life (Mirowsky & Ross, 2005). Education also enables individuals to accumulate resources over time through structural amplification. Evidence from natural experiments, such as compulsory schooling reforms, indicates that additional years of education can improve some health outcomes, though the effects are generally smaller than suggested by observational associations (Davies et al., 2018a; Galama et al., 2018; Kawachi et al., 2010).

At the same time, education has important limitations as a measure of social position, as its meaning is highly context-dependent. For example, leaving school at age 16 in mid-20th-century Europe signified a very different social position than it does today or in low-income settings (Graham, 2007). Moreover, educational attainment is strongly shaped by childhood family background, and thus partly serves as a proxy for early-life (dis)advantage rather than a pure measure of individual achievement (Conti et al., 2010). Despite this, education is often treated as an indicator of individual "merit," a practice that risks obscuring the structural conditions that shape educational opportunities (Bartley & Kelly-Irving, 2025). This problem is compounded in many high-income countries by rapid educational expansion, which has reduced variation in attainment and thereby limited its ability to capture underlying socioeconomic differences (Bartley & Kelly-Irving, 2025).

## Occupation

Occupation is another central socioeconomic position indicator, capturing relations of power and control in the labour market and reflecting the prestige and social standing attached to different jobs. Occupation is valuable because

it positions individuals, and their families, within the social hierarchy (Graham, 2007). It also reflects crucial aspects of working life, including income, job security, physical hazards, and psychosocial characteristics such as autonomy and job strain (Lahelma et al., 2004). Research consistently documents an inverse relationship between occupational class and risks of chronic disease, disability, and mortality (Clougherty et al., 2010), inequalities that persist in Swedish society today (Fritzell, 2025).

However, the interpretation of occupational measures is contested. Reverse causation may matter: individuals in poor health can be excluded from higher-level jobs, while health-related attributes such as physical capacity or lifestyle may influence occupational sorting (Mackenbach, 2019). Moreover, occupational categories are shaped by changing economic and institutional contexts. For example, Sweden experienced one of the steepest international declines in the skill wage premium (the income premium individuals gain by attaining university education) between the 1970s and 1990s, largely due to the expansion of the public sector and wage-setting institutions (Domeij & Ljungqvist, 2019). This development altered the relative economic returns and social positioning of many occupations, particularly those requiring higher levels of formal education. This illustrates how the social meaning of occupations can shift across time and place, making them harder to compare along these dimensions.

## **Income**

Income has become an increasingly central measure of socioeconomic position in health research. Unlike education, which is fixed earlier in life, and occupational class, which can be difficult to measure consistently across groups, income tends to vary more over the life course and can therefore capture more dynamic changes in the material resources available to individuals or households. It reflects the ability to afford adequate food, housing, and healthcare, and to buffer against economic shocks, making it closely aligned with the material pathway emphasised in social determinants of health research (Darin-Mattsson et al., 2017; Galobardes et al., 2006; Kim et al., 2018). Its comparability across countries and time is another strength: while the meaning of educational qualifications and occupational categories varies with institutional context, monetary resources are more readily standardised.

At the same time, there are some drawbacks to using income as a measure. It can fluctuate substantially from year to year, making it a less stable indicator than education or occupation. Self-reported income may be affected by reporting errors, non-response, or otherwise be incomplete. Most importantly, income does not fully capture non-monetary aspects of socioeconomic position, such as prestige, authority, job hazards, or access to influential networks, which can also shape health.

## **Income mobility**

Beyond its role as a point-in-time indicator of socioeconomic position, income is especially useful for studying intergenerational social mobility. From the 1990s onward, mobility research increasingly shifted away from occupational class toward income, a trend also evident in the wider stratification literature (Barone et al., 2022; Mouw, 2022). While class-based measures still account for about half of mobility studies, their suitability has been increasingly questioned in favour of income (Sakamoto & Wang, 2020) or job-based approaches (Avent-Holt et al., 2020). Many sociologists nevertheless continue to recommend occupational class where reliable long-term income data are lacking (Goldthorpe & McKnight, 2006; Yaish & Kraus, 2020).

The growing use of income reflects both better access to administrative income records and recognition of the limitations of class-based measures within the mobility literature. As argued by Sakamoto and Wang (2020), income has several advantages over occupational class when measuring mobility. Compared to occupational class, income is less context-dependent, allowing for more valid cross-national, historical, as well as multi- and intergenerational comparisons. Growing within-occupation inequality has reduced the extent to which occupational categories meaningfully capture individuals' long-term earnings or socioeconomic position. Moreover, income captures rising economic inequalities more directly and provides a dynamic measure that is sensitive to fluctuations and trajectories across the life course. Occupation has often been assumed to better reflect non-pecuniary aspects of work than income, yet its relevance has diminished with the growing complexity of organisational structures and employment relations. Furthermore, using income avoids reliance on the absolute (structural) versus relative (circulation) mobility distinction, a framework that has been criticised as conceptually problematic. For these reasons, income mobility has become a central tool for understanding how advantages and disadvantages are reproduced across generations. It is particularly well suited for examining how socioeconomic conditions at different points in life shape long-term health outcomes, which is a central focus of this thesis.

## **Income and health across the life course**

### **Adult income and health**

A substantial body of evidence shows that higher income is associated with longer life expectancy and more favourable physical and mental health outcomes (Chetty et al., 2016; Fritzell et al., 2004; Kawachi et al., 2010). The relationship, however, is not purely one-directional. Health selection, or reverse causality, suggests that health itself can shape income. Healthier adults are more likely to enter and remain in employment, progress in their careers, and achieve higher earnings, while poor health lowers productivity, reduces

hours, increases absenteeism, and raises the risk of job loss or withdrawal from the labour market (Currie & Madrian, 1999; Lundin et al., 2010; Pelkowski & Berger, 2004). Longitudinal studies confirm that adverse health shocks lead to lasting “scarring” of income trajectories, mainly through reduced employment and increased reliance on disability benefits (García-Gómez, 2011; Lenhart, 2018).

Social causation perspectives, however, receive greater attention, as they help explain why lower income itself contributes to poorer health outcomes (Blane et al., 1993; Dahl, 1996; Marmot, 2004; Marmot & Wilkinson, 2001). These explanations overlap with the mechanisms discussed earlier, linking socioeconomic position and health more broadly, but income is a particularly direct determinant because it governs immediate access to material resources and buffers against economic insecurity.

Four main pathways have been proposed to explain the link between income and health. The materialist perspective highlights how income enables access to adequate housing, nutritious food, healthcare, and safe working conditions, resources that directly affect morbidity and mortality (Deaton, 2002b; Marmot, 2004). Building on this, the neo-materialist perspective shifts the focus from individual resources to the broader political, historical, and economic structures that shape how these resources are distributed across society, thereby influencing population health (Lynch et al., 2000). Lynch and colleagues (2000) famously illustrated this with the “airplane-class” metaphor, where seating arrangements capture how structural inequalities translate into health-relevant differences in comfort, stress, and rest.

In contrast, the cultural-behavioural explanation emphasises that health behaviours are socially stratified: disadvantaged groups are more likely to smoke, have poorer diets, or engage in harmful drinking, and these differences account for part of the income–health gap (Pampel et al., 2010; Stringhini et al., 2010). Finally, the psychosocial approach underscores the health costs of relative deprivation, with higher income inequality linked to stress, reduced social trust, and worse mental health (Elgar et al., 2020; Pickett & Wilkinson, 2015).

Importantly, new causal evidence demonstrates that income itself matters for adult health. Evidence summarised in a systematic review suggests that increases in income are associated with improved mental health, particularly among those starting from very low incomes, whereas income reductions are associated with deteriorating mental health (Thomson et al., 2022). Furthermore, new research based on longitudinal UK data shows that increases in household income predict better physical and psychological health, although benefits plateau at higher levels (Reed et al., 2025). These findings reinforce the interpretation that income affects health through a combination of material, behavioural, psychosocial, and structural pathways that accumulate and interact over the life course.

## **Childhood family income and health**

A large body of research shows that economic conditions in childhood shape health both in the short term and across the life course. Childhood disadvantage is associated with poorer health in childhood itself, and it may also influence health later in life either directly, by biologically embedding early stressors, or indirectly, by limiting educational opportunities and future socioeconomic attainment (Kuh & Wadsworth, 1993; Marmot, 2001). Three main theoretical frameworks guide this literature. Two life course epidemiology models were briefly introduced earlier and are particularly relevant here. Firstly, the sensitive period hypothesis, which refers to a specific window of time during an individual's development when exposure to certain environmental, social, or biological factors has a particularly strong and lasting impact on development and later disease risk, compared to exposures occurring at other stages of life (Kuh et al., 2003). Secondly, the accumulation of risk perspective holds that health reflects the build-up of exposures over time. Repeated or prolonged adverse conditions, including low socioeconomic position, increase physiological strain. As people age, the capacity for repair declines, and the number, duration, and intensity of these different types of exposures become increasingly consequential (Kuh et al., 2003).

Thirdly, the pathway model emphasises how childhood family income sets in motion a chain of events: it influences educational achievement, which affects labour market opportunities and adult socioeconomic position, and these factors in turn shape health (Marmot, 2001). Most empirical studies suggest that both childhood conditions themselves (direct effects) and the long-term paths they set in motion (indirect effects) affect health, but the relative importance of each depends on the specific health outcomes, time period, and context (Case et al., 2005).

There is strong empirical evidence that parental income impacts children's health and development. Case, Lubotsky, and Paxson (2002) demonstrate that higher parental income enables families to better protect children's health when chronic conditions arise, leading to widening health disparities over the course of childhood. Policy evaluations strengthen this conclusion. Milligan and Stabile (2011) found that expansions of Canadian child benefits led to significant improvements in children's physical and mental health. A recent systematic review of studies from high-income countries similarly concludes that increases in household income improve children's health and developmental outcomes, while income losses have adverse effects (Cooper & Stewart, 2021).

The link between childhood family income and adult health is less consistent. Adjusting for adult socioeconomic position often weakens the association (Lundberg, 1993; Palme & Sandgren, 2008), supporting the pathway model. Yet other studies find persistent effects of early-life deprivation even after such adjustments, suggesting long-term biological or developmental

“scarring” (Galobardes et al., 2004; Poulton et al., 2002). Overall, the literature indicates that childhood family income matters for health both by shaping later socioeconomic opportunities and through direct, enduring consequences of early disadvantage.

### **Income, wealth, and health**

So far, I have focused on income as the main predictor variable, in line with the empirical analyses presented later in the thesis. However, there is growing recognition that wealth may be an even more relevant indicator of socioeconomic position, as it reflects accumulated resources and provides a buffer against shocks. Research shows that wealth is far more unequally distributed than income and exhibits stronger intergenerational persistence, thereby reinforcing social inequalities across generations (Pfeffer & Killewald, 2018; Pfeffer & Schoeni, 2016). Despite increasing calls to incorporate wealth into health research (Balogh & Katikireddi, 2025; Baum, 2005), data on wealth remain relatively limited.

Recent studies highlight the significance of wealth for adult health outcomes. A nationwide register-based study from Norway found that individuals in the lowest wealth decile at midlife had substantially higher mortality risks than those in the highest decile, even after accounting for sibling and twin fixed effects (Gugushvili & Wiborg, 2025). In Sweden, large inequalities according to wealth were found, which remained more stable across the life course than inequalities by income (Katikireddi et al., 2021). This suggests that wealth, much like income, has a strong and independent association with health and longevity. At the same time, income and wealth are closely connected, and both contribute to the reproduction of health inequalities across the life course. Although this thesis does not analyse wealth directly, it is important to acknowledge wealth as a closely related dimension of stratification in Sweden that likely contributes to the observed patterns and should be addressed in future research as data availability improves.

### **Income mobility and health at the individual level**

As noted in the previous section, research on socioeconomic position and health points to several pathways (material, cultural-behavioural, and psychosocial) through which social and economic resources shape wellbeing. The mobility literature extends this discussion by asking whether changes in socioeconomic position across the life course affect health in their own right, beyond the conditions of origin or destination.

From a sociological perspective, Sorokin’s thesis (1927, 1959) argues that intergenerationally mobile individuals may feel disconnected from both origin and destination classes, creating stress and loss of support regardless of whether mobility is upward or downward (see also Stacey, 1967). Later theoretical work, such as Friedman’s (2016) concept of *habitus clivé*, likewise

highlights the psychological strain involved in navigating conflicting social norms. These perspectives suggest that mobility itself, over and above origin or destination, can undermine wellbeing by fostering uncertainty and exclusion. Psychological theories of identity complement this view, emphasising that mobility forces individuals to renegotiate their sense of self in relation to both their background and their new environment, a process that can compromise psychosocial health (Destin, 2019; McAdams & McLean, 2013; Oyserman & Destin, 2010).

Although upward mobility is often celebrated, it can also carry hidden costs. Individuals from disadvantaged backgrounds may feel pressure to conform to unfamiliar cultural norms while simultaneously being viewed with suspicion or envy by peers from their class of origin (Daenekindt, 2017; Destin & Debrosse, 2017; Friedman, 2016). Such tensions may foster identity conflict, strained family or community ties, and impostor feelings, while the psychological burden of continually proving one's worth can amplify stress (Stuber, 2006). Thus, upward mobility, while materially beneficial, may nevertheless carry psychosocial costs.

Downward mobility is considered particularly harmful. The "falling from grace" perspective highlights how moving into a lower socioeconomic position can erode health by combining material losses with psychosocial strain. Loss of resources and opportunities may be accompanied by diminished recognition and stigma and a feeling of failure to live up to social expectations, thereby undermining self-worth (Newman, 1999; Stacey, 1967). Those who fall may also feel caught between groups, struggling to maintain ties to their origin status while fearing rejection in their new environment (Blau, 1956; Friedman, 2016). The emotional work of adjusting to more limited circumstances and altered aspirations can be especially taxing, gradually wearing down both mental and physical health (Newman, 1999).

Not all theories predict negative outcomes. The "rags to riches" perspective highlights the potential benefits of upward mobility, including enhanced self-efficacy and a stronger sense of control (Gugushvili, McKee, et al., 2019; Gugushvili, Zhao, et al., 2019), gratitude toward the system enabling mobility (Daenekindt et al., 2018; Day & Fiske, 2017; Tumin, 1957), healthier behaviours (Boehm, 2018; Park et al., 2014; Wood et al., 2010), and greater confidence and coping capacity. This latter idea resonates with posttraumatic growth theory, which suggests that overcoming adversity can foster psychological wellbeing and strengthen beliefs in one's ability to face future challenges (Tedeschi & Calhoun, 2004). Over time, these mechanisms may translate into lasting health advantages, as suggested by theories of control and cumulative resources (Mirowsky & Ross, 2005) as well as longitudinal research showing that upward mobility can mitigate early disadvantage (Gugushvili, Zhao, et al., 2019).

It has also been debated whether social mobility has any independent health effects at all. According to the acculturation perspective, social origin and,

especially, social destination may matter more for health than the process of mobility itself (Blau, 1956). From a life course perspective, Hallqvist et al. (2004) note that proposed mobility trajectories often map onto critical period and accumulation approaches, so separating these mechanisms requires clearly specified, theory-led hypotheses. Similarly, Ben-Shlomo et al. (2014) argue that mobility may be best viewed as a descriptive term rather than a model in its own right.

Empirical findings are mixed. Many studies using education- or class-based measures suggest that health is shaped more by social origin and destination than by the move between them, a pattern often described as consistent with the “acculturation” perspective (Dhoore et al., 2019; Guo et al., 2025; Houle & Martin, 2011; Iveson & Deary, 2017; Präg & Richards, 2019). Still, downward mobility is frequently linked to adverse outcomes, particularly in mental health (Luo & Waite, 2005; Tiffin et al., 2005; Tiikkaja et al., 2013; D. Timms, 1998; D. W. G. Timms, 1996; Ward et al., 2016). Results for upward mobility are more varied. Some studies identify risks (Brody et al., 2013; Castagné et al., 2016; Hadjar & Samuel, 2015; Kessin, 1971), while others suggest benefits such as improved wellbeing (Gugushvili, McKee, et al., 2019; Gugushvili, Zhao, et al., 2019; Iveson & Deary, 2017). It is also possible that upward mobility has a negative impact on physical health and a positive impact on mental health (Chen et al., 2022; Gaydosh et al., 2018; Miller et al., 2020), a pattern called skin-deep resilience. Such divergence reflects differences in national context, measurement strategies, and outcomes studied (Bulczak et al., 2022; Jeong et al., 2025; Nikolaev & Burns, 2014).

Part of the inconsistency stems from methodological challenges. Without a clear counterfactual, it is difficult to establish what the health of mobile individuals would have been if they had remained immobile. Traditional additive or interaction models are more likely to detect mobility effects, while newer approaches such as diagonal reference models, which explicitly separate origin and destination from mobility, often yield null findings. These issues are discussed further in the methodology chapter.

Only a relatively small but growing number of studies examine income mobility directly, though these are most relevant to this thesis. Some find no clear health effects, for example, on obesity and depressive symptoms in the United States (Bulczak et al., 2022) or psychological distress in Canada (Vanzella-Yang & Veenstra, 2023). Others report context-dependent associations. In Japan, upward mobility was found to be linked to poorer self-rated health among men (Okamoto et al., 2019), whereas in Canada, upward mobility was shown to predict better self-rated health for men and downward mobility poorer health for women (Veenstra & Vanzella-Yang, 2021). U.S. research suggests that downward mobility reduces wellbeing, while upward mobility improves it, particularly in midlife (Nikolaev & Burns, 2014). Finally, a Finnish study showed that cognitive functioning in midlife was highest among those stably in high-income groups and lowest among the downwardly

mobile and the stably poor (Nurmi et al., 2025). Together, these studies suggest that income mobility can matter for health, but the direction and magnitude of effects vary by context, outcome, and method, highlighting the need for further research.

## A gendered lens on income and health

The often-cited phrase “women are sicker, but men die quicker” captures a well-documented paradox: women tend to report more morbidity, whereas men have higher risks of death. This paradox motivates stratified analyses by gender, but the rationale for a gender perspective goes deeper, especially in research on income, mobility, and health.

First, sex and gender are deeply intertwined. While sex refers to biological differences and gender to socially constructed roles and expectations, their interaction is so close that separating them risks obscuring how power relations and norms shape health (Heise et al., 2019; Springer et al., 2012). Heise et al. (2019) emphasise how the “gender system” interacts with other axes of inequality to structure individuals’ social positions and health trajectories. Sweden’s welfare state has long aimed to promote gender equality, with policies since the 1960s raising female labour force participation to among the highest in the world (Bergqvist, 2015). Nevertheless, the gender wage gap has hardly decreased since the 1990s, due to the low share of women in top earner jobs, even though they have higher education on average (Fortin et al., 2017). Occupational segregation and unequal caregiving responsibilities continue to shape how men and women accumulate income, status, and health risks (Hustad et al., 2020).

Second, labour market dynamics and household economies create different health risks for men and women. Women often work fewer hours, earn less, and remain concentrated in lower-paid occupations, while also carrying disproportionate responsibility for unpaid care (Organisation for Economic Cooperation and Development [OECD], 2025). These combined pressures increase fatigue, stress, and slower returns to work after illness or injury (Clougherty et al., 2010). Even when women enter “male” occupations, they face persistent wage gaps, slower promotion, and higher injury risks, suggesting both discrimination and greater susceptibility to environmental hazards. These patterns may weaken the observed income–health gradient for women (Torssander & Erikson, 2009). Men, meanwhile, are more exposed to occupational hazards and risky behaviours such as smoking and heavy drinking, contributing to their higher premature mortality (Hämmig & Bauer, 2013; Rehm et al., 2006). Thus, income may capture different constellations of resources and risks across genders.

Third, intergenerational mobility processes themselves appear gendered. There is scarce empirical evidence on gender differences, but the existing literature is mixed. Some studies find effects only for men (Gugushvili, 2023;

Gugushvili, Zhao, et al., 2019; McLoughlin et al., 2023; Präg & Gugushvili, 2020; D. Timms, 1998), others only for women (Steiber, 2019), and some none at all (Veenstra & Vanzella-Yang, 2021). Downward mobility generally harms both men and women, though its psychological meaning may differ. In contexts with strong breadwinner norms, men may experience sharper stigma and status anxiety when facing low income (Nagamine et al., 2020), with evidence showing their subjective health suffers more under such conditions (Araki et al., 2024), while upward mobility may more strongly boost men's self-esteem and wellbeing. For women, upward mobility may yield fewer psychological benefits or even generate identity conflicts (Beyer, 1998; O'Leary et al., 1985).

Finally, the Swedish context provides an important motivation for examining income by gender in this thesis. With an expanding welfare state and a widely held sense of social fluidity, the period between the 1950s and 1990s was marked by an ethos of conscientiousness and personal responsibility (Stenberg, 2018). In such a setting, people may have believed that knowledge and effort mattered more for success than circumstances, which could shape how mobility relates to health. Theories linking social mobility to health emphasise the psychosocial toll of losing resources and opportunities when mobility is downward (Newman, 1999; Stacey, 1967), alongside the gains in self-esteem, perceived control, and optimism that can follow upward moves (Gugushvili, Zhao, et al., 2019). In a context where institutions reduce material risks, yet sustain strong expectations of personal advancement, these mobility effects may have been especially salient for health outcomes.

From the mid to late twentieth century, gender differences in Swedish social roles, particularly in the labour market, narrowed markedly (Ahrsjö et al., 2025; Goldin, 2014). Several institutional changes supported this development, including the shift to individual income taxation (Selin, 2014), the introduction and subsequent expansion of paid parental leave for fathers (Ruhm, 1998), and reforms that extended access to compulsory and higher education (Black et al., 2005; Meghir & Palme, 2005). Consequently, female labour force participation climbed from 29.5% in 1950 to 76.1% in 1980 (Stanfors, 2014). Recent research indicates that the overall decline in intergenerational income mobility reflects stagnation among men alongside a decline among women, as women's incomes became more closely aligned with their earning capacity and potential (Ahrsjö et al., 2025; Engzell & Mood, 2023). Overall, the era's institutional context and the shift from a male-breadwinner model to a dual-earner society, likely amplified mobility effects and reshaped the link between income and health, motivating a specific focus on gender.

While this thesis relies on sex assigned at birth and only partly stratifies results by it, situating the findings within a gender perspective remains important. Gender shapes how income is earned, distributed, and valued, and it influences the social meanings attached to mobility. Keeping these dynamics

in view helps place the empirical results in a broader context and guards against overly narrow interpretations of income-related health inequalities.

## Health outcomes

While health is inherently difficult to define with precision, it remains a concept that is widely and intuitively understood. Two approaches have contributed meaningfully to the direction of this thesis.

In economics, health is often treated as a form of capital that yields utility by enabling individuals to engage more effectively in other activities (Phelps, 2018). Because investments in health are costly in terms of time and resources, individuals are assumed to optimise rather than maximise their health (Grossman, 1972). This perspective emphasises the role of individual decision-making. In contrast, public health adopts a holistic view of health, emphasising structural, social, and environmental determinants in addition to solely individual choices.

The WHO describes health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization [WHO], 1946, p.1), a view expanded by Vanderweele (2017), who frames flourishing as encompassing happiness, meaning, virtue, and social relationships alongside physical health. While such a broad definition underscores the multidimensional nature of health, quantitative research can capture only a subset. The analyses therefore focus on selected indicators of physical and mental health, recognising that they reflect only part of the broader construct.

## Mortality and life expectancy

Individuals may optimise their investments between health and other goods, yet avoiding early death remains a central constraint across the life course. From a life course perspective, exposures to social and biological factors accumulate and become embodied, jointly determining the risk and timing of death (Ben-Shlomo & Kuh, 2002). All-cause mortality is therefore a particularly robust indicator, capturing the combined influence of health processes over time, in contrast to cause-specific disease or mortality, which reflects only certain pathways. Moreover, unlike self-rated health, mortality is not prone to reporting bias, further strengthening its validity. When death occurs before the average life expectancy in a given population, it is referred to as premature mortality, sometimes operationalized as death before a fixed age such as 70 years (WHO, 2025). Because average life expectancy shifts over time and across populations, defining premature mortality relative to population-specific life expectancy can provide a more accurate measure (Preston et al., 2001; Zhang & Vaupel, 2009).

Income inequalities in mortality can be expressed in absolute terms and relative terms. Absolute measures capture the excess number of deaths in lower-income groups compared to higher-income groups, while relative measures describe the proportional disadvantage between them (Mackenbach & Kunst, 1997; Wagstaff et al., 1991). This distinction helps explain an important empirical pattern: even when overall mortality declines across all groups, the rate of improvement is often faster among the advantaged. As a result, absolute inequalities may narrow while relative inequalities continue to widen, a trend repeatedly documented in high-income countries over recent decades (Mackenbach, 2012; OECD, 2019). More recently, novel approaches such as distributional similarity indices, which assess inequalities across the full socioeconomic spectrum rather than focusing on average differences, also confirm that mortality inequalities have widened in wealthier nations (Gómez-Ugarte et al., 2025).

Life expectancy is a summary measure of mortality that expresses the average number of years a person can expect to live under specified mortality conditions. Period life expectancy applies current age-specific mortality rates to a hypothetical population, while cohort life expectancy follows an actual birth cohort over time, incorporating observed and projected mortality. A related concept is temporary life expectancy, which measures the expected number of years lived between two specified ages. Together, these measures provide complementary perspectives on population health (Preston et al., 2001; United Nations Department of Economic and Social Affairs Population, 2022).

Evidence commonly indicates a non-linear income–mortality gradient, where gains in income are most strongly associated with lower mortality at the bottom of the income distribution, and the marginal association weakens at higher income levels (Deaton, 2002a; Dowd et al., 2011; Fritzell et al., 2004; Rodgers, 1979). While Deaton (2002) suggested that this association is muted at retirement age, evidence from Sweden indicates otherwise. Studies show that significant gradients persist into older ages, and in some cases even widen (Fors et al., 2021; Rehnberg & Fritzell, 2016). These findings highlight the continuing importance of economic resources throughout the life course, supporting a materialist interpretation in which income strongly shapes health, even if marginal returns diminish once basic needs are met.

## Mental health

Mental health is a composite construct, encompassing not only the absence of illness but also the presence of psychological well-being. The WHO defines it as a state in which individuals can realise their abilities, cope with the normal stresses of life, work productively, and contribute to their communities

(WHO, 2022). Mental health is shaped by the interaction of biological, psychological, and social factors, making it sensitive to broader social and economic conditions (Patel et al., 2018).

Research consistently shows that mental health outcomes are stratified by socioeconomic position, with income playing an important role. Depression, anxiety, and stress-related disorders are more common among those with lower income, reflecting material hardship, financial insecurity, and chronic stress, alongside reduced access to protective resources (Fryers et al., 2003; Linder et al., 2020; Lorant et al., 2003). Gendered differences are also evident: women more frequently report internalising symptoms such as depression and anxiety, while men show higher levels of externalising behaviours, substance use, and suicide (Rosenfield & Mouzon, 2013).

In Sweden, as in most other Western countries, mental ill-health has become a growing public health concern, with rates of sick leave due to psychiatric and stress-related diagnoses steadily increasing, and today representing the most common reason for sickness absence (Swedish Social Insurance Agency, 2020). Universal health coverage ensures broad access to mental health services. Psychotropic medications are subsidised under the national pharmaceutical benefits scheme (*Läkemedelsförmånerna*), which limits out-of-pocket spending for reimbursed prescription medicines via high-cost protection (“high cost ceiling”) so that patients never pay more than a fixed maximum during a 12-month period (Björvang et al., 2023).

Prescription and dispensation data for antidepressants, anxiolytics, and antipsychotics provide valuable population-level indicators of mental health, supported by high-quality administrative registers (Wallerstedt et al., 2016; Wettermark et al., 2007). Internationally, Sweden reports comparatively high antidepressant use, often interpreted as evidence of both effective access to care and lower stigma around treatment (OECD, 2023; Patana, 2015). Recent European analyses also confirm that antidepressant use in Sweden has increased substantially in the past decade, reaching among the highest levels in Europe (Bojanić, 2024).

Socioeconomic differences are also evident in the prescription of psychotropic medications. Studies from the Scandinavian countries consistently show higher levels of psychotropic drug use among individuals with lower education and income (Andersen et al., 2009; Hansen et al., 2004; Von Soest et al., 2012). In Sweden, population-based analyses have demonstrated a clear social gradient in the prescription of most medications, including psychotropic drugs, with higher use among socioeconomically disadvantaged groups (Weitoft et al., 2008). More specific patterns have also been observed: higher levels of antipsychotic use are found among older adults with lower education, while individuals with higher education are more likely to receive psychotropic prescriptions from specialist psychiatric care rather than primary care (Wastesson et al., 2014, 2015).

At the same time, studies accounting for multiple intersecting factors, such as age, gender, migrant status, income, and psychiatric diagnoses, suggest that these gradients are not uniform across population groups or drug types (Ljungman et al., 2021). These findings highlight that socioeconomic differences in psychotropic drug use reflect not only variation in mental health needs, but also differential pathways to diagnosis and treatment. Individuals in disadvantaged positions are more exposed to chronic stressors and adverse living conditions and may be more likely to receive pharmacological treatment as a first-line response, while those with greater socioeconomic resources may have better access to specialist care and non-pharmacological treatments. As a result, patterns of psychotropic drug prescription tend to mirror, but may also partially reshape, broader socioeconomic inequalities in mental health.

## Mechanisms

### Friendships and social relations

As children enter adolescence, they spend increasingly more time with peers and age mates, while time with parents and family correspondingly declines (Brown, 1990; Brown & Larson, 2009; Felson & Gottfredson, 1984; Hoeben et al., 2016; Warr, 1993). When resources at home are scarce, young people may seek support and guidance through relationships beyond the family sphere (Crosnoe, 2002; Giordano, 2003). Extra-familial connections with peers from more privileged socioeconomic backgrounds and their families can serve as valuable sources of academic assistance, aspirational role models, and access to opportunity structures that may facilitate upward social mobility.

Empirically, students from less privileged backgrounds have been shown to benefit from more advantaged peer settings. For example, a higher average classroom socioeconomic background is associated with better reading scores, and having a high status best friend predicts college completion (Ammermueller & Pischke, 2009; Cherng et al., 2013). Nordic register studies similarly link exposure to peers whose parents have high education or earnings to gains in individuals' later earnings, especially for disadvantaged students (Bertoni et al., 2017; Black et al., 2013).

More recent research reinforces these ideas in two key ways. First, population-level measures of economic connectedness show that areas where youth from families with low income have more friendships with high income peers tend to exhibit higher rates of social mobility. This highlights the importance of institutions that facilitate interactions between children from different socioeconomic backgrounds, such as schools and extracurricular settings (Chetty et al., 2022). Second, research designs that go beyond simple association sug-

gest that the specific individuals one is exposed to can influence later outcomes. In Danish high schools, variation in peer parental income across cohorts within the same school has been linked to higher adult earnings. This finding supports the idea that peers can shape access to information, influence aspirations, and affect sorting processes, indicating that socioeconomic position may indeed be transmitted through peer environments (Campa, 2024). In higher education, studies using quasi-random peer assignment show that the composition of one's peer group can influence early career earnings through an adoption of job searching behaviour, occupational choices, and labour supply (Essbaumer, 2024).

At the same time, access to advantaged friends is itself stratified. Adolescents do not form friendships at random; rather, they tend to resemble one another because they share similar social contexts, and because homophily (the tendency to associate with similar others) draws together youths with comparable backgrounds, abilities, and values (Feld, 1981, 1982; Lazarsfeld & Merton, 1954; McPherson et al., 2001). Recent evidence from Sweden reveals a friendship gap by household income within classrooms: students from lower-income families are less frequently chosen as friends and have fewer reciprocated ties. This limits their exposure to more privileged peers, even in socially integrated settings (Raabe et al., 2024). New population-level evidence further documents sharp differences in peer income exposure, with affluent students often remaining relatively isolated from less affluent peers across schools, reducing opportunities for cross-class friendship formation from the outset (Spiegel et al., 2025). Yet, quasi-experimental studies show that proximity-induced contact can foster cross-status friendships and help to create bridging ties within educational settings (Gitmez & Zárate, 2021).

Studies that link adolescent friendship nominations to long-term socioeconomic outcomes remain relatively scarce. Most recent contributions focus either on the area or institution level, measuring connectedness and relating it to place-level mobility (Chetty et al., 2022), or they exploit plausibly exogenous variation in peer composition, for example across-cohort shifts within the same school (Campa 2024) or quasi-random group assignments (Essbaumer, 2024). These exogenous designs help mitigate confounding from homophily and thereby improve the identification of opportunity structures. However, they typically do not observe explicitly expressed friendships and therefore cannot estimate direct interpersonal influence. At the same time, evidence on the quantity and persistence of adolescent friendships shows sizeable returns to having more friends (Lleras-Muney et al., 2022), illustrating the value of focusing on the ties themselves when such data are available.

## Personal attributes: cognitive ability and social skills

While tracing the links between income, changes in income, and health, it is important to consider intermediary attributes. Personal characteristics, such as

cognitive ability and social skills, are widely recognised as key factors in shaping both economic outcomes and health trajectories. Mackenbach (2019) argues that such attributes account for a substantial part of health inequalities in Western countries. Taking these partly heritable characteristics into account from a relatively early stage of life is important, as it allows for a more accurate consideration of pre-existing individual differences when predicting later socioeconomic and health outcomes.

### **Cognitive ability**

Cognitive ability, i.e., the capacity to learn, reason, and solve problems, is closely linked to educational attainment, occupational class, income, and health behaviours. Alongside a genetic component, it is also shaped by early-life conditions such as family resources, school quality, and stress (Brinch & Galloway, 2012; Duyme et al., 1999; Shonkoff et al., 2012). As such, cognitive ability reflects both inherited traits and environmental influences, functioning as both an outcome of socioeconomic conditions and a channel through which those conditions affect adult income and health.

A growing body of research supports the role of environmental influences on cognitive ability. Studies have found that adoption into higher-status families is associated with higher adolescent test performance (Duyme et al., 1999). Quasi-experimental estimates from Norway and Sweden further suggest that additional or better-timed schooling can raise test scores in late adolescence (Brinch & Galloway, 2012; Carlsson et al., 2015). Socioeconomic conditions have also been linked to differences in children's brain structure and cognition, with exposure to lead associated with lower intellectual performance even at concentrations previously considered safe (Lanphear et al., 2005; Noble et al., 2015). Because lead exposure is more common in socioeconomically disadvantaged environments, e.g., through older housing and environmental contamination, its neurotoxic effects disproportionately affect children from low-income families (Lanphear et al., 2005; Noble et al., 2015).

While these findings highlight the importance of environmental influences, genetic factors also play a significant role. Behavioural genetics research reports substantial heritability of cognitive ability, with estimates typically increasing from childhood into early adulthood (Briley & Tucker-Drob, 2013; Plomin & Deary, 2015). Evidence from genetically informed research designs suggests that accounting for genetic inheritance substantially reduces estimated social transmission, yet still leaves a statistically significant environmental component. In Sweden, studies combining adoption and twin data show that parent-child correlations in cognitive ability, particularly among fathers and sons, reflect both inherited and environmental pathways, contributing to intergenerational associations in education (Lundborg et al., 2018).

Research based on U.S. data shows that the correlation between adoptive parents' education and children's cognitive outcomes is typically smaller than that observed in biological families, and tends to be more pronounced in early

childhood (Halpern-Manners et al., 2020; Plomin et al., 1997). This pattern is consistent with behavioural genetics findings that the heritability of cognitive ability increases with age as individuals increasingly select and shape environments aligned with their genetic predispositions (Briley & Tucker-Drob, 2013; Plomin & Deary, 2015). Nevertheless, findings from adoption studies indicate that environmental influences can still exert meaningful effects. For instance, children adopted at ages 4 to 6 into higher-status homes have been shown to make substantial cognitive gains, particularly when adopted from disadvantaged backgrounds (Duyme et al., 1999). To summarise, these findings suggest that the empirically demonstrated relative importance of genetic and environmental pathways to cognitive ability varies across developmental stages, research designs, and social contexts.

### **Social skills**

Social skills, often referred to as “non-cognitive skills,” are behaviours and dispositions that facilitate effective interaction, cooperation, self-presentation and goal pursuit (Heckman & Kautz, 2012; Roberts et al., 2007). Important dimensions of the concept of social skills include sociability, prosociality, communication, perseverance, self-control, and the ability to coordinate with others under norms and role expectations (Heckman & Kautz, 2012). While classifications vary across fields, a relatively shared view is that these attributes shape how individuals mobilise resources, navigate institutions, and elicit support across the life course.

As with cognitive ability, social skills reflect both inherited characteristics and environmental inputs. Family climate, parenting practices, classroom organisation, peer settings as well as broader neighbourhood contexts all contribute to their formation from early childhood through adolescence (Roberts et al., 2007). Peer interactions are particularly important in early adolescence, when time with same-aged peers expands and status competition intensifies (Brown, 1990; Brown & Larson, 2009). In this context, peer status refers to the social standing an individual is assigned by classmates. Such status emerges from the everyday relational processes within the classroom and reflects how well a child is accepted, integrated and respected by peers (Almquist et al., 2023). A child’s position within this hierarchy can therefore be viewed as an early indicator of their capacity to use social skills effectively within group interactions.

There is growing evidence that socio-emotional skills carry significant labour market benefits. From the 1980s and onwards, demand for interpersonal and communication skills has increased and, with it, the economic returns to jobs requiring social skills (Deming et al., 2017). Swedish research shows that non-cognitive skills, such as perseverance, sociability, and emotional regulation, are strong predictors of unemployment risk, job finding, and career persistence, whereas cognitive skills are more closely associated with wage levels

(Lindqvist & Vestman, 2011). These findings highlight the importance of distinguishing between different dimensions of personal attributes when analysing pathways between income and health.

Sociometric research directly measuring peer status in adolescence (e.g., classroom nominations) finds that holding a high peer status in school is associated with higher adult wages decades later, consistent with the idea that early social positioning captures durable, valued competencies rewarded in the labour market (Conti et al., 2013; Shi & Moody, 2016).

### **Cognitive ability, social skills, and health**

Both cognitive ability and social skills have been prospectively linked to a wide range of health outcomes. Within the Stockholm Birth Cohort, low peer status in early adolescence predicts clusters of later social and mental health disadvantage, disease-specific morbidity, circulatory disease, and a gradient in premature mortality. These associations persist net of measured confounders, indicating that children's peer status position in school becomes embedded in later-life risks and opportunities (Almquist, 2009; Almquist et al., 2023; Almquist & Brännström, 2014; Miething & Almquist, 2020). More broadly, research on self-control, sociability, and related socio-emotional traits supports the idea that such skills shape long-term health directly through stress regulation, emotion management, and health behaviours, and indirectly through their influence on education, employment, and social support (Conti et al., 2010; Moffitt et al., 2011).

Cognitive ability shows a similarly robust, though partially distinct, pattern. Meta-analytic and large-sample studies consistently demonstrate strong associations with educational attainment and occupational class, and somewhat weaker but still meaningful links with income (Deary et al., 2007; Schmidt & Hunter, 1998; Strenze, 2007). In Swedish data, both cognitive and non-cognitive abilities predict earnings and labour-market outcomes, but in different ways: cognitive ability is closely tied to wage levels, while non-cognitive skills are more predictive of employment stability and unemployment risk (Lindqvist & Vestman, 2011). Higher early-life cognitive scores are also associated with lower adult mortality and reduced risk across several disease categories (Calvin et al., 2011; Deary et al., 2010; Hemmingsson et al., 2006). Evidence from Swedish military conscription data, where cognitive ability was measured at ages 18–20, similarly shows that lower test scores are linked to higher risks of premature mortality, cardiovascular disease, and injury-related causes (Batty et al., 2009). In summary, these findings place cognitive ability and social skills at the intersection of social causation, where early socioeconomic conditions shape their development and indirect selection, where they later influence both income trajectories and health outcomes.

## Historical context

The 1953 cohort analysed in this thesis grew up during a period of extensive welfare state expansion and institutional reform in Sweden. In the decades following the Second World War, social policy developed in several phases, including the establishment of the national health insurance, active labour-market programmes, and the introduction of income transfer schemes, initially as flat-rate benefits and later increasingly earnings-related (Olsson, 1990). These reforms were followed by a major expansion of publicly provided services in the 1960s. Together, they reflected an explicit policy ambition to improve living standards and reduce families' exposure to economic risks (Olsson, 1990; Palme, 2006).

Income inequality declined in Sweden during the late 1960s and 1970s, driven in part by wage compression (Björklund & Palme, 2000; Spånt, 1979). Sweden has also been characterised as a comparatively mobile society, although evidence suggests that increases in social fluidity began before the post-war welfare state reached its mature form (Berger et al., 2023). At the same time, mobility patterns are not uniform across socioeconomic dimensions, and intergenerational persistence in wealth appears more pronounced than in occupational or income-based measures (Adermon et al., 2018; Pfeffer & Waitkus, 2021). Nevertheless, from the 1960s to the 1980s, during the upbringing of the 1953 cohort, Sweden was characterised by high employment and sustained economic growth (Nahum, 2005). These trends began to reverse in the early 1990s, following welfare state retrenchment and a severe economic recession, after which inequalities increased again (Fritzell et al., 2014; Therborn, 2020).

Schools and housing were central arenas of change for this cohort. Large-scale urban development during the 1950s and 1960s, including new neighbourhood construction in Stockholm, contributed to more socially mixed residential areas, as young families from different social backgrounds moved into the same neighbourhoods (Janson, 1987, 2002). Because children were primarily assigned to local schools and school choice was limited at the time, neighbourhood integration translated into relatively socially heterogeneous schools (Brandén & Bygren, 2018; Wondratschek et al., 2013). In parallel, the nine-year compulsory comprehensive school reform postponed early academic selection and mandated a common curriculum through the lower grades, further promoting social mixing within schools (Meghir & Palme, 2005).

In contrast, today's Swedish school landscape is characterised by substantial school segregation by socioeconomic and immigrant background, including in the Stockholm region (Böhlmark et al., 2016; Söderström & Uusitalo, 2010). The 1953 cohort, however, grew up in a comparatively ethnically homogeneous society. Immigration in the 1950s and 1960s was lower than in

later decades and dominated by labour migration, primarily from Nordic countries and, to a lesser extent, other European countries (Skodo, 2018). Immigration from non-European regions increased from the late 1970s and during the 1980s (Statistics Sweden, n.d.). In this context, ethnic and immigrant-background segregation in neighbourhoods and schools was likely lower during the cohort's childhood than it is today, and socioeconomic differences were a primary axis of stratification shaping early-life environments.

Family and labour-market institutions were simultaneously undergoing transformation. Separate taxation of married couples, introduced in 1971, reduced disincentives to women's paid work, while the introduction of universal parental insurance in 1974 strengthened the compatibility of employment and family life (Gustafsson & Jacobsson, 1985; Selin, 2014). Together with the rapid expansion of the public sector, these reforms supported the sharp rise in female labour-force participation from the late 1960s onward (Stanfors, 2014), reshaping household income structures and the social meaning of paid work and economic independence over the cohort's life course.

# Aim and research questions

The overarching aim of this thesis is to investigate how income and income mobility shape health over the life course, highlighting the role of social and individual factors in these processes. To address this, the thesis is structured around four research questions:

RQ1. How have income inequalities in life expectancy changed between two cohorts born before and after the establishment of the Swedish welfare state, and do the associations differ for men and women? (Study 1)

RQ2. Are higher parental income and having a privileged classroom friend associated with higher adult income, and does the strength of the association with friends depend on parental income? (Study 2)

RQ3. Are childhood economic conditions related to all-cause mortality directly or indirectly through personal characteristics and adult socioeconomic conditions, and is intergenerational income mobility associated with mortality? (Study 3)

RQ4. Is mental health, proxied by psychotropic drug intake, associated with intergenerational income mobility beyond social origin and destination, and do the associations differ for men and women? (Study 4)

These research questions connect the social determinants of health framework, which emphasises how material, psychosocial, and cultural-behavioural factors shape health inequalities, with life course and mobility perspectives that trace how these processes unfold over time and across generations. By focusing on income and income mobility, the thesis operationalises core ideas of the health gradient, linking individual circumstances to structural conditions.

The studies follow a thematic progression across multiple layers of the Dahlgren and Whitehead framework: from macro-level socioeconomic conditions, situating income-related mortality differences within their historical and institutional context (S1)<sup>1</sup>, through childhood social relationships that channel later mobility (S2), to living and working conditions, where intergenerational

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<sup>1</sup> Throughout the thesis, S1, S2, S3, and S4 refer to Studies 1, 2, 3, and 4, respectively.

and individual income trajectories translate childhood resources into adult mortality and mental health outcomes (S3 and S4).

Guided by both social causation and health selection, the analysis considers intermediary attributes such as personal characteristics, often highlighted in indirect selection accounts as pathways contributing to the health gradient, while also acknowledging environmental influences. Where possible, results are presented separately for men and women and interpreted through a gender lens, recognising potential contextual and pathway differences in how income and health are linked.

# Materials and methods

Three of the four empirical studies in this thesis draw on the Stockholm Birth Cohort Multigenerational Study (SBC Multigen), a population-based prospective cohort of individuals born in 1953 and their extended family lineages, created through record linkage to rich Swedish administrative and historical sources. This thesis only uses data on the original cohort members and their parents (SBC), without drawing on its additional multigenerational extensions.

The data combine nationwide registers, archived social and school records, survey data, cognitive tests, and sociometric information on classroom friendships collected when cohort members attended sixth grade. This enables long-term follow-up with minimal attrition and repeated, register-based measurements of key factors such as income, family background, mortality, and psychotropic medication. In addition, Study 1 draws on nationwide register data covering all individuals born in Sweden in 1922 to 1926 and 1951 to 1955, aligning with the parent generation of the SBC and the SBC members themselves.

Study 1 establishes the background for the thesis, situating the life course analyses in Studies 2-4 within their broader historical and institutional context, with a special focus on health and health inequalities in the two generations. Studies 2-4 use the SBC data to estimate individual-level associations across the life course. This combination of population-level data, network-informed exposure measurement, and life course analysis motivate the in-depth description of materials and methods presented below, including data sources, study population, variable operationalisation, and analytic strategies.

## Data sources

### **The Stockholm Birth Cohort Multigenerational Study**

The SBC Multigen, constituting the data material for Studies 2–4, is a prospective cohort study of individuals born in 1953 who resided in the Stockholm metropolitan area in 1963 (N=14,608). The SBC Multigen builds on the Stockholm Metropolitan Study (SMS, N=15,117), which was initiated in 1966 with a comprehensive investigation of all children attending school in Stock-

holm on the day of data collection. The study included questionnaires, socio-metric measures, and cognitive tests of the students (Almquist et al., 2020; Stenberg & Vågerö, 2006). This was followed by interviews with their guardians two years later and a final survey with the participants in 1985. The survey data were linked to a wide range of administrative and register data. In 1986, following concerns about participants' personal integrity from the authorities and the public, the entire dataset was de-identified and further data collection was discontinued (Stenberg, 2018).

However, this did not mark the end of the study. Researchers later obtained ethical approval to extend the SMS by linking it to new register data on two occasions using probability matching. The first update involved matching the data with the Work and Mortality Database (WMD), a pseudonymised temporary dataset built from register data (Stenberg & Vågerö, 2006). In accordance with regulations on the retention of personal data, the matched dataset was once again de-identified in 2017. The present thesis draws on data from the second update in 2018, when SBC Multigen was created by merging the multigenerational dataset RELINK53 with the SMS, covering the period up to 2021 (Almquist et al., 2020). RELINK53 includes all individuals born in 1953 who resided in Sweden in 1960, 1965, and/or 1968. This group represents the vast majority of participants from the original SMS cohort. The dataset also encompasses the cohort members' parents, siblings, partners, children, grandchildren, and other relatives.

Of the original 15,117 SMS participants, 14,608 were successfully matched in the SBC Multigen linkage. The current thesis uses information for these matched cohort members and their parents up to the year 2021. The unmatched individuals had, on average, lower IQ scores, lower paternal income, poorer school grades, and a higher probability of dying before 1984 (which was the last year of mortality information update before the dataset was de-identified). This selective attrition may have introduced bias into our analyses. Specifically, the absence of the most socioeconomically and health-disadvantaged participants likely resulted in an underrepresentation of stable low-income and downwardly mobile individuals. Such selection could attenuate the estimated risks associated with poverty or downward mobility and inflate the apparent benefits of upward mobility, as the poorest and least healthy members of the cohort are underrepresented in the analytical sample.

### **The Total Population Register (*Registret över totalbefolkningen*)**

The Total Population Register (TPR), maintained by Statistics Sweden since 1968, records basic information on all registered residents of Sweden. It includes demographic information such as sex, age, marital status, place of residence, country of birth, citizenship, and family relationships, as well as events such as births, deaths (including those occurring abroad), and migrations. While updated daily by the Swedish Tax Agency, researchers typically access

the annual version, which reflects individuals recorded as residents for at least one year as of 31 December. The TPR is of high quality, with near-complete coverage of births and deaths, and high coverage of immigration (~95%) and emigration (~91%), although some over-coverage exists when individuals emigrate without notifying the authorities (Ludvigsson et al., 2016).

### **The Income and Tax Register (*Inkomst- och taxeringsregistret*)**

The Income and Tax Register, maintained by Statistics Sweden, is an administrative register containing individual-level data on earned and capital income, deductions, taxes, and certain wealth components for the entire Swedish population and taxable individuals. Income data are provided at both the individual and household level, and are available in several forms, including pre-tax and post-tax amounts. Before the repeal of Sweden's net wealth tax in 2007, the register also included tax-assessed values of assets and liabilities (Seim, 2017).

The register is compiled annually, approximately 12 months after the income year, by integrating administrative data from several authorities, including the Swedish Tax Agency and Swedish Social Insurance Agency, and has been produced continuously since 1968 (Statistics Sweden, 2011). However, the register does not capture income not reported to the Swedish Tax Agency, such as earnings from abroad or from informal or illegal work.

### **Cause of Death Register (*Dödsorsaksregistret*)**

The Cause of Death Register, maintained by the National Board of Health and Welfare (*Socialstyrelsen*), has been in operation since 1960 and covers all deaths among individuals registered in Sweden, including those occurring abroad. The register is based on medical certification of death and is considered highly complete for all-cause mortality (Brooke et al., 2017).

### **The Prescribed Drug Register (*Läkemedelsregistret*)**

Since 1 July 2005, the Prescribed Drug Register records all prescriptions that are dispensed (picked up) at community pharmacies in Sweden, regardless of where they were written (e.g., primary care, specialist outpatient clinics, private practices, dental care, or hospital outpatient settings) (Socialstyrelsen, 2019; Wettermark et al., 2007). The register does not include over-the-counter purchases, medicines administered at clinics (inpatient wards, day-care units, or nursing homes when supplied by requisition), or prescriptions that are never collected. For each dispensed item, it contains the drug's Anatomical Therapeutic Chemical (ATC) classification code, prescription and dispensing dates, quantity and defined daily doses, patient demographics (age, sex, area of residence), costs/reimbursement, and the profession and practice of the prescriber.

### **Longitudinal integrated database for health insurance and labour market studies, LISA (*Longitudinell Integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier*)**

LISA covers all individuals registered in Sweden who are aged 16 years or older on 31 December each year, from 1990 onward, and from 2010 it includes those aged 15 years or older. Inclusion in government registers is compulsory in Sweden, which minimises selection bias. The register provides annual information on education, income, occupation, and employment at the individual level. Although the formal decision to establish LISA was taken in 2003, Statistics Sweden has compiled the series retrospectively from 1990. LISA integrates harmonised data from multiple sources, including education from the Education Register. Income information is derived from the Swedish Tax Agency's administrative tax registers and compiled by Statistics Sweden, covering all taxable earnings, capital income, and major transfer payments on an annual basis (Ludvigsson et al., 2019).

### **The Population and Housing Census (*Folk- och bostadsräkning, FOB*)**

Every five years from 1960 to 1990, Statistics Sweden carried out full-count Population and Housing Censuses of all residents aged 16 years or older and their dwellings. Participation was mandatory, resulting in very high response rates (Ludvigsson et al., 2019). The Census provides self-reported demographic and socioeconomic information (for example, age, sex, civil status, country of birth, citizenship, most recent immigration, education, income, employment status, occupation, and, in several years, industry/workplace), together with housing variables (for example, dwelling type, tenure, and size/rooms) that underpin Sweden's housing-stock statistics.

### **Population and Income Register (*Mantals- och inkomstlängden*)**

The Project Metropolitan research team compiled a Population and Income Register by aggregating records from local and national administrative sources. Built in 1964, it includes mothers' and fathers' year of births, earned and unearned income, marital status, year of change in marital status, the cohort members' household size (number of household members), type of family and number of siblings.

### **National Patient Register (*Patientregistret*)**

The Swedish National In-patient Register was initiated in 1964 by the National Board of Health and Welfare and is part of the National Patient Register. Initially, it covered somatic in-patient care in six counties and gradually expanded to include the entire country. In 1972, approximately 86% of all psychiatric hospital discharges were reported to the register, and by 1976, the coverage for somatic in-patient care had reached about 50%. In Stockholm

county, coverage was considered complete from 1973. Complete national coverage was achieved in 1987 and today includes more than 99% of all somatic and psychiatric hospital discharges in Sweden. All publicly and privately funded physicians are required to report in-patient data, though primary care is not included.

Each record contains dates of admission and discharge, primary and secondary diagnoses, and external causes of injuries or poisoning. Diagnoses are coded according to the Swedish version of the International Classification of Diseases (ICD), used since 1964. External validation studies indicate that the positive predictive value of diagnoses ranges from 85% to 95% (Ludvigsson et al., 2011).

### **The School Study (*Skolundersökningen*)**

Cohort members who attended schools in the Stockholm Metropolitan Area were invited to The School Study of 1966. In May 1966, trained interviewers conducted group questionnaires in schools with all sixth-grade pupils (about age 13) in each class, whether or not they were members of the cohort. The fieldwork covered 619 school classes. Two non-Swedish-speaking schools were not visited, and one boarding school was surveyed in the autumn of 1966. Pupils born in 1953 who were not in sixth grade completed a version of the questionnaire without sociometric items. The survey used two forms. One included a cognitive test and questions on interests, attitudes towards school, leisure activities, and educational plans. The other contained sociometric questions and questions on career plans. Sociometric nominations were restricted to classmates and did not require reciprocity. Nominations were unordered, i.e., pupils did not rank their choices. A small number of special-education classes were excluded because pupils could not read well enough to complete the questionnaires. At the end, 13,476 students participated in The School Study (Janson, 1980).

## **Study populations**

In Study 1, we analyse two birth cohorts drawn from nationwide registers: those born 1922–1926 and 1951–1955. Inclusion required being born in Sweden, alive at age 50 according to the Total Population Register, and having non-missing disposable income data in the Income and Tax Register at the cohort-specific income year (1970 for cohort 1922–1926 and 1999 for cohort 1951–1955). Results are presented separately for men and women.

In Studies 2–4, the study populations were created based on the SBC Multigen, i.e., individuals who were born in 1953 and lived in the greater Stockholm metropolitan area in 1963. We excluded cohort members if data for parental income (1963/1970) or own mid-career income (1990–2001) were

missing. For Study 2, we further restricted the data to those who attended sixth grade during The School Study in order to obtain sociometric information. For Studies 3 and 4, we excluded individuals who emigrated and never returned or died before follow-up (start: 2002 for Study 3; 2005 for Study 4). Participants who emigrated and then returned before follow-up began remained in the risk set.

Across studies, observations with missing covariates were excluded, with two exceptions. In Study 2, missing parental education was retained as a separate category, and cohort members whose occupational class was not known in the 1990 Census were grouped together into a separate category and kept in the analysis. Study 4 is stratified by men and women; Studies 2–3 report pooled estimates with sex included as a covariate (but Study 2 included sex-specific analysis as supplementary material). The main methodological features of the empirical studies are summarised in Table 1.

*Table 1. Concepts and methodological characteristics of the studies*

|                                       | <b>Study 1</b>  | <b>Study 2</b>  | <b>Study 3</b>  | <b>Study 4</b>   |
|---------------------------------------|---|---|---|--|
| <b>Concept</b>                        | Income inequality in cohort life expectancy                                       | Friendships and intergenerational income mobility   | Pathways between childhood family income and adult mortality                  | Intergenerational income mobility and mental health  |
| <b>Outcome</b>                        | Temporary life expectancy   | Adult income  | Mortality   | Psychotropic drug dispensation   |
| <b>Exposure</b>                       | Adult income  | Parental income   | Parental income   | Income mobility (up, down, stable)   |
| <b>Income variable definition</b>     | Disposable individual income  | Pre-tax labour market income<br>Parental: household, Adult: individual                            | Pre-tax labour market income<br>Parental: household, Adult: individual        | Pre-tax labour market income<br>Parental: household, Adult: individual                         |
| <b>Income scale</b>                   | Vigintiles  | Percentiles   | Parental: percentiles, Adult: log-transformed                                 | Tertiles   |
| <b>Modifier</b>                       |   | Privileged friend   | Adult income  |  |
| <b>Control variables</b>              | None  | Single parent household, parental education, cognitive ability, social skills, attained education | Cognitive ability, social skills, occupational class, attained education, sex | Single parent household, cognitive ability, social skills, marital status, any hospitalisation |
| <b>Method</b>                         | Temporary cohort life expectancy (gender-specific)                                | Fixed effects (school classes)  | Cox proportional hazards model  | Diagonal reference model (gender-specific)   |
| <b>Study Population/Data material</b> | Whole Sweden Cohorts:<br>C <sub>0</sub> : 1922–1926<br>C <sub>1</sub> : 1951–1955 | SBC Multigen  | SBC Multigen  | SBC Multigen   |
| <b>Follow-up</b>                      | C <sub>0</sub> : 1972–1987<br>C <sub>1</sub> : 2001–2016 (age 50–61)              | 1990–2001 (age 37–48)   | 2002–2021 (age 49–68)   | 2005–2019 (age 52–66)  |
| <b>Sample size</b>                    | N <sub>0</sub> =387,866<br>N <sub>1</sub> =489,208                                | N=10,641  | N=11,325  | N=11,199   |

## Measures

This section describes the measures used in the empirical studies of the thesis, and Figure 1 illustrates the most important measures of Studies 2–4.

### Income

#### *Childhood family income*

In Studies 2–4, childhood family income is measured using parental income, observed in 1963 and 1970 for mothers and fathers via the Register of Population and Income and the Census from 1970. All nominal amounts were first converted to 2001 SEK using Statistics Sweden’s Consumer Price Index (CPI) (annual averages). Due to limited documentation for 1963, we cannot further disaggregate sources beyond “taxable income”, whereas in 1970 taxable income comprises earnings from employment and self-employment and, per register definitions, also income from agricultural property and certain business ownership forms.

Because definitions differ across years, we construct a resource-focused parental measure as follows: for each year we CPI-adjust mother’s and father’s incomes and sum them to capture total parental resources, then average across 1963 and 1970 for each family (using a single year if the other is missing), and finally transform the average to a within-sample rank. In 1963 the register does not clearly distinguish zero from missing income; to avoid conflating non-earnings with non-observation, we reclassified some 1963 zeros as missing using 1960 household economic-activity indicators (i.e., if an individual had zero income but reported economic activity, the zero was set to missing).

We use both mothers’ and fathers’ recorded incomes to capture resources available during childhood and to represent single-mother families more accurately; this combined-parent approach became standard in intergenerational mobility research from around 2015 (e.g., Chetty et al., 2014; Heidrich, 2017). Where parents were not co-resident, we retain both recorded parental incomes. This reflects Swedish institutions of shared financial responsibility (Children and Parents Code, *Föräldrabalken*, 1949:381), with state advance maintenance (*bidragsförsäkring*) available from 1964 when the liable parent did not pay, although non-payment could occur in practice and our choice may therefore slightly overstate resources for some non-resident cases. Parents are ranked in the same year regardless of age; we acknowledge that earnings follow an age profile and note this as a limitation.

### *Adult income*

In Studies 2–4, adult income for cohort members is taken from the longitudinal LISA registers for 1990–2016; each annual value was first converted to 2001 SEK using Statistics Sweden’s CPI (annual averages). LISA defines labour income as earnings from employment and self-employment plus work-related social-insurance benefits (e.g., wages, parental and sickness benefits, temporary care of a close relative, rehabilitation benefits). To reduce transitory noise and life-cycle bias, we average income over mid-career ages when annual income best proxies lifetime income. Specifically, the mean of annual incomes from ages 37 to 48 (calendar years 1990–2001 for this cohort) was calculated and the resulting measure analysed as a within-sample rank. This approach mitigates attenuation from year-to-year volatility and aligns with evidence that late-30s to 40s income better reflects lifetime resources than early-career observations (Bhuller et al., 2011; Böhlmark & Lindquist, 2006; Haider & Solon, 2006; Nybom & Stuhler, 2016). We use individual labour income to approximate own earning capacity, that is, how much individuals can support themselves independently of household composition or partner income, thereby avoiding compositional influences from marriage, cohabitation, or household size while following common practice in intergenerational income studies that model adult individual earnings averaged over mid-career years.

For Study 1, adult income is measured as individual disposable income from the Income and Tax Register in 1970 (for the 1922–1926 cohort) and 1999 (for the 1951–1955 cohort). 1970 was the first year when national-level income data were available. At both measurement points, participants were in their mid-40s, i.e., of working age and not affected by retirement income. Although this is slightly older than the mid-30s window often recommended for approximating permanent income, it remains a standard, informative point in the life cycle (Bhuller et al., 2011; Böhlmark & Lindquist, 2006; Haider & Solon, 2006; Nybom & Stuhler, 2016). Individual disposable income comprises all post-tax income, including income from work, transfer payments, and capital. There are some differences in the precise definitions of the income measures due to changes in tax systems between 1970 and 1999, although these are unlikely to alter the relative income positions of cohort members. We first classified income into sex- and cohort-specific vigintiles. For descriptive context, we then CPI-adjusted incomes to 2020 SEK and reported the within-vigintile mean.

To better reflect available economic resources – particularly among women with lower labour-market participation in the earlier-born cohort – we also constructed a household-level income measure. For 1970, we used the sum of spouses’ post-tax incomes from the 1970 Census (household income is not available in the register that year); for 1999, we used disposable household income from the Income and Tax Register. As with individual income, we

first created sex- and cohort-specific vigintiles and then CPI-adjusted to 2020 SEK to report within-vigintile means.

### *Income mobility*

Income mobility is operationalised consistently with each study's aims. In Study 2, adult income is the outcome and parental income the predictor; mobility is summarised by the rank–rank correlation between parental and adult income ranks. In Study 3, mobility enters the mortality models via an interaction between parental and adult income ranks, capturing how associations vary across origin–destination combinations. In Study 4, parental and adult income ranks are trichotomised and cross-classified into downwardly mobile, upwardly mobile, and stable groups to estimate associations with psychotropic drug dispensation beyond origin and destination.

### *Validation against prior Swedish estimates*

As a convergent-validity check, we compared our intergenerational rank–rank associations with published Swedish estimates by Heidrich. Using fathers' income only, our father–child, father–son, and father–daughter correlations were close to those reported by Heidrich; using the combined parental measure, correlations were similar in size and pattern. Small differences are expected given design choices: we pool parents across ages rather than use age-banded ranks, incorporate mothers' income to capture household resources, use mid-career, multi-year offspring income, and study a Stockholm cohort rather than a national sample. Estimates were most similar when parental income was averaged across 1963 and 1970 and offspring income across 1990–2001.

## **Mortality and life expectancy**

In Study 3, information on all-cause mortality (date of death) comes from the Swedish Cause of Death Register for the period 1 January 2002–31 May 2021. In Study 1, dates of death are taken from the Total Population Register and mortality is observed between ages 50 and 61. For the 1922–1926 birth cohort, this corresponds to follow-up windows starting at each person's 50th birthday and ending at the 61st, spanning roughly 1972–1987 across birth years (e.g., 1922 births: 1972–1983; 1926 births: 1976–1987). For the 1951–1955 cohort, the analogous windows span roughly 2001–2016 (e.g., 1951 births: 2001–2012; 1955 births: 2005–2016). Mortality between ages 50 and 61 is summarised as cohort (temporary) life expectancy in that interval.

## **Psychotropic medication (dispensation)**

In Study 4, the measure is a binary indicator of any psychotropic drug dispensation between 1 July 2005 and 31 December 2019 (approximately ages 52–

66 for this cohort). It is coded 1 at the first observed dispensation and 0 otherwise. Psychotropic drugs are defined by ATC codes N05A (neuroleptics/antipsychotics), N05B (anxiolytics), N05C (hypnotics and sedatives), and N06A (antidepressants). We use dispensation, collection of a prescribed medicine at a pharmacy, rather than “intake” as ingestion is unobserved and inpatient administrations are not captured.

We adopt a composite definition spanning these ATC classes to capture a broad spectrum of mental ill-health, from symptomatic distress managed with anxiolytics or hypnotics to diagnosed depressive and psychotic disorders treated with antidepressants or antipsychotics. This choice increases sensitivity to heterogeneous stress responses that income mobility may trigger or exacerbate. It also provides a pragmatic proxy for psychological morbidity in the absence of biomarkers or physiological indicators (for example, measures of allostatic load).

### **Privileged friend**

Sociometric data were collected in 1966, when cohort members were about 13 years old. In each classroom, students named up to three classmates (no out-of-class nominations were allowed) in response to: “Who are your three best friends in class?” Nominations did not need to be reciprocated. For every nominated friend, we linked parental income using the same construct as for own parental income: mothers’ plus fathers’ taxable income, converted to 2001 SEK, averaged across 1963 and 1970, and then transformed to a cohort-wide percentile rank. The exposure therefore reflects in-class ties to peers whose families are relatively privileged in the cohort context. All available nominations (up to three) were used while cohort members who did not make nominations were excluded. If a specific nominated friend lacked linkable parental-income data, that tie was ignored; if no valid ties remained, the privileged-friend measure was set to missing. We defined a binary privileged friend indicator equal to 1 if any nominated classmate’s parental income lay in the top quartile ( $\geq 75$ th percentile) of the cohort-wide distribution; otherwise, 0. This threshold identifies exposure to distinctly higher-resource peers while preserving sufficient sample size for inference. The measure was used in Study 2.

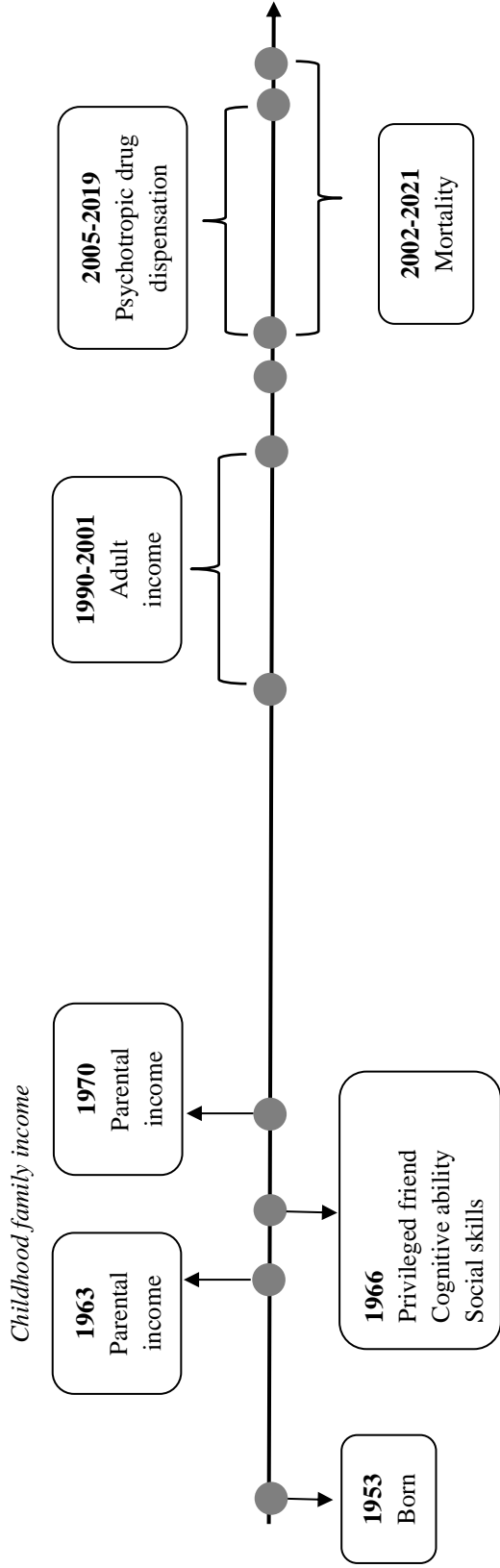
### **Cognitive ability**

In Studies 2–4, cohort members’ cognitive ability was measured in grade 6 with three sub-tests: verbal, spatial, and numerical. The data set provides a precomputed continuous composite score based on these subtests; we analysed this composite as a continuous variable. Pupils were required to have valid results on all three subtests for a composite to be issued. Observations with a missing composite or implausible values (e.g., outside the valid range)

were excluded. The composite has a theoretical range of 0–120; in our data, the maximum observed value was 116.

**Social skills (number of sociometric nominations by classmates)**

In Studies 2–4, social skills were proxied with peer nominations from The School Study's (1966) sociometric module. Within each classroom, pupils could nominate up to three classmates as their “best friends.” We measured social skills as the number of best-friend nominations received from classmates (i.e., in-degree). This count is theoretically bounded between 0 and class size – 1; in our data, the observed range was 0–33. The variable was analysed as a continuous measure. Observations were excluded if the nomination count was missing or implausible (e.g., exceeding the classroom roster or otherwise inconsistent with class size). As is typical at this age, nominations were predominantly same-sex; we imposed no restrictions on nominations by sex.



*Figure 1* Timing of key measures in Studies 2-4

## **Covariates**

### **Single-parent household**

Single-parent status, used in Studies 2 and 4, was derived from the 1964 Population and Income Register. A family was coded as single-parent if either the mother or the father was recorded as living without a co-resident partner. All other families were coded as non-single-parent, including those reporting co-residence with an adult other than the child's biological parent.

### **Parental education**

Parental education, used in Study 2, comes from the 1960 Census and is coded into four categories: neither parent completed upper-secondary education, one parent completed at least upper-secondary education, both parents completed at least upper-secondary education, and missing information. In the Swedish 1960 context, "upper secondary" refers to *gymnasial utbildning* (high-school level education). The missing category was retained to preserve sample size.

### **Attained education**

Own educational attainment (LISA, 1991) was used in Studies 2 and 3, with study-specific coding. In Study 2, attainment was dichotomised into "at least two years of tertiary education" versus "less than two years" (the latter grouping includes pre-primary, primary, lower/upper secondary, post-secondary non-tertiary, and records with no or unknown education). In Study 3, attainment was grouped into seven categories similar to the ISCED (International Standard Classification of Education) classification (pre-primary, primary, lower secondary, upper secondary, post-secondary non-tertiary, first-stage tertiary, second-stage tertiary), and observations with missing education were excluded.

### **School class**

Classroom fixed effects, used in Study 2, were defined by the classroom identifier assigned in The School Study of 1966 ( $n = 612$  school classes in the final study).

### **Occupational class**

Occupational class, used in Study 3, was measured at baseline using the Swedish Socio-Economic Index (SEI) from the 1990 Census and grouped as low manual, high manual, low non-manual, and high non-manual. Individuals with unknown SEI were retained as a separate category.

## **Sex/Gender<sup>2</sup>**

Sex was included in all analyses, serving as a stratification variable in Studies 1 and 4 and as a covariate in Studies 2 and 3, and was coded as male/female as recorded at birth in the population registers (0 = male; 1 = female).

## **Marital status**

In Study 4, marital status (Total Population Register, 1989, age ~36) was coded as married, not married, divorced, or widowed.

## **Hospitalisation**

Baseline morbidity, used in Study 4, was proxied by any inpatient hospitalisation (due to somatic or psychiatric diagnoses) during 1987–1989, coded as a binary indicator (1 = any admission; 0 = none). Admissions with diagnoses not indicative of illness or disease were excluded; the full list of excluded ICD-9 codes is provided in Table 2. The 1987–1989 window was chosen because the National Patient Register reached full national coverage in 1987 and these years precede the start of adult-income observation (ages 34–36). In supplementary analyses, we alternatively adjusted for any hospitalisation recorded from 1969 through 1989 (earliest available) and, from 1972 through 1989, when most regions began reporting diagnoses.

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<sup>2</sup> When we began this project in 2018, we labelled the variable as sex because it reflected registered sex at birth, not self-identified gender. Over time, we opted to use gender in parts of the text to acknowledge that the differences we study are also shaped by social processes. In this thesis, we therefore use sex/gender to be transparent about the variable's origin (registered sex at birth) while recognising its social meaning in analysis.

Table 2. Reasons for ICD code exclusion from Study 4

| Category   | ICD-9 code(s)   | Notes  |
|--|---|--|
| Pregnancy, child-birth, and the puerperium                         | 630–679   | Maternity-related admissions as baseline morbidity               |
| Factors influencing health status and contact with health services | V00–V69   | Encounter/administrative codes not indicating disease or injury. |
| Additional single codes excluded                                   | 3009, 3748, 4788, 5188, 5308, 5642, 5694, 5698, 5758, 5778, 5938, 5968, 6028, 6078, 6088, 6118, 6208, 6218, 6228, 6594, 6595, 6598, 7360, 7362, 7367, 7368, 7369, 7380, 7383, 7608, 7958, V51 | Non-illness/administrative or ambiguous entries.                 |

## Methods

### Cohort temporary life expectancy

In Study 1, we analysed two birth cohorts (1922–1926 and 1951–1955) using linked register data on income and mortality. Individuals entered the risk set at their 50th birthday, implying left truncation (delayed entry), as survival to age 50 was required for inclusion. We chose age 50 as the starting point because income information for the 1922–1926 cohort first became available in 1970. Follow-up continued from age 50 up to, but not including, age 62. Thus, each individual could contribute up to 12 years of observation, representing the interval [50,62). Follow-up ended at the earliest of death (the event of interest), emigration, or administrative end of follow-up, implying right censoring for those who did not experience the event. For the 1951–1955 cohort, this corresponded to follow-up between 2001–2016, which fully covers the 12-year window for the older birth years and only slightly truncates the youngest (born 1955).

We calculated cohort temporary life expectancy (CTLE) for each cohort, sex, and income quintile group based on observed deaths and person-years of exposure, censoring at migration or administrative end. CTLE, denoted as  $CTLE(\tau) = E[\min(T, \tau)]$ , where  $T$  is survival time and  $\tau$  is a specified time point, represents the average survival time within the age interval  $[0, \tau]$ . Considering censoring, CTLE can be estimated as the area under the survival curve up to  $\tau$ , that is,  $CTLE(\tau) = \int_0^\tau S(t)dt$ , where  $S(t)$  is the survival function (Royston & Parmar, 2013; Uno et al., 2014). In epidemiological research, this

measure is also known as partial life expectancy or restricted mean survival time (RMST).

In this context, CTLE represents the average number of years lived between ages 50 and <62 for the two cohorts. The theoretical maximum CTLE is therefore 12 years, corresponding to complete survival throughout the follow-up.

### Fixed-effects model

In Study 2, we estimated classroom fixed effects models to control for unobserved differences that are constant within classrooms (Angrist & Pischke, 2009; Wooldridge, 2010). The approach compares individuals within the same classroom, removing factors that do not vary among classmates, for example, teacher quality, classroom resources, and local norms. Let  $i$  index individuals and  $c$  classrooms. The estimating equation is

$$Y_{ic} = \alpha_c + \beta X_{ic} + \gamma' Z_{ic} + \varepsilon_{ic}$$

where  $Y_{ic}$  is the outcome for individual  $i$  in class  $c$ ,  $X_{ic}$  is the exposure of interest,  $Z_{ic}$  are observed controls, and  $\alpha_c$  are classroom fixed effects. Identification comes from differences between classmates after conditioning on  $Z_{ic}$  (Wooldridge, 2010).

The fixed-effects specification relies on the following assumptions. First, we assume that classroom-specific unobservables are constant across students and enter additively, so they can be captured by a classroom fixed effect  $\alpha_c$ . Second, conditional on classroom effects and controls, there are no remaining unobserved factors that jointly affect  $X_{ic}$  and  $Z_{ic}$  ( $E[\varepsilon_{ic} \mid \alpha_c, X_{ic}, Z_{ic}] = 0$ ). In our setting, residual confounding by unmeasured characteristics is possible if such characteristics influence both the likelihood of having privileged friends and later outcomes; however, classroom fixed effects and observed covariates reduce this concern. Third, there is no perfect collinearity: variables that do not vary within classrooms are not separately identified from  $\alpha_c$  (Angrist & Pischke, 2009). This condition is met in our analysis because the key exposure and all interaction terms vary within classrooms, and class-constant aggregates were not included.

Standard errors were clustered at the classroom level to allow for arbitrary correlation within classrooms (Wooldridge, 2010). Classroom fixed effects were included as a full set of classroom indicators, and continuous covariates were entered linearly unless stated otherwise. When assessing effect heterogeneity, we included product terms. For modifier  $M_{ic}$ ,

$$Y_{ic} = \alpha_c + \beta_1 X_{ic} + \beta_2 M_{ic} + \beta_3 (X_{ic} \times M_{ic}) + \gamma' Z_{ic} + \varepsilon_{ic}$$

With a linear specification, coefficients are interpreted on the additive scale in the units of  $Y$ . The interaction coefficient  $\beta_3$  captures deviations from additivity, that is, whether the combined effect of  $X_{ic}$  and  $M_{ic}$  (moderator) differs from the sum of their separate effects (Knol & VanderWeele, 2012).

## Cox proportional hazards model

In Study 3, we used Cox proportional hazards models to estimate associations between childhood and adult income, intermediary variables, and mortality. The Cox model belongs to the family of event history analysis, often referred to as survival analysis in biostatistics (Blossfeld et al., 2007). These regressions relate covariates to the timing of an event (death) by modelling its hazard. The hazard can be viewed as the instantaneous event rate at time  $t$ , that is, the limit of the number of events per unit time among those still alive just prior to  $t$ .

Let  $i$  index individuals and  $X_i$  denote time fixed covariates. The hazard at time  $t$  is  $h_i(t | X_i) = h_0(t) \exp(\beta' X_i)$  where  $h_0(t)$  is an unspecified baseline hazard and  $\beta$  are regression coefficients (Cox, 1972). The model is multiplicative on the hazard scale and linear on the log scale,  $\log\left(\frac{h_i(t)}{h_0(t)}\right) = \beta' X_i$  hence,  $\beta_k$  is interpreted as the change in the log relative hazard associated with a one unit increase in covariate  $k$  (Cleves et al., 2004; Kleinbaum & Klein, 2005).

All models included a set of observed individual level controls  $Z_i$ . The final specification added an interaction between the exposure of interest  $X_i$  and a modifier  $M_i$  (to model social mobility). Interactions were modeled as product terms in the Cox specification, which implies effect modification on a multiplicative hazard scale. Equivalently, coefficients are additive on the log relative hazard scale, thus the interaction coefficient represents the log of a ratio of hazard ratios (Cleves et al., 2004). Log relative hazard coefficients  $\beta$  are assumed constant over time, which implies constant hazard ratios. We evaluated this using standard diagnostics, for example, tests and plots based on Schoenfeld residuals, together with visual checks of log cumulative hazards (Kleinbaum & Klein, 2005). Parameters were estimated by partial likelihood, and model-based standard errors were reported. We did not use robust or cluster-robust adjustments, since the analysis focused on individual level covariates. Results are presented as coefficients on the log relative hazard scale  $\beta$  with 95 percent confidence intervals.

## Diagonal reference model

In Study 4, we analysed how income mobility relates to mental health, proxied by psychotropic drug dispensation. In standard regression settings, separating the contributions of social origin and social destination is difficult because the two are highly correlated and mobility indicators are linear combinations of them (see the methodological considerations section). The diagonal reference model, DRM, was developed to address these identification problems by contrasting only the mover and stable groups (Sobel, 1981, 1985). We assume a mobility table (transition matrix) with social origin on rows and social destination on columns. Observations that remain in the same position lie on the

diagonal of this table, while movers occupy the off-diagonal cells. The diagonal cells summarise outcomes in the positions where individuals are socialised and spend substantial time, and they anchor the model (van der Waal et al., 2017).

For each off-diagonal cell  $(i, j)$ , the diagonal reference model defines a reference outcome as a weighted combination of the two relevant diagonal cells: the origin diagonal  $(i, i)$  and the destination diagonal  $(j, j)$ . The diagonal weight  $w \in [0, 1]$  captures the relative salience of origin versus destination. Hence, the diagonal reference for cell  $(i, j)$  is  $w$  times the origin diagonal  $(i, i)$  plus  $(1-w)$  times the destination diagonal  $(j, j)$ ; on the diagonal,  $i=j$ , the model reduces to the diagonal mean.

Let  $Y_{ijk}$  denote a binary outcome for person  $k$  in origin  $i$ , destination  $j$ , and let  $X_{ijk}$  collect covariates. With a linear probability specification,

$$E[Y_{ijk}] = w\mu_{ii} + (1 - w)\mu_{jj} + X'_{ijk}\gamma, \quad 0 \leq w \leq 1$$

where  $\mu_{ii}$  and  $\mu_{jj}$  are the estimated diagonal means in cells  $(i, i)$  and  $(j, j)$ . We operationalised mobility with indicators for upward and downward moves, included in  $X_{ijk}$ , so their coefficients indicate whether off-diagonal cells differ from their diagonal reference, conditional on other covariates. Here,  $w=1$  implies origin only, while  $w=0$  destination only, and  $w=0.5$  equal weighting. Identification follows the standard DRM with an intercept and marginal-weighted centring of diagonal effects (Kaiser, 2018). Since we use linear probability models, coefficients in  $X'_{ijk}\gamma$  are interpreted on the probability scale as percentage-point differences. Given gender differences in psychotropic use and socioeconomic position, models were estimated separately for women and men.

## Ethical considerations

The Stockholm Birth Cohort Multigenerational Study (SBC Multigen) builds on register linkages and the Stockholm Metropolitan Study (SMS). SMS began in 1966 with a school questionnaire administered to all pupils in Stockholm on the day of data collection, followed by guardian interviews in 1968 and a final participant survey in 1985. These surveys were linked to several types of administrative and register data. In the 1970s and 1980s, the newly established Data Inspection Board (*Datainspektionen*) and a wider public debate raised questions about research ethics, legitimacy, and whether participants had been adequately informed about data use over time. The debate unfolded in a new era of evolving norms around personal integrity after Sweden's 1974 data protection law and growing concern about the societal effects of computerisation. Although reviews concluded that participants' personal integrity had not been breached, the entire dataset was anonymised in 1986 and further data collection ceased (Stenberg, 2018).

Since the anonymisation, researchers have obtained ethical approvals to extend and update the material while maintaining anonymity. In 2003, SMS was updated with a pseudonymised, register-based dataset, the Swedish Work and Mortality Dataset, via probability matching (reg. no. 03-629) (fully anonymised in 2017). The Stockholm Regional Ethical Review Board later approved the use of this base to study links between childhood conditions and later-life outcomes (Reg. no. 2011/1907-31/5) (Stenberg et al., 2007). SBC Multigen further extended the material by linking to the multigenerational register RELINK53 up to 2021 through additional probability matching (reg. no. 2017/34-31/5 and 2017/684-32). Studies 2–4 were carried out in line with these specific permissions. The data material can be accessed under strict confidentiality agreements between Stockholm University, Statistics Sweden, and the National Board of Health and Welfare. The linked files are stored at the Department of Public Health Sciences, Stockholm University (Almquist et al., 2020). Because all data are pseudonymised, individual identification is not possible for researchers with access. Since the 1970s, no further ethical objections have been raised regarding the numerous studies conducted with these data. Although early concerns about how well participants were informed were not unfounded, the societal benefits of the research can reasonably be seen to outweigh the societal costs. Today, we maintain robust safeguards, including clear communication where appropriate, data minimisation, controlled access, audit trails, and continuous oversight.

The Central Ethical Review Board provided permission to conduct research on the data material used for Study 1 (Reg. no. Ö 25-2017).

Open science is a core ethical concern alongside participant privacy. The FAIR principles guide efforts to enhance reproducibility (Wilkinson et al., 2016). While sharing data and code is central to reproducibility, our materials cannot be made openly available because of ethical and legal constraints. To balance transparency with confidentiality, we provide detailed metadata, variable lists, and documentation where permissible, and we describe our analytic procedures in full. We also follow the STROBE reporting guidelines to ensure clear, complete reporting and we publish our studies in open-access formats whenever possible (Von Elm et al., 2007).

# Results

## Study 1

Over recent decades, life expectancy has risen, but gains have been socially uneven, with higher-income groups benefiting more than lower ones. In Sweden, the universal welfare state was explicitly designed to promote social equality and equal living conditions, with the expectation that such policies would help narrow long-run disparities. Opportunities also expanded for women, whose labour force participation increased rapidly between the two cohorts. Study 1 explores whether these ambitions are reflected in income-related differences in cohort life expectancy by comparing two nationally defined birth cohorts: individuals born in 1922–1926 before the consolidation of the universal welfare state, and those born in 1951–1955, after its establishment. These cohorts align with the parent generation of our study participants and the study participants themselves, but the analysis uses nationwide register data rather than the SBC sample. We use cohort temporary life expectancy between ages 50 and 61 to highlight cohort-specific mortality patterns shaped by shared social and institutional conditions, rather than period influences that affect all ages at once.

Results showed that, among men, income-related inequalities in life expectancy increased between the two cohorts, largely because life expectancy stagnated below the 25th percentile of the income distribution. Gains rose up to roughly this point and were fairly stable above it. In absolute income terms, the pattern was similar, but a smaller share belonged to the lowest income groups in the 1951–1955 cohort. Among women, an income gradient by individual income emerged only in the later cohort. The increase in life expectancy was smaller for women than for men, although women started from a higher level in 1922–1926 and experienced larger income growth across cohorts. When we considered household income, women also showed a clear income gradient already in the 1922–1926 cohort. Taken together, these findings indicate that while overall longevity improved, the gains were unevenly distributed, suggesting that the expansion of the welfare state did not translate into proportionate improvements among those with the lowest incomes.

In general, these results are in line with previous research on disparate life-expectancy gains, but they extend that line of research with earlier time estimates and estimates that avoid mixing information from different age groups.

## Study 2

Study 2 asks which factors, beyond parental income, enable children to attain higher adult incomes, with special attention to those at the bottom of the income distribution where mobility is most constrained. We consider school friendships as self-acquired social capital and examine whether having at least one classroom friend from a high-income family is associated with higher adult income, net of parental resources. To separate friendship influence from selection into similar peers and shared classroom context, we use individual friendship nominations and estimate within-class models that hold classroom factors constant while adjusting for cognitive ability, social skills, and other background characteristics.

Cohort members whose parents belonged to the highest income quartile were more likely to have at least one privileged friend, indicating that friendship networks were partly socially stratified. Having a privileged friend was strongly associated with higher adult income, and this relationship remained robust after controlling for parental income. Using a step-wise approach, we adjusted for factors that could influence both friendship formation and adult income, including parental education at age 7, family structure at age 11, cognitive ability and social skills at age 13, and attained education at age 38. The association between privileged friendship and adult income persisted even in the fully adjusted model.

Results from an interaction analysis revealed that the positive effect of having a privileged friend was strongest among children from the lowest parental income quartile, suggesting that friendships with higher-income peers may serve as a channel of upward mobility for disadvantaged children. In contrast, friendships with peers from economically disadvantaged backgrounds were not associated with adult income outcomes. Cognitive ability and social skills were also significant predictors of adult income and were more consequential for both income attainment and friendship formation than parental education or single-parent upbringing. Sensitivity analyses showed that the correlation between parental and adult income was weaker for women.

Taken together, these results complement work on parental resources by highlighting the role of peer networks and early competencies in income attainment. By incorporating direct measures of cognitive ability and social skills, which are rarely available, the study clarifies mechanisms of mobility. These findings identify pathways into adult income, the key stratifying resource in Study 1, and a central exposure for the health outcomes examined in Studies 3 and 4.

### Study 3

The research question of the third study was how economic conditions across the life course relate to adult mortality, asking not only whether childhood and adult circumstances matter but also through which intermediate factors they operate. We investigate pathways from childhood economic conditions to all-cause mortality by incorporating personal attributes measured in early adolescence, such as cognitive ability and social skills, and then we account for adult socioeconomic career in terms of educational attainment, occupational class, and income. We also assess whether intergenerational income mobility is associated with mortality through the interaction of parental and adult income tertiles. The analysis uses Cox proportional hazards models with follow-up from 2002 to 2021, entering variables in the temporal order in which they occur to examine attenuation patterns consistent with a life-course pathway model of inequality.

Results showed that parental income was only modestly associated with adult mortality, and this association became non-significant after adjusting for cognitive ability and social skills in adolescence. Both cognitive ability and social skills predicted adult mortality, although the association for cognitive ability was more robust. The reduction in the childhood income–adult mortality association after adjusting for cognitive ability indicated that cognitive ability was related to both, consistent with either confounding or an intermediate pathway. Cognitive ability also remained significantly associated with adult mortality after adding adult socioeconomic factors. The association between cognitive ability and mortality weakened most when adult educational attainment was introduced, and to a lesser extent when adult income was adjusted for, indicating that much of the remaining association was accounted for by education, with an additional contribution from adult income. We did not find an independent association between intergenerational income mobility and adult mortality, but there was a tendency toward a weaker income–mortality gradient among individuals from higher-income families, suggesting some buffering of adult income differences by advantaged childhood origins.

Previous studies have documented links between childhood and adult economic conditions and adult mortality, either independently or jointly, but the role of intermediate factors is less clear. Our findings highlight the importance of cognitive ability in adolescence and educational attainment in adulthood in explaining this association. We did not detect an independent association for intergenerational income mobility, but this null result may reflect a design that is not fully aligned with theoretical expectations about mobility processes. Study 4 therefore refines the investigation with a specification that better captures mobility-related mechanisms.

## Study 4

In the fourth study, we examined whether mental health, proxied by psychotropic drug dispensation measured at ages 52 to 66, is associated with intergenerational income mobility over and above social origin and destination using diagonal reference models. This approach follows theorised stress mechanisms around social mobility and applies statistical methods that separate mobility from origin and destination.

Results showed that psychotropic drug dispensation was most common in the stable low-income group for both women and men. Among women, prevalence was lowest in the stable high-income group, reflecting an income gradient among the non-mobile. The diagonal (non-mobile) estimates for women also showed a clear gradient across models: stable low income was associated with higher-than-average dispensation, while stable high income was associated with lower-than-average dispensation. In unadjusted models, destination appeared more influential than origin. After including mobility, the weights did not differ, indicating no confirmed difference in the relative salience of parental versus adult income among mobile women. Mobility coefficients were not statistically significant.

For men, the lowest prevalence was observed in the upwardly mobile middle-to-high group. In the unadjusted DRM, the diagonal estimates showed a gradient among the non-mobile groups. Adding mobility removed the difference between the middle- and high-income groups, and subsequent adjustment for life-course factors fully attenuated the high-income estimate. In the unadjusted model, destination dominated the weights. After including mobility, origin and destination became similarly important, and in the fully adjusted model, origin was slightly, but not meaningfully, more salient. Net of origin and destination, downward mobility increased the probability of psychotropic drug dispensation, whereas upward mobility decreased it. These effects were modest in magnitude but remained robust across model specifications and sensitivity analyses.

Higher cognitive ability was inversely associated with psychotropic drug dispensation, whereas social skills were not. Being divorced and having a prior hospitalisation increased the likelihood of dispensation for both women and men. Taken together, these findings suggest that intergenerational income mobility is only modestly related to mental health and that its effects are largely confined to men. The results highlight the importance of considering both the direction of mobility and gendered life course processes when assessing how social mobility relates to health.

# Discussion

This thesis investigated how income and income mobility shape health across the life course, with particular attention to the roles of individual characteristics and structural conditions. Four research questions guided the work. Firstly, how income inequalities in life expectancy have evolved across two generations exposed to different welfare state contexts. Secondly, whether parental income and access to socioeconomically advantaged peers influence adult income and mobility. Thirdly, whether childhood economic conditions shape adult mortality directly or through personal characteristics and socioeconomic careers. Relatedly, whether intergenerational income mobility is associated with adult mental health beyond the effects of social origin and destination. Across Studies 2–4, cognitive ability and social skills were considered as potential intermediate factors linking socioeconomic position and health, and results were examined through a gender-sensitive lens whenever possible.

In the sections that follow, I discuss the findings in relation to the research questions, address methodological considerations, assess internal and external validity, and reflect on the implications for public health policy.

## Main findings and interpretation

### Income inequalities in life expectancy across cohorts

While period studies consistently show widening income inequalities in mortality, little is known about whether these trends differ across generations raised under distinct institutional conditions. Study 1 addressed this by comparing two Swedish cohorts born before (1922–1926) and after (1951–1955) the expansion of the welfare state. Despite substantial overall improvements in life expectancy between ages 50 and 61, when avoidable death is dominant, income inequalities widened between the cohorts, consistent with earlier period-based studies (e.g., Hederos et al., 2018; Rehnberg & Fritzell, 2016). Longevity gains were concentrated among higher-income groups, whereas both income levels and temporary life expectancy stagnated among a small group of low-income men. Viewed through a cohort lens, period-based inequality trends appear to hide meaningful generational divergence. In this

sense, the welfare state's equalising ambitions were only partly realised, as longevity improvements accrued disproportionately to higher-income groups.

Several mechanisms may contribute to these widening income gradients and help clarify why inequalities expanded despite favourable macroeconomic conditions. Health selection may have intensified as educational expansion increased social fluidity, making higher socioeconomic positions more selective of good health and personal characteristics and leaving poorer health increasingly concentrated among those at the bottom of the income distribution (Breen & Jonsson, 2007; Mackenbach, 2019). Behavioural changes also became more socially patterned, in that smoking and harmful drinking declined earlier among advantaged groups, while remaining common among disadvantaged men and increasing among later-born women, reinforcing the emerging gradients (Klein, 1993; Östergren et al., 2019). Rising income inequality likely amplified the consequences of relative deprivation, as low-income groups gained less from rising living standards and faced growing material and psychosocial strain (Roine & Waldenström, 2008). Finally, innovation diffusion, whereby new health-promoting behaviours and medical advances are adopted earlier by advantaged groups, may have accelerated survival gains at the top but not at the bottom (Weiss & Eikemo, 2017). Relatedly, harmful innovations and behaviours can also diffuse unevenly, with advantaged groups often earlier to adopt but also earlier to abandon them once risks become known.

Together, these trends suggest not absolute poverty, but a form of relative marginalisation, in which a subgroup of individuals with low income saw limited improvements despite overall societal progress. This interpretation aligns with broader evidence of clustering disadvantage in Sweden during the same period (Jonsson et al., 2016; Rehnberg et al., 2019). Study 1 also provides an important foundation for the analyses that follow. By tracing changes in the association between income and health across these generations, the analysis situates both parents and offspring within a shifting structural context. This perspective is central for interpreting the intergenerational mobility and health outcomes analysed in Studies 2 to 4.

## Friendships and intergenerational income mobility

Parents transmit substantial social and economic resources to their children, producing strong intergenerational persistence at both ends of the income distribution (Jäntti et al., 2006; Sirniö et al., 2013). This raises the question of what resources children can draw on outside the family to improve their long-term socioeconomic prospects. Study 2 examined whether classroom friendships, as a marker of children's self-acquired social capital, contribute to adult income and income mobility. Friendships with classmates from families with higher income were associated with higher adult income, with the strongest effects among children from disadvantaged backgrounds. These associations

remained robust after adjustment for classroom fixed effects and detailed characteristics including parental background and personal attributes. This indicates that the advantages linked to privileged friends cannot be explained by classroom composition or homophily alone.

Although similar patterns have been reported elsewhere, previous studies typically rely on aggregated measures of peer context at the classroom (Essbaumer, 2024), school cohort (Campa, 2024), or area level (Chetty et al., 2022), making it difficult to distinguish contextual effects from individual social ties. By identifying self-reported friendship nominations, Study 2 isolates the contribution of actual ties and demonstrates that the benefits of cross-class friendships can arise at the individual level. Even in the relatively homogeneous, low-segregation schools of 1960s Stockholm, access to privileged peers was socially stratified, underscoring persistent structural barriers to cross-class interaction. Moreover, simply being exposed to privileged classmates was insufficient; it was the expressed ties themselves that mattered.

Education explained part of the association between privileged friends and adult income, suggesting that friendships influence educational trajectories. Yet education did not mediate the entire effect, consistent with the idea that friendships also operate through mechanisms similar to Granovetter's "weak ties", facilitating access to information, opportunities, and networks (Granovetter, 1973, 1983). Evidence from other settings supports this interpretation, showing that friends shape job-search behaviour and occupational choices (Essbaumer, 2024).

Early-life social ties are shown to shape the socioeconomic trajectories that later determine exposure to the forms of relative (dis)advantage documented in Study 1, while the findings also set the stage for Studies 3 and 4, which examine how early-life economic conditions, personal attributes, and inter-generational mobility further shape cohort members' health across adulthood.

## Income, income mobility, and adult health

Studies 1 and 2 highlighted how socioeconomic inequalities emerge and persist across generations, and how early social ties can influence movement within the income distribution. Building on this foundation, Study 3 turns to the health consequences of these socioeconomic trajectories by examining whether early-life economic conditions have lasting implications for survival, and the extent to which these associations operate through personal attributes and adult socioeconomic attainment.

Childhood economic conditions showed a modest association with adult mortality that was substantially attenuated after adjusting for personal attributes and adult socioeconomic career. This is in line with the pathway model of social inequality in health, where early socioeconomic position shapes health mainly through its influence on education and labour market opportu-

nities (Marmot et al., 2001). Adult income was strongly associated with mortality between ages 48 and 68, but this association reflects both causal and reverse causal processes and should be interpreted as an indicator of cumulative life-course processes rather than a simple exposure. Study 3 did not find clear evidence that intergenerational income mobility was independently associated with mortality, although downwardly mobile individuals appeared to have somewhat lower risk than those who remained in low income across childhood and adulthood, consistent with previous work showing intermediate outcomes among the downwardly mobile.

Study 4 extended the analysis of mobility by applying the Diagonal Reference Model and focusing on a mental health outcome more sensitive to psychosocial processes. Psychotropic drug dispensation, used as an indicator of a broad range of mental health complaints, is well suited to capture stress-related mechanisms theorised to arise from social mobility. These include changes in self-esteem, perceived control, and feelings of failure or dislocation when leaving a familiar social environment and entering a new one. Such mechanisms are less likely to manifest in mortality outcomes but more readily reflected in patterns of psychotropic medication use. Accordingly, intergenerational mobility was found to be associated with psychotropic drug dispensation among men, with upward mobility linked to lower and downward mobility to higher use. This pattern is consistent with “rising from rags” and “falling from grace” hypotheses (Gugushvili, Zhao, et al., 2019; Newman, 1999). Mobility showed no independent association with women’s psychotropic drug use, a finding that will be discussed further below.

The contrast between Study 3 and Study 4 suggests that differences in both health outcomes and analytical approaches contribute to the distinct patterns observed. Mortality reflects long-term structural and biological processes, whereas mental health outcomes are more sensitive to psychosocial mechanisms such as stress, perceived control, and status loss or gain, even when these mechanisms have accumulated over earlier stages of the life course. The strong influence of adult income on mortality may also dominate subtler effects of origin or mobility, consistent with Study 1’s findings of stagnation at the lower end of the income distribution in this cohort. Finally, mechanisms identified in Study 2, such as access to privileged friends facilitating upward mobility, may help explain why upward mobility was associated with more favourable mental health profiles, reflecting both the material benefits of improved socioeconomic position and the supportive social ties that enabled it.

## Personal attributes, income mobility, and health

Personal attributes such as cognitive ability and social skills have long been recognised as relevant for understanding both socioeconomic attainment and health. Because these characteristics reflect a combination of inherited and

environmental influences, they may shape how early-life conditions are translated into later-life outcomes.

Across Studies 2–4, personal attributes emerged as important factors shaping both socioeconomic trajectories and adult health. In Study 2, we adjusted for parental background and personal characteristics to account for homophily, i.e., the tendency for individuals to form relationships with similar others (McPherson et al., 2001). Adjusting for parental socioeconomic background only modestly attenuated the association between having a privileged friend and adult income, whereas adjusting for personal attributes, particularly cognitive ability, led to a more substantial reduction. This pattern suggests that value homophily played a more prominent role than status homophily in friendship formation within this comparatively egalitarian cohort.

In Study 3, cognitive ability and social skills were both independently associated with adult mortality, consistent with theories of health inequalities that emphasise the role of socially patterned personal attributes in shaping long-term health (Deary et al., 2010; Mackenbach, 2019). However, only cognitive ability attenuated the modest association between childhood income and mortality, indicating that it served as an intermediary in the pathway linking early socioeconomic conditions to adult health. The attenuation patterns provide further insight into these processes: when educational attainment and adult income were added to the models, the coefficients for cognitive ability were reduced substantially, whereas those for social skills changed little. This suggests that cognitive ability was more strongly linked to the socioeconomic trajectories that shape adult mortality, a pattern consistent with Swedish research showing that cognitive skills are more closely tied to wage levels, while socio-emotional skills are more strongly associated with employment stability (Lindqvist & Vestman, 2011). Study 4 showed a similar pattern for mental health: cognitive ability was significantly associated with psychotropic drug dispensation, whereas social skills were not, reinforcing the overall finding across Studies 2–4 that cognitive ability played a more consistent role than social skills in shaping adult socioeconomic position and health. At the same time, the studies were not designed to isolate the full causal contributions of these attributes, and more refined modelling could further clarify their respective roles.

In sum, across Studies 2–4, personal attributes contributed to adult socioeconomic trajectories and health through partly distinct mechanisms. Cognitive ability was particularly important for educational attainment and adult income, thereby linking childhood economic conditions to adult mortality and mental health, whereas social skills influenced income and mortality through channels less directly tied to socioeconomic achievement.

## Gendered pathways between income and health

Changes in social roles, labour-market conditions, and health behaviours during the period in which this cohort grew up and aged motivated the use of sex-stratified analyses where meaningful. In Study 1, the income–life expectancy gradient differed markedly between earlier- and later-born women. Among the 1953 cohort, gradients by individual income were clearly visible, whereas in the earlier cohort women’s life expectancy was more closely associated with household income. This shift likely reflects broader social changes: as women’s labour-market participation expanded, individual income increasingly captured their own economic resources. At the same time, gendered patterns of health behaviours evolved. Smoking, historically concentrated among men, diffused later among women, with smoking-attributable mortality peaking decades later for women than for men (Janssen et al., 2021; Klein, 1993). Women in this cohort may also have been more exposed to occupational hazards and to health-related selection into the labour market than their predecessors (Clougherty et al., 2010).

Study 2 provides additional indications of gendered socioeconomic pathways. Descriptive correlations, and interaction analysis between childhood family income and gender revealed that parental and own income were more strongly linked among men than among women, aligning with existing evidence of gender differences in intergenerational income transmission (Chadwick & Solon, 2002)<sup>3</sup>. Study 4 showed that while women displayed a clear income gradient in psychotropic drug dispensation among those with stable income histories, intergenerational mobility did not add explanatory value for this proxy of mental health, whereas for men, both upward and downward mobility did. One plausible explanation lies in the cohort’s position at the early stages of Sweden’s transition from a male-breadwinner to a dual-earner model. As Study 1 indicated, women’s individual incomes increasingly reflected their own labour-market participation, and similar trends have been documented for later cohorts (Ahrsjö et al., 2025). Yet women’s adult socioeconomic position still appeared more strongly shaped by family roles, relational circumstances, and life-course events, which may explain why mobility itself held limited relevance for their mental health, while factors such as divorce and hospitalisation were more predictive. For men, by contrast, the previously mentioned psychosocial expectations of the era, emphasising economic achievement, personal effort, and upward mobility (Stenberg, 2018), may have heightened the significance of intergenerational movement, making mobility more salient for their mental health than for women’s.

Overall, income mattered for health among both men and women, but the pathways through which income and mobility operated were gendered. These

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<sup>3</sup> Calculations were conducted for the Introductory chapter of the dissertation and not shown in table.

differences reflect the cohort's historical context and highlight the importance of gendered life course analyses.

## Methodological considerations

### Internal and external validity

The observational nature of the empirical studies limits the scope for causal inference. Although rich longitudinal register data and extensive covariate adjustment strengthen internal validity, income, mobility, and health influence one another through dynamic and potentially bidirectional mechanisms that cannot be fully disentangled. In Study 1, the aim was explicitly descriptive, and no causal interpretation is intended.

In Study 2, the design allows us to approach a causal interpretation more closely than in the other studies. Friendship ties were measured prospectively during childhood, before adult socioeconomic outcomes unfolded, reducing the risk of reverse causation. The analysis adjusted for a broad set of parental resources and individual characteristics, and classroom fixed effects accounted for shared school environments. Nevertheless, some residual confounding may remain, such as unmeasured individual traits or time-varying family circumstances.

In Studies 3 and 4, causal inference is more constrained. Adult income may be both a determinant and a consequence of health, and social mobility, as discussed earlier, cannot be conceptualised as a conventional treatment because of the identification problem. For these reasons, the associations observed should be interpreted descriptively.

Including cognitive ability and social skills allowed us to provide a more nuanced picture of the pathways linking childhood conditions, income, and health. Yet these measures do not separate health selection from causal processes. Adjusting for them may control for part of the pathway through which childhood conditions operate, while also capturing inherited advantages or disadvantages. Consequently, they help describe associations but cannot identify the underlying mechanisms with causal precision.

Social skills were operationalised using incoming classroom friendship nominations, often interpreted as a measure of “peer status.” In Study 2, outward friendship nominations were also used to capture access to socioeconomically privileged peers. While related, these measures reflect distinct phenomena: incoming nominations capture being chosen by peers regardless of their family income, whereas outgoing nominations reflect choosing socioeconomically advantaged friends based on their family income. Collinearity tests confirmed that the two variables were not statistically redundant.

This thesis is based exclusively on Swedish data, nationwide in Study 1 and from the Stockholm Birth Cohort Multigenerational Study in Studies 2–4, which inherently limits external validity. The SBC Multigen cohort grew up during a period of strong welfare-state expansion, economic growth, and comparatively low inequality. Swedish society at the time was also considerably more homogeneous than today. Because the welfare state in this period explicitly assumed responsibilities previously borne by families, parental income may have mattered less for children’s life chances than in later cohorts (Palme, 2006). These conditions offered greater opportunities for social mobility and may have reduced the impact of childhood economic disadvantage. In Study 3, parental-income associations may therefore represent lower-bound estimates. Since the 1980s, aspects of the Swedish welfare state have been retrenched, weakening its equalising capacity (Alm et al., 2020; Bergh, 2011). Furthermore, the ethos of the era emphasised knowledge and academic performance (Stenberg, 2018), a context in which the strong role of cognitive ability observed in this thesis may have been particularly consequential for long-term socioeconomic careers and adult mortality.

Study 2 may be particularly context-specific, not only because of the factors mentioned above, but also due to the low level of school segregation in 1960s Stockholm. Moreover, Stockholm cohorts typically show slightly higher educational attainment and labour-market success than the national average. Nonetheless, recent studies from Denmark (Campa, 2024) and the United States (Chetty et al., 2022) document similar associations between cross-class friendships and socioeconomic outcomes, suggesting broader applicability of the mechanisms observed. In Study 4, mobility associations emerged among men but not among women, a pattern that may reflect the cohort’s position in the early transition from a male-breadwinner to a dual-earner society and its ethos emphasising personal effort and knowledge (Stanfors, 2014; Stenberg, 2018).

## Measurement of childhood family income and adult income

There are multiple ways to measure and operationalise income using administrative data, each requiring a set of methodological decisions with associated strengths and limitations. These choices may influence both the magnitude of estimated associations and their interpretation. In this section, I describe and motivate the key decisions underlying the measurement of income in this thesis.

Childhood family income was observed in only two calendar years (1963 and 1970), which can bias associations toward the null. Single-year income measures contain substantial transitory variation, and using only two observations increases the risk of attenuation bias (Björklund & Jäntti, 2009). Averaging multiple years would have reduced this bias even further (Mazumder, 2005; Solon, 1992). In Study 1, using the same register year (1970) produced

robust income–health associations, and intergenerational estimates in Study 2 were only somewhat smaller than national benchmarks (Heidrich, 2017). These patterns suggest that despite limitations, our parental income measure performs reasonably well for both descriptive and analytical purposes.

A second consideration concerns how parental ranks were constructed. We rank parents relative to other parents of children in the same cohort and income years, capturing parents at different points of their earnings trajectories. While this might complicate the comparison of family social status, it provides an approximation of the resources available during specific childhood stages. An alternative is to rank parents within their own birth cohorts to approximate longer-term socioeconomic standing. Previous studies show that mobility estimates are highly robust to these different ranking choices (Chetty et al., 2014; Heidrich, 2017). Given our limited coverage of parental income years and our conceptual focus on childhood resources, we apply the former approach consistently across Studies 2–4.

We rely on rank-based income measures because they offer several advantages over intergenerational elasticities: the parent–child rank relationship is near-linear; ranks accommodate zero and very low incomes; and rank-based mobility is less sensitive to measurement error, reporting differences, and cross-cohort changes in inequality (Chetty et al., 2014). This robustness is particularly important in Sweden, where income inequality has increased in recent decades (OECD, 2017; Roine & Waldenström, 2008). Rank-based methods also avoid excluding individuals with zero income, who are central to questions of equality of opportunity. In Study 3, however, adult income was log-transformed, reflecting the well-established non-linear association between income and mortality. Log income provides a better approximation of the diminishing marginal health returns to income. Parental income, by contrast, remained rank-scaled to capture children’s relative socioeconomic position.

Finally, we measured parental income as the combined income of both parents, and own adult income as individual labour income. Heidrich (2017) demonstrates that Swedish mobility estimates are stable across parental income definitions and argues that individual own adult income is preferable to household income because household measures conflate personal earnings with those of a partner, an issue particularly salient in dual-earner contexts. This distinction is also important for health analyses: household income may obscure individual economic vulnerability, as having a high-earning partner does not necessarily imply personal economic security. Chetty et al. (2014) similarly show that using family rather than individual income inflates mobility estimates, especially for women, highlighting the value of our chosen specification.

## Modelling intergenerational income mobility

Measuring intergenerational income mobility similarly requires a series of methodological decisions, each involving trade-offs. In Studies 2–4, intergenerational mobility is measured as changes in individuals’ relative income positions compared with their parents’. This provides an objective measure of mobility, capturing movements in observable socioeconomic resources and positions within the income distribution (Chetty et al., 2014; Jäntti & Jenkins, 2015). However, it does not capture how people perceive their own mobility. Although subjective mobility is an important dimension of social experience, we focus on objective mobility, which aligns with prevailing empirical approaches and most directly reflects structural opportunities.

Attempts to estimate mobility “effects” face a fundamental conceptual limitation: within a counterfactual framework, mobility cannot be varied independently of origin and destination. Because mobility is defined by the change between the two, it is impossible to hold origin and destination constant while altering mobility (Holland, 1986; Sobel, 1981, 1985). Mobility is therefore not an exposure in the conventional causal sense. Despite this limitation, the long-standing interest in social mobility supports continued individual-level analyses, provided their interpretational boundaries are acknowledged.

A further challenge is the statistical dependence between origin, destination, and mobility. Destination is partly shaped by origin, and mobility is mathematically derived from both. This interdependence complicates attempts to isolate a mobility effect and has motivated several modelling strategies. One approach uses “difference measures,” classifying individuals as upwardly mobile, downwardly mobile, or stable. Such models are easy to interpret but cannot fully separate mobility from origin and destination, since mobile individuals contribute to the estimation of both. As Billingsley et al. (2016) note, these approaches offer descriptive contrasts but do not identify mobility net of status differences. A second family of models, including interaction specifications and variants such as the square-additive (Duncan, 1966) and diamond models (Hope, 1975), avoids perfect multicollinearity by treating each origin–destination combination as its own category. Yet each parameter blends origin, destination, and mobility components. Luo’s (2022) recently proposed mobility-contrast method formalises these comparisons but similarly cannot isolate a general mobility effect independent of status.

As outlined in the Methods section, Sobel’s (1981, 1985) diagonal reference model (DRM) addresses many of these statistical problems by estimating origin and destination effects solely among the non-mobile and treating these as reference points. Mobility is then defined as deviation from this diagonal expectation, avoiding the confounding inherent in difference and interaction models. However, the DRM does not resolve the fundamental identification problem (Zang et al., 2023). Moreover, because the diagonal groups absorb most systematic variation, mobility parameters rely on residual deviations and

may therefore be attenuated (Fosse & Pfeffer, 2019). Under certain data-generating conditions, especially when mobility is patterned in ways the diagonal structure cannot accommodate, the DRM may also overstate mobility effects (Luo, 2022). Thus, while theoretically appealing, DRM estimates require cautious interpretation.

The empirical results in this thesis illustrate the importance of modelling choices. Study 4 identifies mobility associations under the DRM, whereas Study 3, applying an interaction approach, finds none. This is expected: the models capture different contrasts. The interaction model in Study 3 examines whether the association between parental and adult income varies across the income distribution, while the DRM in Study 4 identifies whether mobile individuals deviate from the outcomes of the non-mobile. Stratified analyses in Study 4 also diverge from the DRM because they describe gradients within origin–destination groups rather than isolating mobility itself. In addition, the outcomes reflect different life-course processes and psychosocial mechanisms linked to mobility. Taken together, the findings show that mobility associations depend on modelling strategy and outcome and should be interpreted as complementary rather than contradictory.

A final consideration concerns how income distributions were constructed in Study 4. The main analyses used sex-specific income ranks, which is reasonable given gender-patterned income trajectories and health processes. However, this implicitly assumes that equivalent rank positions reflect comparable material and psychosocial experiences for men and women, which may not fully hold. To assess this, a pooled income distribution was constructed. As expected, women were overrepresented in the lower income groups (women comprised 67% of the low, 63% of the middle, and 27% of the high income tertiles)<sup>4</sup>. Mobility estimates in this pooled sample were not statistically significant, and stratifying the pooled sample by gender yielded patterns similar to the sex-specific analyses: no mobility associations among women and expected upward/downward gradients among men. This suggests that the main findings in Study 4 are not driven by the choice of rank construction.

## Implications and future research

The studies in this thesis demonstrate several mechanisms through which childhood economic conditions shape later-life socioeconomic position and health. Taken together, the findings highlight resource accumulation, social networks, and personal characteristics as key pathways through which inequalities develop across the life course.

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<sup>4</sup> Calculations were conducted for the Introductory chapter of the dissertation and not shown in table.

Study 1 showed that even under the favourable institutional conditions of mid-century Sweden, life expectancy stagnated among individuals in the lowest income groups, despite major gains for the rest of the population. This suggests that universal welfare provision alone may not fully mitigate the health consequences of economic disadvantage. In today's more unequal context, the risks associated with persistent low income may be even greater. Policies targeted specifically at the lowest-income groups, rather than assuming universal systems will lift all boats, remain crucial.

Evidence from Study 2 shows that cross-class friendships can facilitate upward mobility for children from disadvantaged backgrounds, which has clear implications for education and housing policy. Policies that promote socioeconomic mixing, through comprehensive school structures, mixed catchment areas, and classroom practices that reduce clustering, may help counteract rising segregation. Recent work further demonstrates that cross-class friendships are more likely to form when children from different socioeconomic backgrounds are in closer physical proximity (Gitmez & Zárate, 2021). Together, these findings suggest that enabling everyday interaction across class lines can meaningfully expand opportunities for disadvantaged children. Beyond social networks, the results also underscore the importance of cognitive ability and social skills. These characteristics strongly predict friendship formation, adult income, and later health. Because cognitive and non-cognitive skills are shaped by both genetic and environmental factors, and are partly structured by parental resources, schools may play an important compensatory role. Policies that foster early cognitive development and socio-emotional learning, particularly for children facing economic hardship, may reduce long-term inequalities in income and health.

Study 4 suggests that intergenerational mobility is associated with mental health risks among men, particularly those experiencing downward mobility. Although women did not show similar patterns in this cohort, mobility-related stress may be more gender-balanced in younger generations as economic roles converge. These findings imply that labour-market services, social insurance agencies, and mental-health providers should pay attention to the psychological strain associated with declining socioeconomic position, especially in periods of job loss, unemployment, or downward mobility.

Across studies, the findings point to processes that are likely to operate differently in today's social and institutional landscape. Since the 1980s, income inequality has widened and key elements of the Swedish welfare state have been scaled back, altering both the resources available to families and the context in which mobility and health trajectories unfold. Replicating these studies in more recent cohorts would help to assess whether parental income has become a stronger determinant of adult health, whether mobility carries different psychological implications, and whether cross-class friendships continue to promote upward mobility under contemporary conditions.

In relation to Study 1, examining additional Swedish birth cohorts would provide a fuller picture of changes in income-related disparities in life expectancy. A cross-national comparison would also be informative. Finland, for example, expanded key components of its welfare state later and more gradually than Sweden (Kangas & Palme, 2005), offering a useful contrast for understanding how institutional development shapes socioeconomic gradients in mortality. Extending the analysis to cause-specific mortality would further clarify which health conditions contribute most to stagnating life expectancy among low-income groups.

Further research should also deepen understanding of the mechanisms identified in Study 2 by examining what aspects of cross-class friendships matter, such as role modelling, shared activities, or later job-search support. Richer longitudinal data, particularly with more parental income observations, would make it possible to formally assess how cognitive ability, social skills, and other childhood characteristics mediate associations between parental income and adult health, and whether these pathways differ by cohort or gender. Finally, the findings from Study 4 point toward several promising directions. Investigating physiological stress markers, allostatic load, and broader mental health outcomes would help identify mechanisms underlying the associations observed among downwardly mobile men. Parallel research on perceived mobility and subjective status could clarify how psychological interpretations of mobility align with objective mobility measures and identify potential mechanisms through which mobility shapes health.

To summarise, these avenues of inquiry would extend the contributions of this thesis by clarifying how early-life socioeconomic conditions, social relationships, and mobility processes shape health and opportunity across changing welfare-state contexts.

# Conclusion

This thesis examined how income and income mobility shape health across the life course and across generations in Sweden. Using longitudinal register data and the Stockholm Birth Cohort, it analysed income-related inequalities in life expectancy, the role of childhood social relations in shaping adult income, and the pathways linking childhood economic conditions, income mobility, and adult mortality and mental health. By integrating life course, mobility, and social-determinants perspectives, the thesis aimed to clarify how socioeconomic advantage and disadvantage are produced, transmitted, and embodied in health over time.

Across the four studies, income emerged as a central axis of health inequality, even in a welfare state often regarded as a model of social equality. Life expectancy gains were unevenly distributed across income groups and cohorts, with stagnation among those at the bottom of the income distribution despite overall improvements. Childhood economic disadvantage was associated with poorer adult health, but largely through indirect pathways involving cognitive ability and educational achievement rather than strong direct effects. These patterns underscore the importance of a life course perspective, showing that early conditions matter not because they fix outcomes, but because they shape subsequent opportunities and constraints.

The thesis also highlights the role of social relationships and mobility in structuring life chances. Friendship relations in school, particularly with children from privileged families, were associated with higher adult income and greater upward mobility, especially among children from disadvantaged backgrounds. At the same time, access to such relationships was socially stratified, indicating that opportunities for mobility are themselves unequally distributed. Intergenerational income mobility showed limited association with mortality, but modest links with mental health, suggesting that mobility processes are more readily reflected in outcomes sensitive to psychosocial stress than in long-term survival. Gendered patterns ran through the findings. Income gradients in health differed between men and women and changed across cohorts, reflecting shifts in labour-market participation and family roles. Mobility was associated with mental health among men but not among women, pointing to gendered meanings of economic success and failure in the historical context studied.

The contribution of this thesis lies in bringing together income, social relationships, mobility, and personal attributes within a single analytical framework. In doing so, it highlights both the achievements and the limitations of the Swedish welfare state: while absolute deprivation has been substantially reduced, relative inequalities remain embedded in social structures and continue to shape who lives longer, healthier lives. Addressing health inequalities therefore requires not only redistributive policies, but also sustained attention to the social, relational, and developmental processes through which advantage and disadvantage are reproduced across the life course.

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